Section 4.5
Cultural Resources

ESA

Note to file: Cultural resources references for the Lakeview Substation EIR.

- The following references are confidential and cannot be publically released. The references are available on file for qualified individuals at the Eastern Information Center, Dept. of Anthropology, University of California Riverside, Riverside, CA 92521-0418, and at ESA, 626 Wilshire Blvd, Suite 1100, Los Angeles, CA 90017.

  Cotterman, Gary D., and Roger D. Mason, 2010. Cultural Resources Inventory and Evaluation for the Proposed Lakeview Substation, Source Lines, and Telecom Fiber Optic Cable Route, Lakeview Vicinity, Riverside County, California. Prepared by ECORP Consulting, Inc., for Southern California Edison, June 2010.

- The following references are available at the Los Angeles Public Library, 630 W. 5th Street, Los Angeles, CA 90071

  Chartkoff, Joseph L., and Kerry Kona Chartkoff, The Archaeology of California, Stanford University Press, Stanford, California, 1984.

  Call number: 970.4 C153Ch

VOLUME 8

California

ROBERT F. HEIZER
Volume Editor



SMITHSONIAN INSTITUTION
WASHINGTON
1978

Cahuilla

LOWELL JOHN BEAN

Language and Environment

Cahuilla (kəˈwēyu) is the name given to a group of south-central California Indians. The term is of uncertain origin but may be from their own word *káwiya* 'master, boss' (Kroeber 1925:693; Hansjakob Seiler, personal communication 1974). Their language belongs to the Cupan subgroup of the Takic family of the Uto-Aztecan stock; among the four Cupan languages, Cahuilla is more similar to Cupeño than it is to Luiseño (Bright and Hill 1967; Bright 1975).*

The Cahuilla area was topographically complex: mountain ranges interspersed by passes, canyons, valleys, and desert, with elevations from 11,000 feet in the San Bernardino Mountains to 273 feet below sea level at the Salton Sink. The Cahuilla occupied most of the area, from the summit of the San Bernardino Mountains in the north to Borrego Springs and the Chocolate Mountains in the south, a portion of the Colorado Desert west of Orocopia Mountain to the east, and the San Jacinto Plain near Riverside and the eastern slopes of Palomar Mountain to the west (fig. 1).

Valleys, passes, and foothills blended into the mountain ranges with the lower desert areas. Alluvial fans led into canyons averaging 4 to 16 miles in length and several miles in width; these in turn led into mountain valleys flanked by high scarps. Consequently, separate and distinct environmental zones were formed, each with its characteristic life-zones (table 1): Lower Sonoran, Upper Sonoran, Transition, and Canadian-Hudsonian (Hall and Grinnell 1919; Grinnell and Swarth 1913).

Seasonal extremes of temperature, precipitation, and wind patterns caused dramatic differences in the relative abundance of flora and fauna from place to place and time to time. Dry winds affected food potential and increased the incendiary potential of the plant cover, while high velocity winds accompanied by sandstorms were common (Ryan 1968).

During some years abundant water was available, while in other years serious drought conditions prevailed, inhibiting plant growth and causing decreases in the faunal population. Permanent springs and tinajas were common; lakes appeared occasionally; and rivers, streams, springs, sloughs, and marshy areas were subject to considerable variation in water potential throughout the year. Periodic desert lakes extended to 60 miles in length and were formed by melting snows, torrential rains, and overflows from the Colorado River. When the water table was low deep, walk-in wells were dug in the sand (A.S. Evans 1889; Ryan 1968; Shepard 1965; Lawton and Bean 1968; Nordland 1968; Bean 1972).

Territory

The Cahuilla area, located near the geographic center of southern California, was bisected by a major trade route, the Cocopa-Maricopa Trail, and was at the periphery of two others, the ones labeled Santa Fe and Yuman. Natural boundaries such as the Colorado Desert separated the Cahuilla from the Mohave, Halchidoma, Ipai and Tipai; the mountains, hills, and plains separated them from the Luiseño, Serrano, and Gabrielino.

These peoples interacted regularly by intermarriage, trade, ritual, and war. The Cahuilla shared a common tradition with the Gabrielino and other nearby Takic speakers, such as the Serrano and Luiseño. Of these, the Gabrielino and Serrano were most intensively involved with the Cahuilla (Bean 1972:69; Kroeber 1925: 578–580).

Villages

Villages were usually situated in canyons or on alluvial fans near adequate sources of water and food materials, where a degree of natural defense was afforded from strong prevailing winds.

The area immediately surrounding the village was owned in common by the lineage, while other lands were divided into tracts owned by clans, families, and individuals. Networks of trails used for hunting, trading, and social visiting interconnected villages. Numerous sacred sites marked off by petroglyphs and pictographs were associated with each lineage village.

Movement out of permanent villages was for specific purposes such as hunting, gathering, trade, ritual, or

* Modern linguists have used several equivalent phonemic orthographies for Cahuilla. Those described by Bright (1965a) and in more detail by Seiler (1957) are readily converted to Handbook standards by the following substitutions (Bright's symbol is given first, then Seiler's, and finally the Handbook equivalent): qw, kʷ, *kʷ*; xw, xʷ, *xʷ*; ly, ĺ, *l̓*; ñ, ñ, *n̓*. Bright and Seiler show vowel length with a double letter, while a raised dot is used here. Italicized Cahuilla words in the Handbook are written in this orthography, after respellings provided by Hansjakob Seiler.

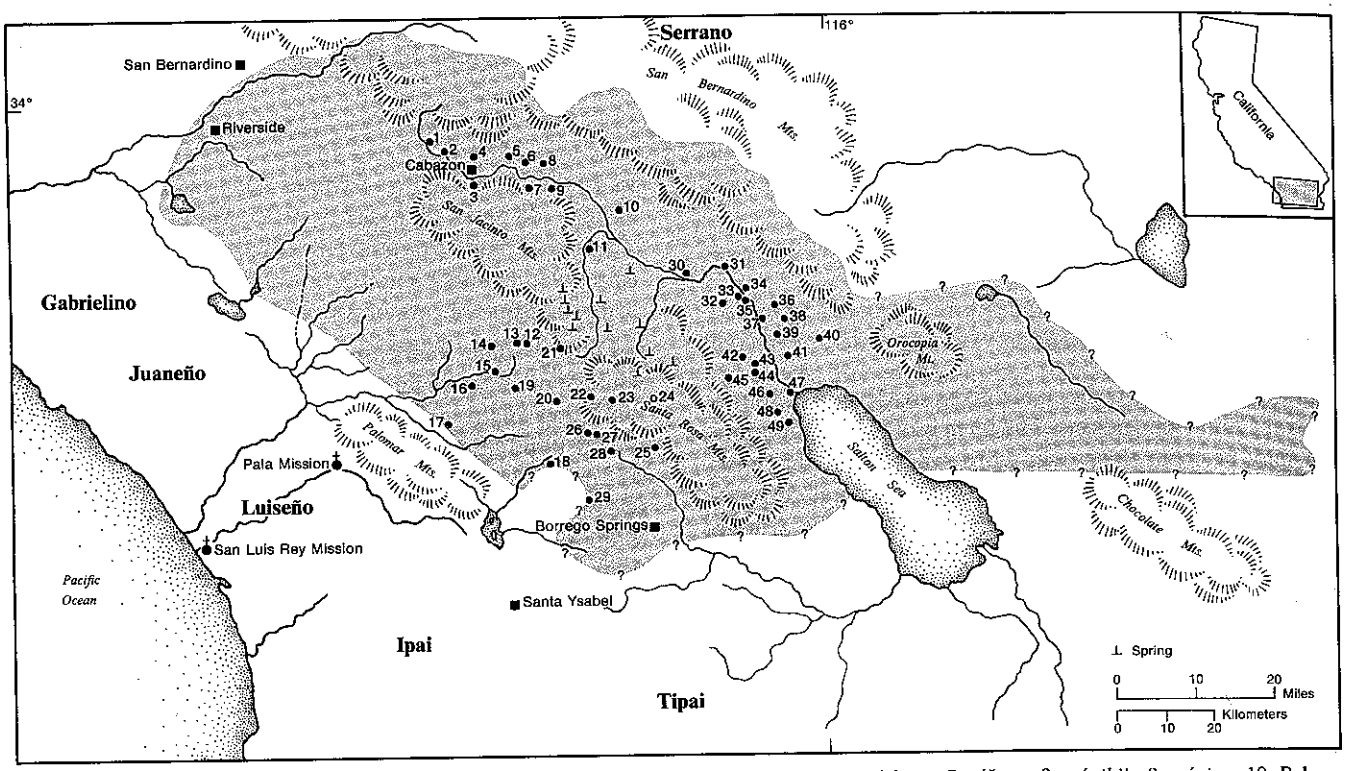
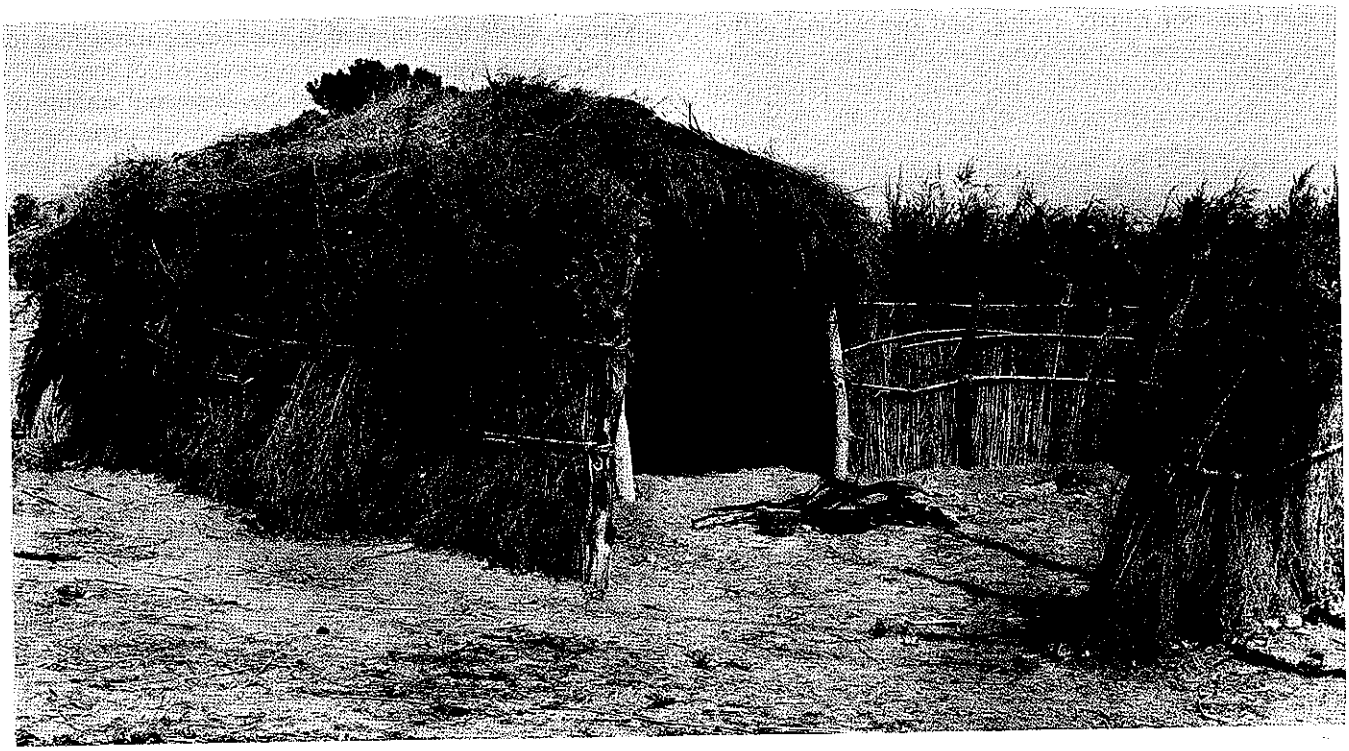


Fig. 1. Tribal territory and villages. 1, *aýkat;* 2, *písataŋa;* 3, *húvana;* 4, *wáqsiš;* 5, *pálakna;* 6, *hévina;* 7, *téčaŋa;* 8, *wánikik;* 9, *wáqina;* 10, Palm Springs; 11, *pánik;* 12, *páwata;* 13, Pastawha; 14, *sáwvelpa;* 15, *páwi;* 16, *wíyasmal;* 17, *áwaŋa;* 18, *číya;* 19, *máwet síwpa;* 20, *páwki;* 21, *pál písa;* 22, Natcūta; 23, *síwiw;* 24, Old Santa Rosa Indian Ruins; 25, Ataki, 26, *tépaŋha;* 27, Wilīya, *sáwivel* (or *sáw?vel*); 28, *sáwiš;* 29, *páčawal;* 30, *kávinič;* 31, *pál téwat;* 32, *ilv čúŋhaluŋi;* 33, *pál sétaxat;* 34, *pál sétamal;* 35, Coachella; 36, *pál áyil;* 37, Thermal; 38, *áwal páčava;* 39, *túvakiktem hémki?;* 40, *máyswat héla·nat;* 41, *pál múluqalet;* 42, *máwl mí?i;* 43, *témal síkalet;* 44, *pál hílviwet;* 45, *púičekiva;* 46, Alamo; *pál púni;* 48, Agua Dulce; 49, *túva, ú·lišpači.*

Table 1. Environment

Zone	*Altitude*	*Significant Habitats*	*Plant Foods*	*Animal Foods*	*Percent of Tribal Area*	*Percent of Diet Acquired in Zone*
Lower Sonoran	−200 to 3,500 feet	Sand dune–creosote, creosote-palo verde, cholla-palo verde, rocky slopes, agave-ocotillo	Cacti, palm, mesquite, agave, Mohave yucca, screwbean, catsclaw, Mariposa lily, desert lily, ephedra, corn, beans, squash, melons	Deer, rabbit, antelope, mice, rats, mountain sheep, reptiles, insects, larvae, fish, quail, doves, ducks, roadrunners	60	25
Upper Sonoran	3,500 to 6,300 feet	Piñon-juniper, chaparral	Cacti, agave, mushroom nolina, yucca, piñon, oak, juniper, manzanita, sugar bush, tule, various grass seeds, chia, cattails, wild onion, wild rose	Deer, mountain sheep, rabbits, rats, mice, reptiles, insects and larvae, fish, quail, dove, roadrunners	28	60
Transition	6,300 to 9,000 feet	Coniferous forests, meadows	Oak, elderberry, service berry, manzanita, wild cherry, yucca, tule, various grass seeds, chia, cattail	Mountain sheep, deer, pack rats, squirrels, mice, chipmunks, fish	7	15
Canadian-Hudsonian	9,000 to 10,000+ feet	Alpine	Few	Deer, mountain sheep, rabbits, squirrels, mice, some reptiles	5	less than 1

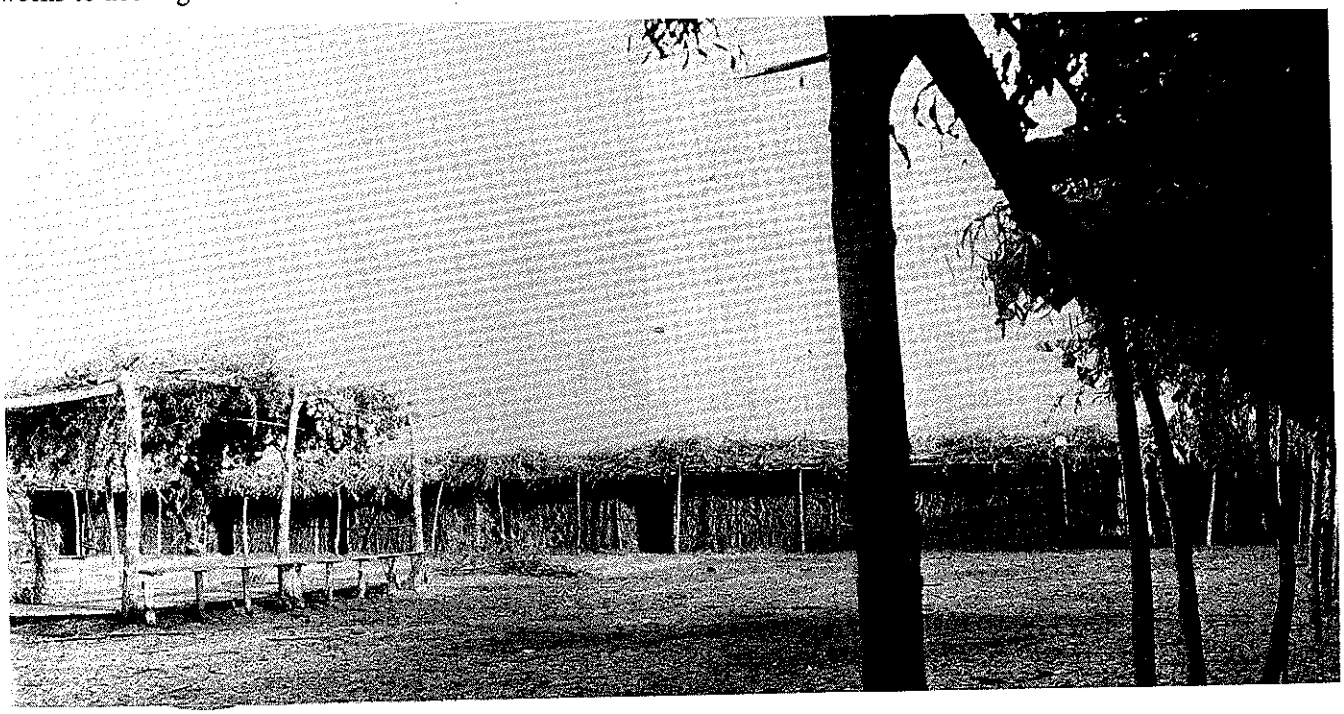
Source: Bean 1977



Dept. of Anthr. Lib., Smithsonian.
Fig. 2. Dome-shaped brush house in the desert. Photograph by Edward S. Curtis in 1924 or before.

social visiting. Houses and other structures in a village were situated to take advantage of water sources and ensure privacy. The largest number of people left for the greatest amount of time during the acorn-collecting season, when most village members moved for several weeks to acorn groves.

Buildings varied in size from brush shelters to dome-shaped or rectangular houses (fig. 2), 15-20 feet long depending on the individual family's needs, and ceremonial houses (fig. 3). The home of the *nét* 'chief', usually the largest, served many purposes. It was located near a good water source and usually built alongside the ceremonial



Lowie Mus., U. of Calif., Berkeley.
Fig. 3. Rectangular ceremonial house on Soboba Reservation. Photograph by C. Hart Merriam, Oct. 1901.

house (used for rituals, curing, and recreational activities). A communal men's sweathouse and several granaries were also located within the village, clustered around the ceremonial house or homes (Bean 1972:70–75; Strong 1929; H.C. James 1960; Barrows 1900; Kroeber 1925).

Culture

Subsistence

Hunting was the occupation of adult able-bodied men who stalked their prey, chased it, hid in blinds, maneuvered the animals into striking range of their arrows, chased them down trails into pits, or exhausted them so they could be clubbed to death. Rabbits and other small game were shot with bow and arrow; stunned or killed with throwing sticks; captured in nets, snares, and traps; or acquired by firing bush clumps (Bean 1972:64).

Butchering and skinning was done by men, cooking by women. Meat was roasted, boiled, or cut into strips and sun-dried. Bones were cracked to extract marrow or crushed and ground into a powder and mixed with other foods. Blood was either drunk fresh or cooked and stored in a leather pouch or sections of gut (Bean 1972).

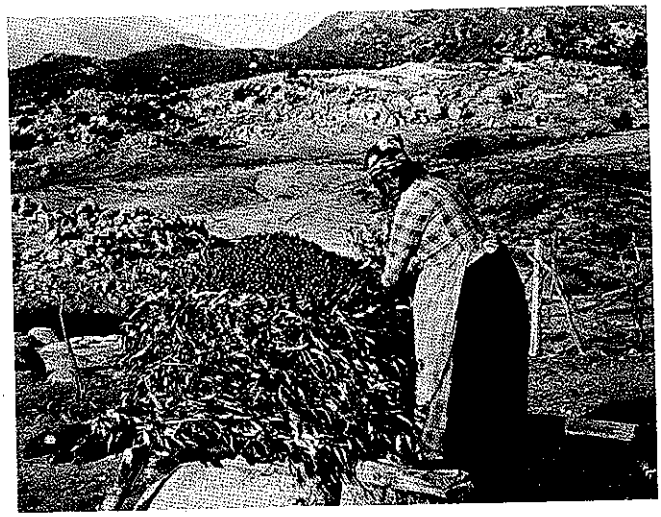
Diversity of habitat produced a floral domain of immense variety consisting of several thousand species of which the Cahuilla remember using several hundred for food, manufacture, or medicine (Bean and Saubel 1972). The most important were: acorns (six varieties of oak), mesquite and screw beans, piñon nuts, and the fleshy bulbs of various types of cacti. These were supplemented with a variety of seeds, wild fruits and berries, tubers, roots, and succulent greens (Bean 1972).

Proto-agricultural techniques and a marginal agriculture existed among the Cahuilla. Corn, beans, squashes, and melons of the types used by the neighboring Colorado River tribes were the most commonly raised (Lawton and Bean 1968).

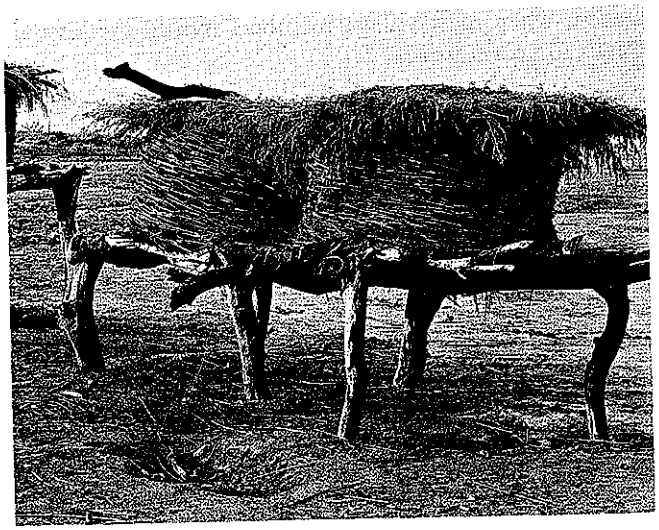
Other plants provided construction materials for houses, while over 200 plants were used to cure diseases, decrease infections, and stimulate physical activities (e.g., tobacco and datura) (Bean and Saubel 1972).

Grinding acorns and dried berries was done in stone mortars with stone pestles; stone manos were rolled on stone metates to grind hard seeds as well as soft foods like piñon nuts; and wooden mortars were used to pulverize soft, fibrous foods like honey mesquite. Flourlike materials were then sifted in baskets to segregate the larger particles from the flour, and the larger particles were reground. This was usually the duty of women. Parching, performed in a basket or pottery tray, preceded grinding. Leaching acorn meal, which was essential, was done in baskets or sand basins. Yucca, agave, and tule-potatoes were baked in stoned-lined ovens or pits. Sun-drying allowed for preservation of fruits, blossoms, and buds. Various foods were cooked in baskets, or sometimes in pottery, with liquid.

Preservation was facilitated by hermetic sealing of perishable foods with pine pitch. Large granaries were used for storing enormous quantities of food, such as acorns (figs. 4–5); and ollas were used to store seeds. In times of famine natural caches, the food stores of rodents and birds, were raided for food (Bean 1972).



Title Insurance and Trust Company, Los Angeles.
Fig. 4. Woman filling a granary with acorns. Photograph possibly by C.C. Pierce, about 1900.



Title Insurance and Trust Company, Los Angeles.
Fig. 5. Large granary for storing mesquite beans at Torres-Martinez Reservation. Photograph by C.C. Pierce, 1903.

Technology

Baskets were made of a grass (*Epicampes rigens*) for the warp, a reed grass (*Juncus robustus* or *Rhus trilobata*) for the weft, and either elder or suede species for black dye. Yellow, red, brown, and greenish colors were obtained from different portions of juncus.

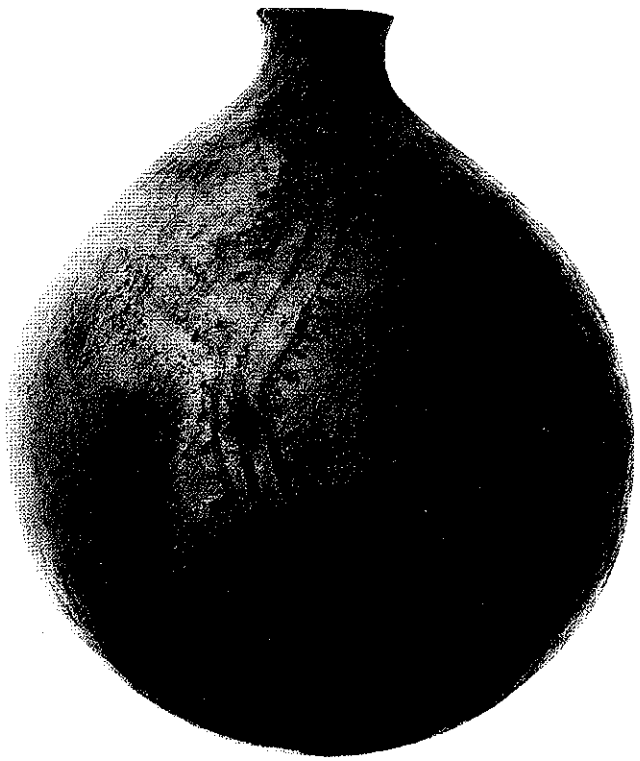
Coiled wares were of four types: flat baskets for plates or trays for winnowing; shallow baskets—receptacles for food or for parching corn or seeds; deep baskets, large and shaped like inverted cones used for carrying along with a net; and globular, flat-bottomed baskets used to keep small utensils and trinkets. Cosmologically significant beings (*núkatem*) such as eagle, lightning, and stars were the most commonly used motifs in basket design (Bean 1972; Kroeber 1925).

Cahuilla pottery was often painted and incised. It was a light, thin, brittle red ware made by coiling narrow cylinders of ropes of clay. This was then patted between a smooth, rounded stone and a wooden paddle. Five principal forms of pottery existed: small-mouthed jars (fig. 6), cooking pots, open bowls, dishes, and pipes (Kroeber 1908b).

Stone implements (besides the mortars, pestles, and metates) included the arrow straightener, fashioned from soapstone and incised with linear designs having magical connotations and indicating ownership (Kroeber 1908b).

Bows of willow or mesquite were narrow, thick, and strung with a mescal fiber or sinew. Arrows varied in shape, size, and design, depending upon the use to which they were put (Kroeber 1908b).

Ceremonial implements included charmstones, bullroarers, clappers, rattles, feathered headdresses and wands, and eagle-feathered skirts worn by ritualists (fig. 7). The principal ceremonial object was the *máyswut* (or *máyswat*), which was brought out of the ocean by Coyote. Known as "heart of the house," the *máyswut* was passed from clan leader to his successor in the paternal line (Bean 1972; Bean and Saubel 1972).



Dept. of Anthr., Smithsonian: 21779.
Fig. 6. Earthenware jar with painted design in yellow ocher. Diameter 32.0 cm, collected in 1876.

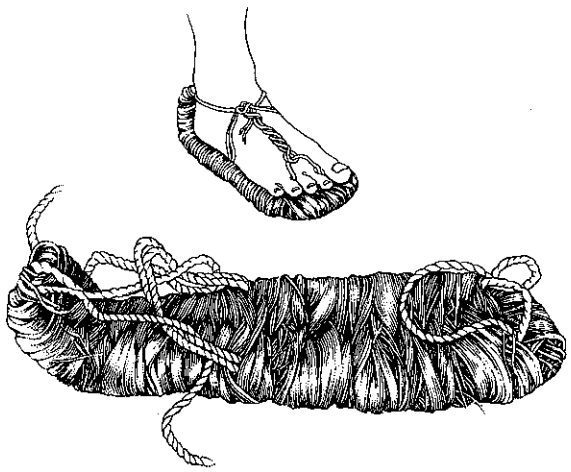


Malki Mus., Banning, Calif.
Fig. 7. Sylvestro Saubel dressed as an Eagle Dancer. He is wearing a skirt and cape of eagle feathers and is holding what appear to be ceremonial wands. Photographed before 1905.

Clothing included sandals, made of mescal fibers soaked in mud to whiten them and held to the foot with strips of the same fibers or buckskin (fig. 8). Mescal and yucca fibers were used to make rope and cordage. Women wore skirts made from mesquite bark, skins, and tules. Mesquite bark was also used as diapers for babies. Men usually wore a loincloth and hide shoes or sandals (fig. 9). Warmth was provided by blankets or rabbitskin strips woven together (Kroeber 1908b).

Games and Music

Games had an important place in Cahuilla society, men's involving very strenuous physical activity where endurance and ability to withstand physical punishment were



Dept. of Anthr., Smithsonian: 219341.
Fig. 8. Sandal made of a fiber cord foundation, toe and heel loop, and woven bunches of yucca fibers. Worn only on rough or thorny ground. Extended length 33.0 cm, collected in 1875.

basic to the winning of the game. Moiety played against moiety, lineage against lineage, and individual against individual, with wagers placed on the outcome of many games. Men engaged in foot races, demonstrated their skill with the bow and arrow, and played the guessing game *taxnénŋilv* 'hiding each other' (called *peón* by the Spanish). Women favored foot races, juggling, guessing games, cat's cradle, top spinning, jackstones, and balancing objects.

Music pervaded all activities. Tribal cosmology and history were recorded in songs, and songs accompanied games, secular dances, shamanic activities, and hunting and food-gathering activities. Musical instruments included the flute (made of elder); whistles; pan-pipes; flageolets (made of bone); and rattles of turtle shells, deer hoofs, split sticks, seashells, gourds, and dried cocoons. Most musical expression was vocal (Bean 1972).

Hygiene and Diseases

Bodily cleanliness was emphasized; regular bathing and sweating were routinized (Strong 1929:138). There was concern for the proper cleaning of cooking utensils, mortars, manos, baskets, and ollas, because the presence of foreign particles on any of this equipment was considered a great disgrace.

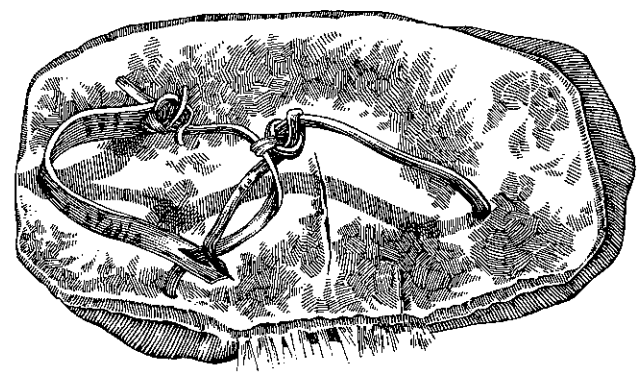
Diseases frequently mentioned are bronchial infections, gastrointestinal disorders, tuberculosis, hepatitis, infections in wounds and sores, blood poisoning, rheumatism, and arthritis. Trichinae and tularemia may also have caused health problems because of ingestion of poorly cooked meats or by handling game that had been infected. Infanticide was condemned among the Cahuilla, but private and individually determined cases of infanticide by suffocation are recalled (Bean 1972:81).

Social and Political Organization

The Cahuilla, a nonpolitical, cultural nationality speaking a common language, recognized two nonterritorial, nonpolitical patrimoieties, *túktem* (Wildcats) and *ʔístam* (Coyotes) (adapted from Kroeber 1962). The Cahuilla were organized into political-ritual-corporate units (clans) composed of 3–10 lineages, dialectically different, named, claiming a common genitor, with one lineage recognized as the founding one. Each lineage within the clan cooperated in defense, in large communal subsistence activities, and in performing rituals. Founding lineages often owned the office of ceremonial leader, the ceremonial house, and a ceremonial bundle (*máyswut*), while other ceremonial offices were distributed throughout the lineages. Although each lineage owned a village site and specific resource areas, most of the clan territory was open to all Cahuillas (Bean 1972:85–86).

The office of lineage leader (*nét*) was usually inherited from father to eldest son and wherever possible kept within a direct line of descent. The *nét* was responsible for the correct maintenance of rituals, care of the ceremonial bundle, and upkeep of the ceremonial house (*kíš ʔámnawet* 'big house'). He was an economic executive, determining where and when people gathered foods or hunted game, administering first-fruit rites, and storing collecting goods for community use (ceremonial, subsistence, or exchange to other groups). He knew boundaries and ownership rights and adjudicated conflict with binding decisions. His sanctioning authority was the *máyswut,* the symbolic representation of the lineage and the link between the sacred past and the present. He met with the *nét*s from other lineages concerning land use, boundary disputes, marriage arrangements, trade, warfare, and ceremonial decisions.

The *nét* was assisted in his ceremonial, administrative, and adjudicative functions by the *páxaʔ*. This office tended to be hereditary, the *páxaʔ* arranging the details for proper order and performance of many rituals and seeking out and punishing anyone who transgressed ritual rules. He told ceremonialists when to perform, contacted the people who were to contribute food, instructed them in what to bring, and saw to it that



Dept. of Anthr., Smithsonian: 207604.
Fig. 9. Rawhide sandal with a double sole. Length 26.5 cm, collected in 1900.

protocol was maintained in the proper distribution of food and gifts during ceremonies.

A *háwaynik* or *háwawaynik* 'ceremonial talker, singer' was a songleader and ceremonialist who possessed and sang ceremonial songs used at rites of passage and intensification. Song cycles were long and complex, some requiring several days to perform. The *háwaynik* trained assistant singers and dancers so mythical events could be enacted.

Among the most revered and simultaneously feared members of the community were the *púvulam* 'shamans' (singular *pú·l*). These individuals, always male, through the manipulation of supernaturally acquired power cured illness (naturally or supernaturally caused), divined, controlled natural phenomena such as rain, created food, witched, acted as guardians during ceremonies (keeping away ghosts, malevolent spirits, evil beings or evil power), and in conjunction with the *nét* and *páxa?* exercised political authority over the community at large. Especially powerful shamans, called *pá?vu?ul,* were able to transform themselves into animals, and unlike the *púvulam,* could kill a person instantly through supernatural means. However, a shaman's status was secure only through reaffirmation of his power through public and private demonstrations of abilities (fig. 10).

Shamans formed an elite group in society, acting together along with the *nét* and *páxa?* as leaders who expressed opinions and made decisions, especially in times of disasters and epidemics. The *nét* and *púvulam,* controlling the political structure by weaving it into a tightly interacting group, thereby increased their power over the community. Thus, an association of *púvulam* cut across clan and lineage boundaries to form an interclan, intertribal association of power-oriented persons.

A diviner (*tét?ayawiš* or *tét?ayawniš* 'dreamer') foretold future events, found lost objects, located trespassers on clan or lineage property, and located game animals and new food sources.

Persons who secretly possessed supernatural power were called nenananiš. They had no formal position in the social hierarchy. Many women are said to have possessed supernatural powers and to have used them to effect magical control over others or predict future events.

The *tíŋ?ayvaš* or *tíŋ?aywet* 'doctor', in sharp contrast to the other statuses in Cahuilla society, was not necessarily connected with supernatural power. Most were women who learned their medical lore from some other *tíŋ?ayvaš* or shaman. As they learned through experience and became known and trusted in the community, they were employed in their profession. A *tíŋ?ayvaš* was middle-aged or older and possessed great knowledge concerning medicinal herbs and the specifics for various conditions or ailments, such as childbirth, wounds, broken bones, or intestinal discomfort.



Malki Mus., Banning, Calif.

Fig. 10. Salvador Lopez, a shaman, at the dedication ceremony of the Malki Museum. He was the last of the fire eaters and is shown here with hot coals of mesquite in his mouth. Photograph by Bill Jennings, Feb. 1965.

• MARRIAGE AND KINSHIP Spouses, selected by parents from members of the opposite moiety, were from families unrelated within five generations. An ideal husband was responsible to his kin obligations, skilled, and diligent in economic pursuit or religious acumen. Young girls were expected to be hard working, get along well with their in-laws, produce food efficiently, and bear male children. Upon marriages the husband's family presented gifts of food and goods to the wife's kin group, and she was brought to the house of the boy's parents and taught wifely duties by her mother-in-law. When a child was born, a long-range economic and social alliance between two families was established, characterized by frequent reciprocal exchange of gifts of food and treasure goods. Most marriages occurred between Cahuillas but some crossed cultural boundaries, for example, Luiseño, Chemehuevi, and Gabrielino.

Divorces were difficult unless a wife was sterile, incorrigibly nonproductive, or lazy. A spouse's death did not destroy the partnership between families, since sororate and levirate rules were often activated.

Kin relationships, memorized by everyone while young, were based on criteria of age, sex, lineality, affinity, sex of speaker, sex of connecting relative, and perhaps locality. The system, Dakota with Iroquois terminology and bifurcate merging of parents and their siblings, was particularistic with a minimum amount of merging (Bean 1972:93; Kroeber 1908b; Tax 1955).

Formal joking relationships existed between kin in the form of verbal jokes, horseplay, and ribald references. These correlated closely with the principles of kin determination and basic Cahuilla values, as age, generation, and lineality determined the nature of the relationships.

Familiar kin terms (equivalent to daddy and mom) were also used. These were limited to collateral, affinal, or female lineal relatives, thus often people who lived outside ego's village.

Proper social and economic role distinctions were clearly reflected in the Cahuilla kinship system, which extended beyond the nuclear family to embrace relatives five generations removed from ego. Further extensions were accomplished affinally. Corporate assets, rights, and responsibilities within the lineage were determined by the rules of kinship (Gifford 1918).

Emergency conditions such as widowhood and orphanhood with their economic consequences were taken into account within the system. Older brother's social role was that of surrogate father to his younger brothers. Differentiation of age and directness operated to insure the equitable and clearly defined distribution of corporate goods and regulated decision-making powers within the lineage (Bean 1972).

• LAW AND PROPERTY Cahuilla law, embodied in oral literature, provided Cahuilla administrators with precedent and authority for proper behavior and punishment. Laws were reinforced through ritual, story, anecdote, and action. Supernaturally imposed automatic retribution was expected when actions went against tradition, but more direct sanctions ranged from individual ridicule to public execution.

Ownership of the territorial units was established by boundaries marked by petroglyphs, stones, or geographic features and by oral traditions, which set the precise boundaries. Clan territory was jointly owned by all members. Each lineage owned particular sections of land (village sites, food-gathering and hunting areas, areas of raw materials), traditional stories, songs, and anecdotes. Subsistence and ritual equipment were also owned by individuals and could be sold or loaned (Strong 1929).

War and Trade

Disputes were usually over economic resources because of poaching or trespassing or because a lineage failed to fulfill its responsibilities in the reciprocal ritual system. Sorcery against another lineage, personal insults, kidnapping of women, nonpayment of bride price, and theft were other reasons for going to war, but armed conflict was attempted only when all other efforts failed. The *nét* or a skillful warrior served as a temporary war party, and a community ritual was performed before and after conflict. Combat usually involved ambush, and weapons used were war clubs and bows and arrows with poisoned arrowheads (Bean 1972).

Trade, between individuals and groups, occurred frequently with some Cahuillas specializing as traders, visiting as far west as Santa Catalina and east to the Gila River to get goods. Gabrielino traded steatite, asphaltum, and shell beads for food products, furs, hides, obsidian, and salt. Rituals and songs were also exchanged. Tourmaline was acquired from the Luiseño and Joshua tree blossoms from the Serrano of the Mojave Desert. Colorado River people exchanged agricultural products (corn, melons, squash, gourds), turquoise, and grooved axes. Craftsmen exchanged their wares—such as baskets, pottery, bows and arrows, and eagle-feathered skirts—for service and goods. Shell beads provided a general medium of exchange (Service 1966).

Cosmology

Cahuilla cosmology recognized *?íva?al,* a power or energy source, as the creative force of a systematic but potentially unstable and unpredictable universe. Although *?íva?al* was neither good nor bad, it was quixotic and therefore made all things subject to unpredictable change. Because of the unpredictable nature of *?íva?al,* the all-pervasive and intense feeling of apprehension of the Cahuilla toward the present and future was a realistic orientation to an environment full of real and continual changes.

The presence of power explained all unusual talents or unusual events and differences in cultural attainment, and all phenomena that contained *?íva?al* were capable of negative and positive actions. Individuals were prepared to deal with contrasting qualities in all phenomena, and since man was an intregal part of nature and the universe was an interacting system, an ecological ethic existed that assumed any action affected all other parts of the system (Bean 1972).

A number of beings inhabited the universe and some were active in Cahuilla affairs as symbols reminding the people of the "early times," while others were associated with the control of *?íva?al* (e.g., *tákuš, kutyáy?al*). The *téwlavelem,* or soul spirits, existed in the body of the living and had a separate existence after an individual's death. Then they went to the land of the dead (*télmekiš*), east of Cahuilla territory, where all *téwlavelem* and those *núkatem* lived (first people created) who no longer dwelt on earth. Most *téwlavelem* reached *télmekiš* after arduous ritual on both the part of the living and themselves. Messages were passed from *télmekiš* to the living, so the *téwlavelem* were directly involved in Cahuilla social life—advising, sanctioning, and aiding those still on earth (Bean 1972).

Cahuilla values were clearly related to basic environmental and economic circumstances. Tradition was authority, and the past was the referent for the present and future. Correct behavior and access to power were correlates of one another, and innovative actions were seen as potentially dangerous. Oral literature was quoted to assess the value or appropriateness of taking action in crisis situations.

Old age was a criterion for privilege, power, and honor. The Creator Gods struggled to establish who was the older. *múkat,* the successful one, demonstrated that older people were more cautious, precise, and orderly and had more creative power than did the younger people. Elders functioned as repositories of knowledge and lore that fostered adaptation to a diverse and sometimes harsh environment. The aged taught the values and skills necessary for successful adult life and for survival of the young. Older women made baskets and rabbitskin blankets and nets, ground seeds, and performed other time-consuming tasks. They taught young girls the techniques and values of womanhood. The older men manufactured arrowheads, bows, rabbit sticks, and hunting nets. They taught boys the traditional values of the society as well as the intricacies of hunting techniques, which fostered the maximum learning for successful adulthood.

Reciprocity was a pervasive value. A well-balanced and rigidly enforced system of reciprocal relations operated at every level of society as well as throughout the universe. Each Cahuilla was taught and encouraged to share possessions, food, and capital equipment. It was proper to give and receive, neither action requiring much formal recognition. Failure to reciprocate was a serious breach of behavioral norms, one punished by public sanctions and ridicule. Accompanying reciprocity were fairness and equality. Lineages and clans reciprocated in collecting privileges by invitations to collect and hunt in one another's areas when surpluses were apparent.

Doing things slowly, in an orderly procedure, deliberately, and thinking about all the ramifications of one's actions were stressed to every Cahuilla. Haste and misplaced sympathy resulted in inappropriate actions in the realities of the world. Rituals were required in the attempt to control and eliminate error anticipated in an unpredictable world.

Integrity and dependability in personal relations were sought constantly and were evident in the manner in which Cahuillas presented information to one another. Actions were expected to be as explicit and direct as possible in order to reduce misunderstandings while simultaneously being correct.

That secrecy and caution in dealing with knowledge was always necessary is repeatedly reflected in Cahuilla oral literature and everyday life. The judicious use of knowledge brought praises and reward; failure generated severe punishment.

Ritual

Ritual was a constant factor in the life of every Cahuilla—always directly ahead or immediately finished. Some rituals were scheduled and routine, while others were of a sporadic and situational nature. Strong (1929) and Bean (1972) have described most Cahuilla rituals in detail. Of the 10 or more types of ritual, the most significant were the *núkil* (annual mourning ceremony), eagle ceremony, certain rites of passage (the most important being birth, naming, adolescent initiation, marriage), public performances announcing status changes of adults (e.g., when a new *nét* assumed office), and rituals aimed at improving subsistence resources. The central focus of most of these rituals was the performance of cosmologically oriented song cycles that placed the universe in perspective and reaffirmed the relationship of the Cahuilla (both the individual and the collective) to the sacred past, to the present, to one another, and to all things.

History

It is likely that the Cahuilla were both aware of and affected by European institutions well before the Spanish first passed through their area in 1774, the Juan Bautista de Anza expedition. That first contact found them hostile to Europeans. Subsequently, Europeans used sea routes to populate California, because the Quechan Indians closed the land route in 1781. The Cahuilla consequently had little direct contact with Europeans except for those baptized at missions in San Gabriel, San Luis Rey, and San Diego and thus integrated into the mission system. In 1819 several *asistencias* were established near the Cahuilla area (San Bernadino, Santa Ysabel, Pala); and Cahuillas became partially involved with the Spanish and adopted some Spanish cultural forms—cattle, agriculture, operations, trade, wage labor, clothing, language, and religion (Beattie and Beattie 1939).

A conservative estimate of the aboriginal Cahuilla population is 3,600 (Hicks 1931). Bean (1972) has suggested that the population may have been as high as 6,000 to 10,000 (table 2) based on an estimate of 80 lineages. Government census figures of Indian villages in the 1850s in which several villages were said to have numbered from 150 to 300 persons (Harvey 1968:190) support this estimate. The larger number seems possible when more lacustrine conditions prevailed.

European diseases probably affected Cahuillas even before contact. Settlement patterns were only slightly changed as Cahuilla lands were used for cattle grazing. Some Cahuillas worked seasonally for the Spaniards and would return to their villages. By the time of the American invasion of California, the Cahuilla still maintained their political and economic autonomy. A principal function of leaders at the time was to articulate the Cahuilla peoples to Europeans, as it had been in the past

Table 2. Population Estimates 1770–1970

Year	*Population*	*Source*
1770	6,000	Bean 1972
	2,500	Kroeber 1925
1860	3,238	County of Los Angeles Census 1860
1863	(Smallpox epidemic)	
1865	1,181	Harvey 1968:193
1883	1,036	Harvey 1968:193
1888	463 (Cahuilla, Los Coyotes, Morongo, and Agua Caliente only)	Harvey 1968:193
1891	1,156	Harvey 1968:193
1892	1,262	Shipek 1971
1955	535	H.C. James 1960
1970	1,629	U.S. Bureau of the Census 1971

with other Indians. When the Americans came to California they were involved with conflicting strategies but maintained their political and economic autonomy. Leaders like Juan Antonio and Cabeson represented them in treaty negotiations in 1851 and acted as liaison between their culture and Americans in legal, economic, and political affairs. The grestest blow to Cahuilla culture and society came in 1863 when a smallpox epidemic killed a large number. From that time on the Cahuillas were in a more dependent and defenseless condition vis-a-vis Americans, who were coming in increasing numbers to their area (Beattie and Beattie 1939; Phillips 1971).

From that time until reservations were established in 1877 and until federal supervision became close and intensive in 1891, the Cahuillas remained for the most part on their own lands, making a living in combination with aboriginal techniques, wage labor, and the like. After 1891 their economic, political, and social life was closely supervised by the federal government. Government schools were opened in which young Cahuillas were trained in rather menial roles, Protestant missionaries became influential, and much traditional Cahuilla life was altered. Cahuilla cultural institutions were generally suppressed, particularly religious and political ones. Despite this, Cahuillas were successful in maintaining a diversified economic strategy until the allotment programs divided lands into such small parcels that agricultural development was difficult (Bean 1972).

From this time until the 1930s, the Cahuilla were variously supported from their reservation land bases—subsistence farming, cattle, leasing lands—and wage labor, Indian Service employment, and the like. The reservation political organization was closely controlled by Indian Service personnel residing on the reservation. This supervision was constantly protested by reservation peoples as well as formal protest organizations that cross-cut reservations, like the Mission Indian Federation. The Indian Reorganization Act resulted in increased political autonomy. The Second World War affected labor patterns; and immediately following, partial termination of federal supervision for California Indians forced Cahuillas to become more involved in health, education, welfare, and economic development from local to federal levels. Reservation governments (elected councils) had to rely less upon Bureau of Indian Affairs gratuities and services (Bean 1972).

In the 1960s new opportunities from federal resources became available. Various programs financed by the Office of Economic Opportunity and other agencies significantly changed conditions of health, education, and welfare for Cahuillas.

There were approximately 900 people claiming Cahuilla descent in 1974; most of these were enrolled on one of several reservations (table 3; "History of Southern California Mission Indians," fig. 1) organized as political and corporate units administered by elected business committees in conjunction with the Bureau of Indian Affairs. They also have committees that aid in the day-to-day administration and provide advice and consent capacities to the group (Bean 1972).

Each reservation interlocks with a network of other reservations in temporary and permanent associates. Consequently, some belong to county-wide, state-wide, and national Indian organizations like those for Mission Indians (see "Luiseño", this vol.).

Occupational specialization among the Cahuilla includes independent businesses, such as cattle raising and farming, as well as secretarial, civil-service, construction, teaching, public-health, blue-collar, and social-work positions. Generally, Cahuillas in the 1970s acquired income from a variety of sources, private lands, and businesses, as well as tribal enterprises when it is feasible. The economic situation appears to be rather poor, but the diversified way in which Cahuillas acquire income may obscure the actual nature of economic income.

The economic situation of the Cahuilla is complicated by the nature of land ownership and location in areas far from markets, water, service roads, and job opportunity. However, economic development plans have been instituted on most reservations. For example, Los Coyotes Reservation has opened a campground facility, and others have written economic development programs (Bean 1977).

Religious affiliations are mixed; most Cahuillas are practicing Catholics, but some are Protestants. Some reservations are still served by the Verona Fathers from Santa Ysabel Mission; others, by priests in local commu-

Table 3. Population and Land Status

Reservation	Tribal composition	1970 population[b] total/reservation	1975 Land area (acres)[c] total	allotted	Economic resources
Agua Caliente, 1891[a]	Cahuilla	164/164	25,899		real estate
Augustine, 1891	Cahuilla-Chemehuevi	2/0	(616)[d] 342	150	agriculture
Cabazon, 1876	Cahuilla	22/6	(2,160)[d] 1,153	548	agriculture
Cahuilla, 1875	Cahuilla	89/23	18,272		agriculture, recreation, real estate
Los Coyotes, 1889	Cupeño-Cahuilla	106/42	25,050		timber, recreation, real estate
Morongo, 1876	Serrano-Cahuilla-Cupeño	652/242	(32,254)[d] 30,957	1,286	agriculture, cattle, recreation
Ramona, 1891	Cahuilla	2/0	560		cattle grazing
Santa Rosa, 1891	Cahuilla	61/7	11,093		recreation, cattle grazing
Soboba, 1883	Cahuilla	314/178	5,036		recreation
Torres-Martinez, 1876	Cahuilla-Chemehuevi	217/42	(31,696)[d] 18,223	6,881	recreation

[a] Date of executive order establishing reservation.
[b] U.S. Bureau of the Census 1971.
[c] U.S. Bureau of Indian Affairs, Southern California Agency 1975. Figures rounded to nearest acre.
[d] Amount of land originally set aside. Theoretically, nonallotted reservations have not lost any land. To determine approximate amount of land alienated from allotted reservations, subtract 1975 total from figure in parentheses.

nities. Cahuilla traditional religions are dominant in funeral ceremonies.

Educational opportunities have increased in recent years, and the level of achievement has advanced rapidly. More Cahuillas are graduating from high school, and many are in college programs, both academic and trade oriented. Adult education programs enjoy vigorous participation.

Residence varies from reservation to reservation. Most Cahuillas live off the reservation, because of water conditions, job opportunities, and the like; but most express a desire to live and occupy the reservations, which are the principal land and identity base for all generations. Settlement patterns on reservations are dispersed. Cahuilla society is extending its identity to a general pan-Indian order while maintaining a sense of ethnic identity that is still Cahuilla (fig. 11). Cahuillas are becoming more organizationally adept in Indian and non-Indian political and economic strategies, transferring traditional organizational principles very frequently to new conditions (Bean 1977). This is especially so in the relationship with state and federal bureaus that are involved with the Cahuillas in addition to the Bureau of Indian Affairs (Bean 1972).

Important institutions have been developed to supplant and serve needs that others have not served adequately. The Malki Museum, Morongo Indian Health Clinic, and Torres-Martinez Historical Society are examples.

Although somewhat modified, many traditional values continue in the 1970s to operate in economic, political, and social affairs, though institutions for enforcing them are not conspicuous. Traditional foods are sometimes used, especially at ritual or social events, like fiestas. Kin relationships, especially in the extended family, remain important, and among a few families kin terminology and attendant role behavior is still used. Traditional concern for individualistic ownership of productive goods remains an important value, as does reciprocity.

In religious affairs funeral ceremonies and memorial services for the dead, directly related to the *núkil* ceremonies (Bean 1972), are practiced. Only two reservations still maintain ceremonial structures, while at other reservations any available structure is used. The ceremonies



Malki Mus., Banning, Calif.
Fig. 11. Gene Pablo chipping an arrowpoint. Photograph by Bill Jennings, at Morongo Reservation, Aug. 1965.

are reduced in content, but the basic patterns—singing the creation epic and feting guests— are maintained.

Some personal rituals (e.g., menstrual) are still observed. Traditional supernatural power techniques for acquiring "luck" and influencing the use of power malevolently continues in some interfamily and interpersonal relations. One traditional game *(taxnéngilʸ)* is still frequently practiced, using traditional equipment and songs. Wagering remains an important feature of this game, and players receive considerable prestige by demonstrating their skill at it. Various nonreligious songs and dances are remembered. Bird songs are sung on some holidays and at fiestas. A few other song types are remembered but rarely performed.

Until recently, Cahuilla was a dying language with only older people speaking it with fluency. However, language classes have started in some communities and a few families are teaching the language to their children.

On the Morongo Reservation the Cahuilla have established the Malki Museum, a repository for artifacts and ethnographic knowledge ("History of Southern California Mission Indians," fig. 3, this vol.; Bean 1977).

Synonymy

The Cahuilla refer to themselves as *ʔívitem* or *ʔívilʸuwenetem* meaning the people who speak *ʔívilʸuʔat,* which is what they call their language. Their closest neighbors, the Cupeño, call the Cahuilla *íswətim* 'wolves' (which is one of the Cahuilla clans) or *támikawičəm* 'people from the east'. They are also called 'easterners' by the Luiseño (*kʷímkačum*) and the Gabrielino (*kumiʻtaraxam*).

They have also been known by the following names: Cowela, Cowillas, Dancers, Danzarines, Gecuiches, Hakwiche, Jecuches, Jecuéche, Jecuiches, Kahuilla, Kahweaks, Kah-we-as, Kahweyahs, Kauvuyas, kau-yaí-chits, Kavayos, Kavwaru-Maup, Koahualla, and Tecuiche (Hodge 1907–1910, 1:669); Cahahaguillas (Bean and Mason 1962); and Coahuillas (Barrows 1900).

Sources

A wealth of archival resources is available on all periods of Cahuilla history. The J.P. Harrington ethnographic notes in the National Anthropological Archives in the Smithsonian and letters and correspondence of agents, missionaries, and historians at the Huntington Library, San Marino (H.N. Rust, William Weinland, Cave Couts, Grace Nicholson, George and Helen Beattie Collections) are valuable. The Bancroft Library, University of California, Berkeley, has numerous resources covering all periods, the most significant of which are the D.P. Barrows Collection, the Anza Expedition Reports, numerous state and federal documents, Estudillo Papers, provincial state papers, and papers from various missions in California. Other institutions holding materials are the Southwest Museum, Los Angeles; Museum of Man, San Diego; Malki Museum, Morongo Indian Reservation; National Archives, Washington, D.C.; and the Library of the Museum of the American Indian, New York.

An extensive bibliography of Cahuilla materials is listed in Bean and Lawton (1967), while descriptive accounts of material culture, social organization, ritual, and myth are available in Barrows (1900), Strong (1929), Kroeber (1908b, 1925), Hooper (1920), H.C. James (1960), Curtis (1907–1930, 15), Bean (1964, 1972), Bean and Lawton (1965), and Bean and Saubel (1972). The works of Bean, Curtis, and James provided new interpretations and data on both aboriginal and historical matters. Several intensive linguistic studies have been done, the most comprehensive being Seiler (1957, 1958, 1965, 1967, 1970) and Bright (1965a).

Several books on the Cahuilla of the 1800s are available, in particular Bean and Mason (1962) and Phillips (1971).

There are five main museum collections of Cahuilla material items: Malki Museum; Lowie Museum of Anthropology, University of California, Berkeley; Southwest Museum; Museum of the American Indian; and the

National Museum of Natural History, Smithsonian Institution, Washington,

There is little archeological material on the Cahuilla. Only tentative surveys have been accomplished revealing settlement patterns, trail complexes (Meighan 1958-1959; F. Johnston 1967; Ruby 1961-1962), and petroglyphs.

Much of this chapter was drawn from Bean (1972), particularly the sections on social and political organization and cosmology.

Luiseño

LOWELL JOHN BEAN AND FLORENCE C. SHIPEK

Language

The term Luiseño (lo͞owĭ'sā‚nyō) derives from the mission named San Luis Rey and has been used in southern California to refer to those Takic-speaking people associated with Mission San Luis Rey. The term Juaneño (hwä'nā‚nyō) derives from Mission San Juan Capistrano and has been used to refer to the Takic speakers associated with that mission. These designations have been used since the Spanish occupation of California. Although Kroeber and Harrington separated Juaneño and Luiseño on the basis of linguistic differences, later studies (R.C. White 1963:91) indicate that they are ethnologically and linguistically one ethnic nationality, which here will be termed Luiseño.

The Luiseño language (along with Cupeño, Cahuilla and Gabrielino) belongs to the Cupan group of the Takic subfamily (Bright and Hill 1967; W.R. Miller 1961; Bright 1975). This subfamily, which also includes Serrano and Kitanemuk, all of southern California, was earlier called Southern California Shoshonean; it is part of the widespread Uto-Aztecan family.

Like most California groups, the Luiseño probably had no name for their own nationality, although they may sometimes coin names to satisfy outside investigators. Quechnajuichom and Puyumkowitchum, suggested as possible names for themselves (True 1966:43), seem not to be. The former is a Spanish spelling of *qéčŋaxwičum* 'people of San Luis Rey Village', and the latter is presumably *payó·mkawčum* 'westerners' (probably as used by inland Luiseños to refer to coastal dwellers).*

External Relations

The development of a separate Luiseño culture is clearly evident in archeological patternings that are locally distinct. This complex, which has been divided into San Luis Rey I (A.D. 1400-1750) and II (A.D. 1750-1850), shows the long-term development of a society that in the second era added components (for example, pottery and cremation urns) from neighboring groups (Meighan 1954).

External relations with neighboring ethnic nationalities were conservative. The Luiseño tended toward an isolationist policy except when expanding, which they did through warfare and marriage. They were considered by their neighbors to be dangerous and warlike expansionists, an opinion supported by their more highly developed warfare structure incorporating war leadership duties in the hands of the *nó·t*, or chief, and an initiated warrior class.

The Luiseño shared boundaries with the Cahuilla, Cupeño, Gabrielino, and Ipai peoples on the east, north, and south respectively. The Cahuilla, Gabrielino, and Cupeño share cultural and language traditions with the Luiseño. The Yuman Ipai have a different linguistic and cultural background but shared certain similarities in social structure (patrilineality as a basic form of social organization) and exchanged some religious practices with the Luiseño.

Luiseño social structure and philosophy were similar to the other Takic-speaking tribes, but they diverged in having a more rigid social structure and greater population density. The differences are clearly seen in: (1) extensive proliferation of social statuses, (2) clearly defined ruling families that interlocked various rancherias within the ethnic nationality, (3) a sophisticated philosophical structure associated with the taking of hallucinogenics (datura), and (4) elaborate ritual paraphernalia including sand paintings symbolic of an avenging sacred being named Chingichngish (*čiŋíčŋiš* or *čaŋíčŋiš*). The common spelling Chinigchinich for this name copies an eighteenth-century attempt to write the Juaneño form *čiŋíčŋič* (Boscana 1933).

Territory and Environment

The territory of the Luiseño comprised 1,500 square miles of coastal southern California (R.C. White 1963:117). Along the coast it extended from about Agua Hedionda Creek on the south to near Aliso Creek on the northwest. The boundary extended inland to Santiago Peak, then across to the eastern side of the Elsinore Fault Valley, then southward to the east of Palomar Mountain, then around the southern slope above the valley of San Jose.

* The orthography used for Luiseño words here is that of William Bright (1968). The preceding two paragraphs are based on data provided by him. The spellings of Luiseño words in the text have been corrected by Bright, Sandra L. Chung, or Pamela Munro, with the assistance of Villiana Hyde. None of them was able to identify the ritual here called aputs.

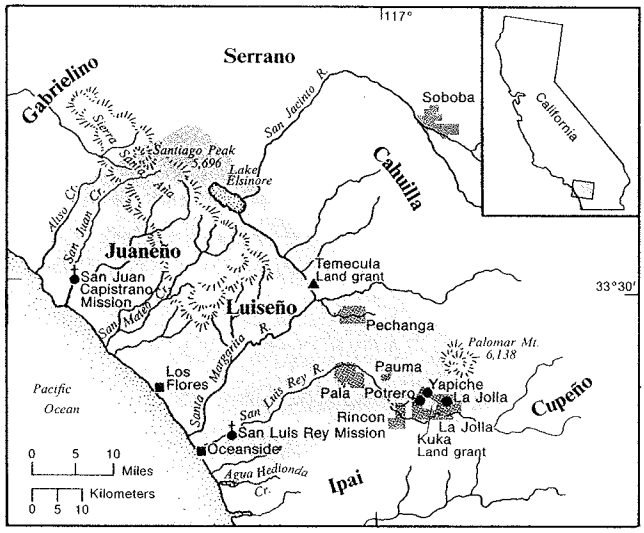


Fig. 1. Tribal territories with reservations and land grants.

From there the boundary turned west and returned to the sea along the Agua Hedionda Creek (fig. 1).

The territory of the Luiseño (excluding the Juaneño) included most of the drainage of the San Luis Rey River and that of the Santa Margarita River immediately to the north. Their habitat thus covered every ecological zone from the ocean, sandy beaches, shallow inlets, marshes, coastal chaparral, lush interior grassy valleys, extensive oak groves, up to the pines and cedars on the top of Mount Palomar. The Juaneño portion extended from the sea to the crest of the southern continuation of the Sierra Santa Ana. For the Luiseño as a whole, territorial elevations ranged from sea level to 6,000 feet on top of Mount Palomar.

Summer temperatures averaged from below 68° F. at the coast to above 85° inland, while winter temperatures averaged about 52° along the coast to 40° in the mountains. The average annual precipitation varied significantly, ranging from below 15 inches at the coast to 40 inches at Palomar Mountain. The Hot Steppe is the prevailing climate type found along the coast and extends inland along the river valleys into Riverside Basin. The uplands of the Santa Ana Mountains and Palomar Mountain had a warm Mediterranean-type climate with summer thunderstorms and winter snowfalls over Palomar Mountain. This diverse environment provided a more abundant and variable subsistence than most areas in southern California.

Settlement Pattern

Sedentary and autonomous village groups, each with specific hunting, collecting, and fishing areas, were located in diverse ecological zones. Typically these were in valley bottoms, along streams, or along coastal strands near mountain ranges. Villages were usually in sheltered coves or canyons, on the side of slopes in a warm thermal zone, near good water supplies, and in defensive locations.

Each village area contained many named places associated with food products, raw materials, or sacred beings. Each place was owned by an individual, a family, the chief, or by the group collectively. Trails, temporary campsites, hunting sites, areas for rabbit or deer drives, quarry sites, and areas for ceremonial use and gaming are examples of places owned by the community as a whole.

Group economic activities were restricted to the particular areas owned by the village, and family gatherings were confined to family-owned areas. Only with the express permission of the other group or family could gathering be done on territory other than one's own. Most inland groups also had fishing and gathering sites on the coast that they visited annually when tides were low or when inland foods were scarce from January to March. Each year for the acorn harvest (October–November) most of the village population would settle for several weeks in the mountain groves to collect acorns, hunt game animals, and collect whatever else was locally available. However, most of the Luiseño foods were available in locations within a day's travel of the village.

Culture

Ownership and Property

Ownership and property, both tangible and intangible, ranged from communal, that is, village, to personal property. At the most general level all members of the village collectively owned the whole area and all its contents. Trespass against this property was explicitly forbidden, boundaries were marked, and the area was protected by physical combat as well as supernatural means. Trespass was a major cause for war.

Within these collectively owned areas, the village chief supervised specific areas for group hunting and gathering. The produce from these areas was under the chief's control and was used for public occasions. R.C. White (1963:124) also describes "gardens" that were owned by individual household groups for subsistence, for example, clusters of cactus, oak trees, other food plants, medicines, or tobacco. These privately owned areas, also with marked boundaries, were inherited patrilineally or could be given to another by the owner. The concept of private property was important and violation of trespass on these areas was seriously punished.

Other private property included the house (owned by a family head), capital equipment, treasure goods (ritual equipment, ceremonial and trade beads, other ceremonial paraphernalia), eagle nests, songs, and other nonmaterial possessions. Individual material possessions were usually destroyed upon the death of an individual, so that his spirit could take all to the spirit world. Songs and knowledge had generally been taught to a successor—a son, son-in-law, or nephew—who had shown the pre-

requisite innate abilities to handle that form of knowledge.

Subsistence

The principal game animals were deer, rabbit, jackrabbit, woodrat, mice and ground squirrels, antelope, valley and mountain quail, doves, ducks, and other birds, including some songbirds. Most predators were avoided as food as were tree squirrels and most reptiles. Coastal marine foods included sea mammals, fish, crustaceans, and mollusks (especially abalone). Trout and other fish were caught in mountain streams (Sparkman 1908:200).

Acorns were the most important single food source; six species were used. Villages seem to have been located near water resources necessary for the leaching of acorns. Grass seeds were the next most abundant plant food used. Other important seeds were manzanita, sunflower, sage, chia, lemonade berry, wild rose, holly-leaf cherry, prickly pear, lamb's-quarters and pine nuts. Seeds were parched, ground, and cooked as a mush in various combinations according to taste and availability. Greens such as thistle, lamb's-quarters, miner's lettuce, white sage, and tree clover were eaten raw or cooked or sometimes dried for storage. Cactus pods and fruits were used. Thimbleberries, elderberries, wild grapes, and wild strawberries were eaten raw or dried for later cooking. Cooked yucca buds, blossoms, and pods provided a sizable increment to the food resources. Bulbs, roots, and tubers were dug in the spring and summer and usually eaten fresh. Mushrooms and tree fungi provided a significant food supplement. Various teas were made from flowers, fruits, stems, and roots for medicinal cures as well as beverages. Tobacco and datura (or toloache; Luiseño *náqtumuš*) were collected for sacred rituals because of their hallucinogenic qualities and were also used as medicines.

Fire was used as a crop-management technique as well as for community rabbit drives. The annual return from certain wild foods and useful plants—grass seed, some greens, yucca, and basket grasses—was maintained by burning at least every third year.

Food Sources

	Inland Bands		*Coastal Bands*	
	R.C. White 1963	*Revised*	*R.C. White 1963*	*Revised*
Acorns	25-50%	25-45%	10-25%	15-25%
Seeds	15-25	20-40	5-10	20-40
Greens	10-15	10-12	5-10	5-10
Bulbs, roots, fruits	10-15	10-13	10-15	10-15
Game	15-25	15-20	5-10	5-10
Fish and marine animals	0-5	0-5	50-60	20-35

Technology

Tools for food acquisition, storage, and preparation included an extensive inventory made from widely available materials. A few items were traded from specific localities, such as steatite bowls from Santa Catalina Island and obsidian blanks or points from either northern or eastern neighbors.

Hunting was done both individually and by groups. A shoulder-height bow was used with fire-hardened wood or stone-tipped arrows, which were carried in a skin quiver. Felsite and quartz points were made using deer-antler flakers. Deer were stalked with deer-head decoys or were tracked and run down. Community deer drives were held when quantities of meat were wanted. Small game was caught with the curved throwing stick (fig. 2), rabbit nets, slings, traps, or the spring-pole or pit type of deadfall.



Mus. of the Amer. Ind., Heye Foundation, New York: 5/468.
Fig. 2. Luiseño wooden throwing stick for hunting rabbits. Length about 65 cm, collected before 1916.

The bows for war were similar to those for hunting. In addition to the bow and arrow, weapons included a small hand-thrusting war club, large war clubs, broad-bladed thrusting sticks, lances, and slings.

Near shore ocean fishing was done from light balsa or dugout canoes. Seines, basketry fish traps, dip nets, hooks of bone or haliotis shell, and possibly harpoons were used. Mountain-stream fish were caught with traps, nets, or poisons.

Coiled and twined baskets were used in food gathering, preparation, storage, and serving (fig. 3). The basket type, shape, and size varied according to the purpose for which it would be used: small hand-held berry and bird-egg-gathering baskets, water-carrying bowls, storage baskets, and large round-bottomed carrying baskets. Coiled baskets were usually decorated with a darker tan, red, or black geometric design. These were very finely and artistically made and are to be found in many collections under the general area term "Mission Indian baskets" (Kroeber 1924).

A large shallow tray was used for winnowing chaff from grain or for sorting coarse from finely ground meal. Openwork twined baskets were used for leaching tannic acid from acorn meal. Basins formed in fine sand could also be used for leaching acorn meal.

Depending upon the size and quantity of the items to be stored, clay and basketry storage containers varied in



Dept. of Anthr., Smithsonian: top, 313023; bottom, 313172.
Fig. 3. Coiled baskets. top, Juaneño meal tray; bottom, Luiseño feast basket with black elder-dyed design. Diameter of top 38 cm, collected in 1900.

size from small bowls to baskets or jars large enough to hold several bushels. Acorn granaries were made of intertwined willow boughs set on a flat rock base.

Net pouches of two-ply cordage were made for handling the fruit and young pads of cactus. Net or skin pouches and bags were also used to carry small game and other foods. Large back-carrying nets were used with a tumpline around the forehead bearing on a coiled basket cap. Infants were carried on a cradleboard frame made of willow boughs.

Seeds were ground with handstones on shallow unshaped basin metates of fine-grained granite (fig. 4). The same granites were made into shaped or unshaped mortars and pestles for pounding acorns or small whole game. Bedrock mortars and metates were generally located near village sites, especially inland. A basket hopper was attached to new or shallow mortars. Medicines, tobacco, and datura roots were ground in stone bowls usually painted red and white for ritual purposes.

Food was cooked in wide-mouthed clay jars over fireplaces or in earth ovens wrapped with clay or leaves. Game was roasted in coals. Seeds were parched by shaking with coals in shallow pottery or basket trays; heated stones were dropped into food held in baskets, pottery jars, or soapstone bowls for boiling.

The pottery was made by paddle-and-anvil technique and fired in shallow open pits. Simple line decoration was either painted or incised with a fingernail or stick. Decoration was rare. Relatively few shapes were made: shallow dishes, bowls, hemispherical bowls, wide- and narrow-mouthed jars, ladles and dippers, and miniatures. A double-mouthed pot was used as a water jar.

Other utensils for food preparation included wooden food paddles, brushes, tongs, tweezers, steatite bowls and cups, and wooden digging sticks. Also a variety of ground-stone, pressure-flaked, or percussion chipped-stone tools were made for cutting, prying, scraping, drilling, and pounding (True 1966).

Ritual equipment included small spherical sacred stone bowls for grinding and drinking datura or tobacco; ceremonial blades of obsidian, clay figurines with "coffee bean" eyes; sacred wands with abalone or crystal insets (fig. 5); ritual head scratchers for puberty ceremonies; eagle-feather headdress, dance skirts, and shoulder bands; head and hand plumes of owl or raven feathers, and ceremonial blades.

Shamans' equipment included tubular soapstone or clay pipes for smoking, purification, and sucking disease rituals. Some had enlarged bowls and cane stems. Shamans also had magical power stones of quartz, tourmaline, and other crystals; magical swallowing sticks; a syringe of deer bladder with a cane nozzle; and special shamans' bundles.

Other ritual equipment included the ground paintings representing the cosmology, image of sacred beings, and of deceased persons; funeral pyre and cremation pits; funeral poles; and offering baskets.

Structures

Houses were primarily conical, partially subterranean thatched structures of reeds, brush, or bark, whichever was available locally. Domestic chores were done in the shade of nearby brush-covered rectangular structures known by the Spanish term *ramadas.* Round, semisubterranean, earth-covered sweathouses (fig. 6) were important for purification and curing rituals. A ceremonial structure, the *wámkiš*, was a centrally located area within the village that was enclosed by circular fencing. Sometimes within this area there was a raised altar upon which was a skin-and-feather image. Ceremonies were held inside the *wámkiš* and ritual and paintings were made in front of it.

Adornment

Personal ornaments were made of bone, clay, stone, shell, bear claws and, later, glass. Beads or pendants were made of these as well as of mica sheets, bear claws, deer hooves, and abalone shell. Bracelets and anklets were made of human hair. Men wore ear and nose ornaments made of cane or bone, sometimes with beads attached. Cloaks and robes were made of deerskin, otterskin, or rabbitskin strips, wound on lengths of fiber, and put together by a twined weft. Yucca-fiber sandals and deerskin moccasins were worn. Body painting and tattooing for men and



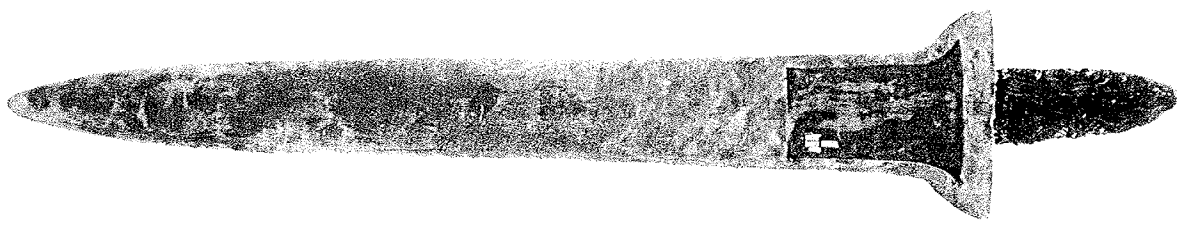
NAA, Smithsonian.

Fig. 4. Juaneño woman in front of adobe house grinding with mano and metate. An earth oven is behind her under the sunshade. Copyright and possibly photographed by Herve Friend, 1892.

women were ritually significant. Semiprecious stones were commonly used, such as quartz, topaz, garnet, opal, opalite, agate, and jasper. Women wore twined cedar-bark double aprons.

Music and Games

Musical instruments included bird-bone and cane whistles; cane flutes; split-stick clappers; rattles of turtle shell, gourd, or deer hooves; and bull-roarers. Gaming equipment included bone and wood cylinders with stretched rawhide loop and counters used in the peon game, dice, painted or incised split sticks for women's gambling games, wooden ball and sticks for the ball-and-stick game, ring and pin, acorn tops, cat's cradle strings, hoops and pole, and wooden balls.



Riverside Municipal Mus., Calif.: A9-20.

Fig. 5. Luiseño ceremonial wand, wood handle with remnants of abalone inlay, obsidian point. Length 61.8 cm, collected before 1923.



Title Insurance and Trust Company, Los Angeles.
Fig. 6. Luiseño sweathouse on Soboba Reservation. Photograph possibly by C.C. Pierce, about 1885.

Social and Political Organization

Women collected most of the plant resources, and men hunted the large game and most of the small game and fished; but there was no rigid sexual division of labor. Work activities often overlapped. Men aided in acquiring acorns and other plant foods by helping with heavy work associated with them, such as knocking acorns from the trees. They sometimes collected plant foods on hunting expeditions. Women, in turn, sometimes hunted and trapped small game and collected shellfish.

Aged women stayed at home to care for children, teaching them arts, crafts, and knowledge necessary for adulthood while active women were busy collecting and processing foods. Older men were most active in ritual, ceremonial affairs, making political decisions, and teaching selected young men. They were skilled net makers and arrow makers; they manufactured much of the capital equipment used in hunting as well as creating much ceremonial paraphernalia.

Children were involved in productive activities at the earliest possible age, boys and girls working with adults as they learned. Older, unmarried girls assumed some care for younger siblings. Men tended to have exclusive responsibility for ritual and sacred affairs, while women made food preparations for ritual affairs and performed supplemental dancing and singing.

Each Luiseño village was a clan tribelet—a group of people patrilineally related who owned an area in common and who were politically and economically autonomous from neighboring groups. The entire social structure is obscure. It does not appear that they were organized into exogamous moieties such as were the Cahuilla, Cupeño, and Serrano (Strong 1929:291). They may have been loosely divided into easterners (mountain-oriented peoples) and westerners (ocean-oriented peoples) (Strong 1929:288-289). R.C. White (1963:163-174) sees a possible moiety structure but the evidence is highly inferential. R.C. White (1963:173-178) and Strong (1929:287) agree that the "party organization" or grouping of lineages for reciprocal performance of ritual is a result of the recent drastic decline of population and the loss of ceremonial leaders without trained replacements.

The hereditary village chief (*nó·t*) held an administrative position that combined and controlled religious, economic, and warfare powers (Boscana 1933:43). He had an assistant (*paxá?*) who acted to relay orders and information and who had important religious ceremonial duties also. There was an advisory council of ritual specialists and shamans, each with his own special area of knowledge about the environment or ritual magic. These positions were hereditary with each man training a successor from his own lineage who showed the proper innate abilities (R.C. White 1957:5-6). These specialists were also members of the cultic organization of Chingichngish and shared special access to ritual and supernatural power forms. There was a multiplicity of specialist roles under the *nó·t* and *paxá?* such as the leaders of the rabbit hunt, deer and antelope drives, expeditions to the sea, as well as a specialist in each major food crop.

The more populous villages along the coast and in the larger valleys undoubtedly had a more complex structure than did the smaller settlements in the little valleys, which seem to have contained fewer lineages (Strong 1929).

Kinship terminology and marriage rules, in addition to the social structure, have been changed so extensively by the overlay of the Roman Catholic incest rules and external linguistic, political, and economic factors that the aboriginal or contact-period usage, rules, and structure are extremely obscure.

Luiseño kinship terminology had a Dakota structure (R.C. White 1963:168) and kin terms occurred only with possessive prefixes (Kroeber 1917:348). There was a tendency toward paired reciprocal terms that indicated equal relationship distance, with the diminutive ending on the younger of the pair (Kroeber 1917:351). For example, *-ka?* 'grandfather' and *-ka?may* 'grandson' (*-may* being the diminutive). This tendency affected all terms of grandparents, great-grandparents, father-in-law, brother-in-law, and cousin classes. The Luiseño had bifurcated merging for aunts and siblings with distinctions being made according to relative age of the parent's siblings (R.C. White 1963:168). Other features included merged terminologies for grandparent's siblings of the same sex; siblings were differentiated by age and sex, as were parallel aunts and uncles; nephews and nieces were recognized by age of connecting relative and sex of speaker; cross-nephews and -nieces were merged as well as parallel nephews and nieces.

Life Cycle

At a child's birth the *nó·t* of the mother's lineage performed the *ṣúlaxiš* ceremony, which confirmed the child to the householding group and the patrilineage (R.C. White 1963:165). Extensive dietary and activity restrictions were imposed upon both father and mother for about a month.

At puberty boys and girls underwent initiation rituals during which they were taught about the supernatural beings governing them and punishing any infractions of the rules of behavior and ritual (Sparkman 1908:221, 225). They were taught to respect elders, to listen to them, to give them food, not to eat secretly, to refrain from anger, to be cordial and polite to in-laws, to follow rituals exactly and respectfully or be subject to punishment and death by the messengers of Chingichngish (rattlesnake, spider, bear, and sickness). The boys' ceremony included the drinking of toloache (datura), visions, dancing, ordeals, and the teaching of songs and rituals. The girls' ceremony included advice and instruction in the necessary knowledge for married life, "roasting" in warm sands, and rock painting.

Marriage was arranged by the parents of children, sometimes at infancy. Girls were married shortly after their puberty ceremonies took place. Luiseños suggest an important concern was that spouses not be closely related, although R.C. White (1963:169-170) suggests that cross-cousin marriages may have been the norm prior to Spanish Catholic influences. Important lineages were allied through marriage. Elaborate marriage ceremonies and a bride price accompanied marriage. Residence was generally patrilocal. Polygyny, often sororal, was practiced, especially by chiefs and shamans. Divorce was not easy, but possible; widows could remarry, preferably a classificatory "brother" of her deceased husband, as a husband might marry a classificatory "sister" of his deceased wife.

Marriage was utilized as an instrument of ecology and economics. Reciprocally useful alliances were arranged between groups in differing ecological niches, and became springboards of territorial expansion, especially following warfare and truces (R.C. White 1963:130). In the twentieth century, marriages of Luiseño women into neighboring reservations have extended Luiseño influence among their neighbors, for instance, among the Cupeño and Ipai and Tipai, and on Soboba reservation.

Death was a major concern to the Luiseño. They observed at least a dozen successive mourning ceremonies. After a *tuví·š* or ritual washing of clothes, a smoking purification of relatives was held and various related clans were invited to an image-burning ceremony, which ended formal mourning. Feasting took place, and food and gifts were distributed to guests. A special ceremony, the eagle killing, was held to commemorate the death of a chief.

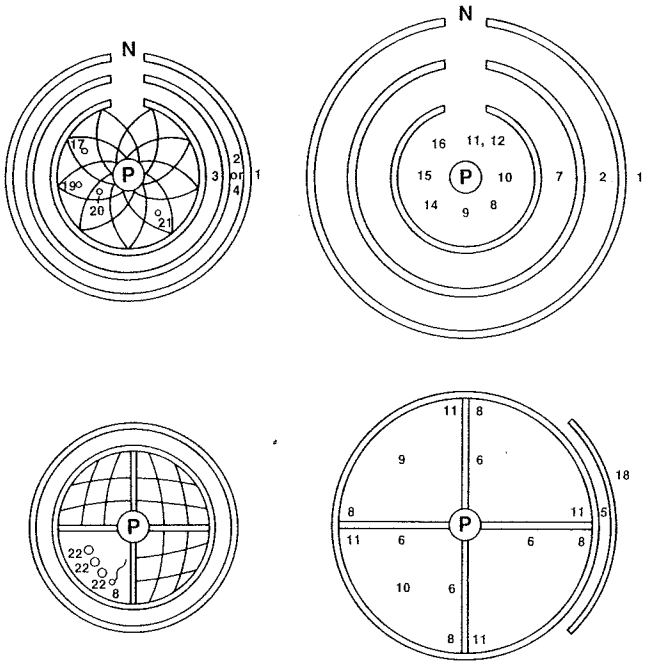
Ritual

Ritual provided dramatic enactments and reciting of sacred oral literature in which ritual was initially ordained. The rituals functioned to control environment, emulate the experience of sacred persons, and guarantee their positive responses. Ritual also aided in the control of knowledge-power, which resided in varying degrees in the Luiseño world. Rituals were strictly governed by rules and procedures administered by religious chiefs and shamans, who comprised a hierarchical power pyramid dominated by the village chief, an assistant, a council, and a secret society, which included most adult males in the village. They articulated ritual and controlled hunting, harvest, warfare, in fact, all major activities of village life. The rituals are connected with the Chingichngish cult.

Most participants in rituals were paid. A guest ritual leader and his assistants—from another village or moiety—officiated. Great quantities of food and treasure goods were distributed at these affairs. R.C. White (1963) has recorded over 16 kinds of ceremonies. In addition to rites for the dead there were rites of passage—naming, birth, puberty, death, installation of new office holder. Other rituals controlled the environment, for instance rainmaking or increase of food crops or animals. Still others involved social and political controls both within and between villages, like peace making between individuals or groups.

Principal rituals conducted by the *nó·t* and his organization were: (1) *má·ni pá·ʔiš*—datura drinking, (2) *ʔántuš*—ant ordeal of puberty, (3) *nó·tuš*—pole climbing, (4) *méyiš*—hunting purification by smoke, (5) *mó·raxiš*—eagle-feather dance, (6) *pé·niš*—eagle killing, (7) aputs (Boscana in Harrington 1934:41)—fertility dance, (8) *háyiš*—moon racing (fertility?), (9) *čúyiš*—mortuary, clothes burning, (10) *tó·činiš*—mortuary, image burning, (11) *tuví·š*—clothes-washing at birth and death, (12) *wiqéniš*—female puberty, (13) *péwluš*—marriage, (14) *né·tuš*—conception, (15) *čélaxiš*—peace among individuals (*čéla-* 'observe ritual silence'), (16) *náwtiš*—peace between parties (lineage groups) or tribes.

Sand painting was a significant ritual-cosmological component associated with most rituals; although utilized by several southern California groups, the paintings are best documented for the Luiseño. The paintings (*turó·hayiš*) were made at boys' initiation rites, girls' initiation rites, and death rites for initiates of the datura cult. Each painting represented various aspects of the universe, for example, the Milky Way, all-encompassing night and sky, sacred beings, and spiritual phases of the human personality, especially the punisher-beings representing Chingichngish (fig. 7). These art forms were destroyed when the ritual was finished. They were only occasionally made in the 1970s.



after Kroeber 1925:662.

Fig. 7. Sand paintings. Elements include: 1, Milky Way; 2, night or sky; 3, root (of existence); 4, our spirit or soul; 5, world; 6, hands (arms) of the world; 7, blood; 8-16, avengers and punishers sent by Chingichngish; 17, sea; 18, mountains; 19, plant hill; 20, boil or abscess; 21, four avenging animals; 22, ceremonial baskets (may be actual objects); N, north; P, pit symbolical of death and burial of ashes, the abode of the dead, or navel of the universe.

After contact, Luiseño ceremonial leaders began to die out. Lineages that no longer had ceremonial leaders and *paxá?* or requisite ritual paraphernalia associated, for ritual purposes, with lineages that did. The groups resulting from this process are now called "parties" to distinguish them from traditional ritual units (Gifford 1918).

Cosmology

Luiseño cosmology centered about a dying-god motif and around *wiyó·t*, a creator-culture hero and teacher who was the son of earth-mother (*tamá·yawut*). It was he who established the order of the world and was one of the first "people" or creations. The death of *wiyó·t* was brought about by another of the first "people." This death changed the nature of the universe and led to the creation of the existing world of plants, animals, and men. The original creations took on the various life forms now existing. Some remained in contact with their descendants, while others went to different levels of the universe. After the death of *wiyó·t* the "people" gathered and worked out solutions for living, including the adoption of the present spatial organization of "species" for living space, and a chain-of-being concept that placed each species into a productive, hierarchically arranged and mutually supportive relationship with all others. Thus the problems of food and space were solved by the acceptance of predatorship and death for all beings and things: rocks and trees lived on top of the ground, gophers lived under, men ate deer, and deer ate grasses (R.C. White 1957:9).

The disposal of the body of *wiyó·t* affirmed the concept of death and established funeral ritualism. It also ended the formation of prescribed knowledge that was given to each species. The remaining knowledge that *wiyó·t* threw away upon his death was known as residual knowledge. Formulated knowledge, the prescribed knowledge given before his death, became the exclusive possession of the ritual officials. Residual knowledge could be sought and acquired by anyone who had the innate ability consistent with that form of knowledge-power (R.C. White 1957:6, 8).

The acquisition and use of knowledge-power was required to be kept secret and there were constant admonitions not to divulge knowledge-power because misfortune and death would follow. The negative consequences of the misuse of knowledge-power or its potential use by an enemy made any careless sharing of knowledge unthinkable. People with knowledge-power had the right to receive more in the distribution of goods (thus ensuring a higher degree of survival in cases of shortages). Knowledge, because of its dangerous nature, was transmitted only reluctantly after the recipient had demonstrated his ability to handle that form. It had to be used specifically and unvaryingly according to set procedures and on the appropriate occasions. Failure to follow set rules at appropriate times resulted in loss of control over the particular kind of power being used and brought grave consequences to the entire community (R.C. White 1957:4).

The rank-order system in society and nature depended upon the natural innate knowledge-power adhering to a species or individual. For people, the innate ability varied with individuals, accruing most often to the families of powerful individuals. An attitude of complete fearlessness was seen to be the satisfactory state of mind for acquiring knowledge-power.

History

Although several earlier European explorers observed the Luiseño, first contact with Europeans was in 1796 when the Gaspar de Portolá expedition arrived and San Diego Mission was founded to the south. In 1776 a mission was established at San Juan Capistrano, and 22 years later San Luis Rey Mission was founded.

R.C. White (1963:104) estimates that there were 50 Luiseño villages, with a mean population of about 200 each, thus suggesting a population of 10,000 people in contrast to Kroeber's (1925:646, 649) estimate of 4,000–5,000 people. At no time have published population figures been reliable, since many individuals and some villages were never part of the mission or reserva-

Table 1. Population

Date	*Total*	*Men*	*Women and Children*	*Reservation Residents*	*Source*
Precontact	10,000				R.C. White 1963
1828	3,683	1,598	2,085		Mission Records
1856	2,500-2,800 (19 villages)				ARCIA
1860	1,011				U.S. Census Office 1880
1865	1,047	536	511		ARCIA
1873	975 (10 villages)				ARCIA
1881	1,120				ARCIA
1885	1,142				ARCIA
1889	901				ARCIA
1894	784			417	ARCIA
1895	948			272	ARCIA
1914	983			983	ARCIA
1925	841			841	ARCIA
1940	721			402	ARCIA
1960	1,757			564	BIA, Sacramento

tion system; therefore, the figures in table 1 may consistently be considered as minimums. Recent counts are further skewed by the mixture of tribal groups on some reservations, for example, Pala.

Upon contact, European ideas and diseases immediately began to spread throughout the Luiseño population. Living conditions at missions and on the ranchos accelerated the population decline.

Some coastal village people were moved into mission environs. Over a period of years, Indians were brought from progressively more distant villages into San Juan Capistrano Mission where they were taught the Roman Catholic faith, Spanish language, farming skills, animal husbandry, adobe brickmaking, carpentry, and other European crafts.

The policy at San Luis Rey Mission was to maintain Luiseño settlement patterns. The priest, Father Peyri, visited villages to hold masses, perform marriages, and supervise agricultural activities; but traditional economic methods remained as the basic subsistence mode, and leadership continued for the most part as it always had.

In 1834 missions were secularized and the attendant political imbalance resulted in Indian revolts and uprisings against the Mexican rancheros, who were using many of the Indians as serfs. Many left the missions and ranchos and sought refuge among inland groups, while a few individuals acquired land grants—Kuka, Temecula (fig. 8), La Jolla—and entered into the mainstream of Mexican culture. Several Indian pueblos were established for some of the San Luis Rey Indian rancherias, among them Santa Margarita and Los Flores, by the Mexican government. These pueblos were intended to be governmental units within the Mexican political system. Most of them disappeared under Mexican rancho pressures; Los Flores, for example, was sold to Mexicans.

Most Luiseño villages, however, continued to maintain their traditional orientation with the addition of wheat and corn agriculture, irrigation, orchards, and animal husbandry.

For the purposes of political and economic controls, the leadership roles that had been established in the mission period, such as *generales, capitanes,* and *alcaldes,* continued to exist and operate with political and economic, rather than religious, mechanisms. These new leaders operated in addition to religious leaders and acted as liaisons between the people and Europeans (fig. 9).

With the entrance of Anglo-Americans into California, Luiseños were displaced from more of their lands (for instance, Temecula, 1859-1877). Conflicts between Indians and encroaching Whites finally led to the investigation and establishment of executive-order reservations for some villages (for example, Pala, Potrero, La Jolla, Yapiche) in 1875. Other Luiseños were evicted from their homes and dispersed at random, some going to reservations, others to nearby towns or ranches.

Civil rights and federal protection were minimal until 1891 when the Act for the Relief of the Mission Indians established trust-patent reservations and initiated a bureaucratic management of them. Agents, teachers, medical personnel, Bureau of Indian Affairs day schools, and Indian captains, judges, policemen, and Indian courts were established. The stated function of this system was



Title Insurance and Trust Company, Los Angeles.

Fig. 8. View of Pechanga showing houses of the Temecula. Palomar Mountain is in the background. Photograph by C.C. Pierce, about 1895.

to develop a self-supporting population, which would eventually be assimilated into the mainstream of American life. Special educational institutions, day schools, and boarding schools such as Perris School, Sherman Institute, and the Carlisle School, and private boarding schools such as the Roman Catholic Saint Boniface were established to adapt Indian children to the American culture. Under the provisions of the Dawes Act a land-allotment program was established to provide land for individuals. During this time there was a concerted program against traditional authority by the federal government, which insisted that all tribally elected persons (captains, judges) must be approved by the local Indian agent. Furthermore, Indian policemen and other Indians were often employed in positions of power without regard to local feelings.

Indians continued to support themselves by farming, ranching, and various forms of wage labor, supplemented by hunting and gathering wherever still available.

Some Luiseños vigorously protested the Bureau of Indian Affairs management of the reservation, and by 1919 the Mission Indian Federation and other instrumental voluntary associations were formed to solve new problems. In 1934 the Indian Reorganization Act was rejected by Luiseños because it did not allow sufficient home rule. Nevertheless, bureaucratic control increased as federal activities on Indian reservations were expanded. The complication of the Depression affected economic life and increased bureaucracy, but considerable support to Indians came from federal agencies such as the Civilian Conservation Corps Indian Service and from economic-aid programs such as the reimbursable cattle program.

Commencing with World War I, many Indians entered the service or migrated to urban areas for defense industry jobs. Reservation activities diminished, but personal incomes increased as new jobs were available and markets improved for agricultural products. At the end of the war a resurgence of farming and cattle raising by the returning servicemen, along with increased job skills and opportunities, led to higher levels of income for most Luiseños.

Pressures for termination of federal involvement in Mission Indian affairs, which had been building since the



Title Insurance and Trust Company, Los Angeles.

Fig. 9. Capt. Pedro Pablo and his headmen from Pauma at Pala for a tribal meeting. Photograph possibly by C.C. Pierce, about 1885.

1930s, reached a peak in the 1950s. Luiseños assumed active leadership, both for and against this program. It was vigorously discussed and partially averted. In 1953, with the passage of Public Law 280 (67 Stat. 588-590) federal services were reduced to the maintenance of the trust status of the land. A period of chaotic legal problems developed because Public Law 280 did not spell out the exact areas of responsibility of states and counties in regard to law enforcement and use of Indian trust lands. Neither the public agencies nor the Indians were adequately apprised of the new relationships of Indians to local, state, and other federal agencies and the consequent changes in responsibilities.

In spite of the confusion engendered by Public Law 280, or because of it, a resurgence of local self-government and self-determination occurred. Reservation groups began to write articles of association and establish formal membership requirements in terms of degree of relationship to original members. With the beginning of the federally funded programs in the late 1960s, such as low-cost housing, manpower training, and Office of Economic Opportunity grants, the Luiseño began establishing new forms of local organizations in order to participate and take advantage of programs. Since program funding required large populations, new organizations were developed to include several reservations, Luiseños as well as others. Luiseño participation and leadership again became prominent in state organizations such as the Intertribal Council of California, county organizations such as the Tribal Chairmen's Association of San Diego County, and regional groups such as the All-Mission Indian Housing Authority. The Luiseño appear to be more generally involved with these types of organizations than most other Indian groups in southern California. Consequently an exceedingly complex proliferation of organizations, committees, and boards working with new governmental and private agencies has developed. Some reservations belong to none, some to one or several reservation-based groups, and some to all. Final authority on any reservation is the entire adult membership. These other groups have no authority inherent in themselves in regard to the reservations. Many of the same individuals sit on several boards, but this does not indicate coordination or closeness between organizations.

Some county or state organizations have had "an Indian" appointed in order to have some Indian input into the policy level: San Diego County Welfare Council,

Human Relations Committee, County Office of ic Opportunity, Public Employment Program, e local school boards.

there are federally funded programs that have a f directors elected from or appointed by various r reservations on the local level or from sections of te on the state level. The Intertribal Council of nia is an example of such an Indian organization. nia Indians Legal Services is another organization by the Office of Economic Opportunity. It is given olicy direction by a board composed of Indians ted from various sections of the state and several s appointed by the bar association. It hires lawyers eir staffs and consultants to provide legal assistance ians in California. The All-Mission Indian Housing rity has all the powers of any "housing authority." uires a legally certified resolution to join passed by najority of members of a reservation. To have ng on tribal land under the All-Mission Indian ing Authority, the tribe must develop a housing area and lease that portion of the reservation to the sing Authority for 50 years.

nited States Public Health Service, Indian Division, sponsible for safe domestic water supplies and tary disposal of sewage. Individual health is the vidual's responsibility. California Rural Indian lth serves only the five reservations in the northern of the county and receives federal funds through the e Public Health for transporting people to doctors some health education classes. The South County siness Managers supervise an unfunded outpatient ic for which they have obtained volunteer services. ssion Indian Development Corporation was set up by Bureau of Indian Affairs to serve all southern lifornia reservations but in fact serves only the Luise-

35.

organi
servatio
ation a
organi
a, coun
sociati
h as t

ultural Persistence

Luiseost Luiseño bands were in the 1970s enrolled on the types eservations at La Jolla, Rincon, Pauma, Pechanga, Pala, outhernd Soboba. In 1970 approximately one-third of the proli nrolled Luiseño resided on the reservations. Most others work ved within a 20-mile radius in towns or on other es ha eservations. A few lived in Los Angeles and other parts me to f California. Less than 1 percent lived in more distant to all reas. Some nonreservation Luiseño live in San Juan adult Capistrano and Oceanside. They are only vaguely orga- ority nized as groups. The reservation groups are structured ions. with elected councils, formal membership rolls, and but articles of association.

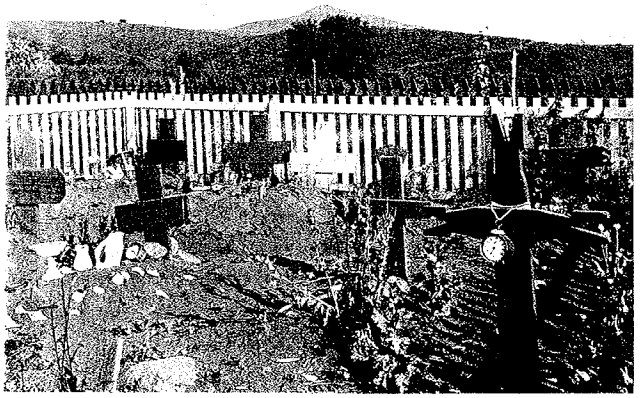
een Occupations are primarily in semiskilled or skilled categories, such as electricians, carpenters, cattle raisers, "an farmers, firemen, defense workers, domestics. Some are in out professional positions such as teachers, professors, engi- cil, neers, certified public accountants. Programs for the aged and indigent, Medicare services, social security, and unemployment compensation are available on the same basis as for any other California citizen. Planning for improved housing and economic development of resources is actively taking place on all Luiseño reservations.

During the 1930s the Bureau of Indian Affairs day schools for southern California were gradually closed and before 1950 both grade-school and high-school students were in public schools. Educational achievement is highly valued and sought out. In the 1960s, numerous young people entered colleges throughout the state, and many adults were returning to college.

Most Luiseño in the 1970s were practicing Roman Catholics but retained an attenuated form of their pre-contact religion (fig. 10). Approximately 10 percent belong to Evangelical, Church of Christ, or other Protestant denominations. Pala Mission is active with the Verona Fathers servicing a Catholic chapel on each Luiseño reservation. A Roman Catholic elementary school has many of the Luiseño children enrolled at Pala. Major Catholic festivals are celebrated; and baptism, confirmation, marriages, funerals, and memorial services are important to most Luiseños. Protestant churches are active on La Jolla and Rincon reservations.

The original Luiseño culture persists in many forms, although it is sometimes not readily apparent to the outside observer. Philosophical assumptions (R.C. White 1957) are maintained as are certain rituals and shamanic practices. Surviving ceremonies include initiation for cult candidates, installation of religious chiefs, funerals, and clothes burning (R.C. White 1953).

While the Luiseño language is spoken by only a few elderly people, there is a revival of interest among the young and language classes have been organized. A language text has been written by a Luiseño, Villiana



Title Insurance and Trust Company, Los Angeles.

Fig. 10. Indian graveyard at Pala with personal possessions or gifts on top of the graves. Photograph probably by C.C. Pierce, about 1900.

Hyde (1971). Traditional amusements such as peon games and secularized songs and dances are continuing; Luiseño foods such as acorns, yucca, and wild game are still eagerly sought. Some traditional medicines and curing procedures are practiced, and traditional political concepts still function, although in new forms. Attitudes toward property, sexual roles, knowledge, power, isolationism, and leadership continue.

In the late 1800s fiestas celebrating saints' days for each reservation became a major activity for each Luiseño reservation, involving interreservation visitors for one, two, or three weekends of each year. These fiestas were active until about the 1920s when they were discouraged, sometimes forbidden, by the BIA. They had become a major mechanism for interreservation economic exchange as well as ceremonial, social, and political activities. They were revived after World War II on some reservations for social and fund-raising purposes.

A traditional feature indicating vigorous persistence is the peon game, a complex guessing game involving two competing groups of four players each and a referee supported by singers and magical formulas to acquire luck. To win the game, 16 counters must be acquired by guessing the ways in which black and white peons are held hidden in the hands by the opposing team. Large amounts of treasure goods and food stores were formerly wagered. Now large amounts of money are wagered on these games, which are played during fiestas. Teams represent families, and sometimes language groups or reservations. Both men and women play. The winning team and their backers are rewarded by large wagers. Individual players are renowned in the local Indian community if they possess peon skills.

Synonymy

The Luiseños (both Juaneño and Luiseño proper) have been known by a variety of terms. The earliest use of the term Luiseño appears in Arroyo de la Cuesta (1821) and was used as the name for the language spoken by a group of Chumash living at San Luis Obispo Mission about 1821-1837. This term was later applied to the Indians living at San Luis Rey Mission (Coulter 1835:67). Pablo Tac, a young Luiseño man, gave several names for the inhabitants of Luiseño territory: Quechnajuichom (translated as 'the inhabitants of Quechla', that is, San Luis Rey), Sanjuaneños, and San Luiseños (Tac 1952:87). Couts (ARCIA 1857:240) termed them San Luisenians, and variations of this term continue: San Luis Indians (Winder 1857:124), San Luis Rey (ARCIA 1872:682), San Luiseños (Bancroft 1874-1876, 1:460; Tac 1952:87; B.D. Wilson 1952), San Luisieños (Bancroft 1874-1876, 1:460). Kroeber (1907b:145) gives the terms Ghecham and Khecham (alternative spelling) for the Luiseños, the term being derived from *qéč* 'Mission San Luis Rey'; for this Harrington (1933b:97) gives Juaneño *qé·ʔeč*, Luiseño *qé·ʔeš*. These terms appear to be the same as those given by Gatschet (1879:413) and Shea (1855:108): kechi and kechis respectively. In 1907 Kroeber termed the Indians living near Mission San Juan Capistrano Juaneño. Boscana's name for them, Acagchemem, appears to be a spelling of Juaneño *ʔaxáčmeyam* or Luiseño *ʔaxášmayam* 'San Juan Capistrano people', derived from the name for the mission town, *ʔaxáčme*, Luiseño *ʔaxášmay* (Harrington 1933b:102). In the 1970s Luiseños tend to use the term San Luiseño when referring to themselves or to identify and call themselves by reservation or clan names.

Sources

Historical sources on Luiseno begin with observations by Cabrillo in 1542 and Vizcaíno in 1602. Later overland Spanish explorers (Portolá, Fages, and Mariner) described villages and activities. Mission records from San Luis Rey and San Juan Capistrano contain accounts of baptism, birth, marriage, and death. Ethnographic descriptions exist in the answers to *interrogatorios* as well as in various writings, of which Boscana's accounts (1933; see also Harrington 1934) are the most valuable. A neophyte's description (Tac 1952) adds further valuable ethnographic and historic data. Various archival resources were drawn upon by Engelhardt in his histories of various missions (1908-1915, 2, 1921, 1922, 1923, 1927). B.D. Wilson (1952) and the National Archives Luiseño files provide data about these people after the American conquest of California. In later years various federal commissions reported on the conditions of Luiseño peoples (Jackson and Kinney 1884; Smiley Commission 1891).

The earliest ethnographic account is that of Henshaw in 1884 (Henshaw 1972); the major ethnographic works begin with Sparkman (1905, 1908, 1908a), Du Bois (1904a, 1908a), and Kroeber (1906, 1908d, 1909b, 1917, 1925). They set the basic ethonographic frame to which other scholars have contributed. Gifford (1918, 1922) and Strong (1929) analyzed kinship, social organization, and ritual. Harrington, who collected extensively in the 1930s and 1940s, published (1933a, 1933b, 1934a) important new ethnographical and linguistic data. R.C. White (1963) established a new interpretation of Luiseño settlement pattern, social organization, and philosophy.

Major archival resources are: United States National Archives (War Records, Department of Pacific; Bureau of Indian Affairs files); John P. Harrington Collection, National Anthropological Archives, Smithsonian Institution; Sparkman papers, Anthropological Archives, Bancroft Library, University of California at Berkeley; and the C.H. Merriam Collection, Archaeological Research Facility, University of California at Berkeley. Major collections of Luiseño artifacts are held at the Museum of

the American Indian, Heye Foundation, New York; American Museum of Natural History, New York; the Smithsonian Institution; San Diego Museum of Man; Lowie Museum of Anthropology, Berkeley; and the Southwest Museum, Los Angeles. Other archival and considerable photographic materials are available at the Huntington Library, San Marino, California; additional material can be found at the San Diego Historical Society Junipero Serra Museum, the San Diego Public Library, and in San Diego County records.

California Prehistory

Colonization, Culture, and Complexity

EDITED BY
TERRY L. JONES AND KATHRYN A. KLAR

Published in Cooperation with the
Society for California Archaeology



A Division of
ROWMAN & LITTLEFIELD PUBLISHERS, INC.
Lanham • New York • Toronto • Plymouth, UK

CHAPTER 14

Prehistory of the Southern Bight: Models for a New Millennium

BRIAN F. BYRD AND L. MARK RAAB

THE GEOGRAPHICAL FOCUS OF THIS CHAPTER IS California's Southern Bight, roughly the southern half of the arc extending from the Mexican border to Point Conception. As defined here, this region encompasses Orange and San Diego Counties, western Riverside County, and the offshore islands of Santa Catalina, San Clemente, and San Nicolas (the Southern Channel Islands). At the time of Spanish contact this region was occupied by native groups (Figures 14.1, 14.2) most commonly referred to as the Tongva (Gabrielino), Juaneño (Ajachemen), Luiseño, and Kumeyaay (Bean and Shipek 1978; Bean and Smith 1978; Kroeber 1925; Luomala 1978; McCawley 1996). Our objective in this chapter is to present a regional summary of research on California prehistory since the appearance of Moratto's (1984) *California Archaeology* and Chartkoff and Chartkoff's (1984) *The Archaeology of California.*

The Southern Bight is remarkably well suited to such a retrospective analysis. This region illustrates a number of important research advances that have been made since the appearance of those two volumes. Data from this area allow us to assess in considerable detail some of the ideas advanced by Moratto and the Chartkoffs. At the same time, however, these studies have generated data that provoke fundamentally different understandings of California prehistory than those in the decades leading up to publication of the two 1984 books. These advances, outlined below, seem likely to propel archaeological research in new directions in the new millennium.

Though they expressed differing perspectives, *California Archaeology* and the *Archaeology of California* were the most comprehensive and also the first statewide syntheses of California prehistory. Both appeared at a time when California archaeology was on the cusp of enormous changes. Following the 1970s, the field experienced an explosive proliferation of archaeological information under the aegis of contract archaeology, the "radiocarbon revolution," and the appearance of a large cadre of archaeologists holding diverse theoretical viewpoints. The result, signaled by the appearance of the two books, was the rise of California archaeology as an intellectual force in its own right. They not only reflected the transformation of California archaeology but also sketched pathways along which research would develop over the following two decades, posing interesting questions about the nature and timing of prehistoric culture change. Chartkoff and Chartkoff (1984), for example, emphasized broad patterns of progressive cultural development, culminating in Late Holocene cultural climaxes characterized by high degrees of adaptive success. By contrast, Moratto (1984:460–464) suggested that culture change may have been more regionally and temporally variable than previously thought, and included episodes of culture change caused by such factors as climatic stresses. One of the most prescient questions posed by Moratto (1984:104–113) was whether a Paleo-Coastal Tradition actually had existed along the California coastline during the Early Holocene, breaking sharply with traditional views of seafaring and intensive maritime adaptations as Late Holocene developments. In the discussion that follows, we point out the ways in which researchers working in the Southern Bight have made significant progress in addressing the following questions:

- Was prehistoric culture change relatively gradual and developmental or more punctuated and multidirectional?
- Did trans-Holocene culture change stem essentially from terrestrial cultural adaptations or did the coastlines play an important early role?
- Did prehistoric culture change result in Late Holocene cultural climaxes characterized by high levels of adaptive success or was change induced by resource scarcity?
- Did environmental stresses play an important role in prehistoric culture change or was change driven by essentially intracultural forces?
- Can California prehistory be explained best in terms of broad developmental stages or regional cultural variability?

Creating a coherent picture of these research advances in the study area inevitably forces certain com-

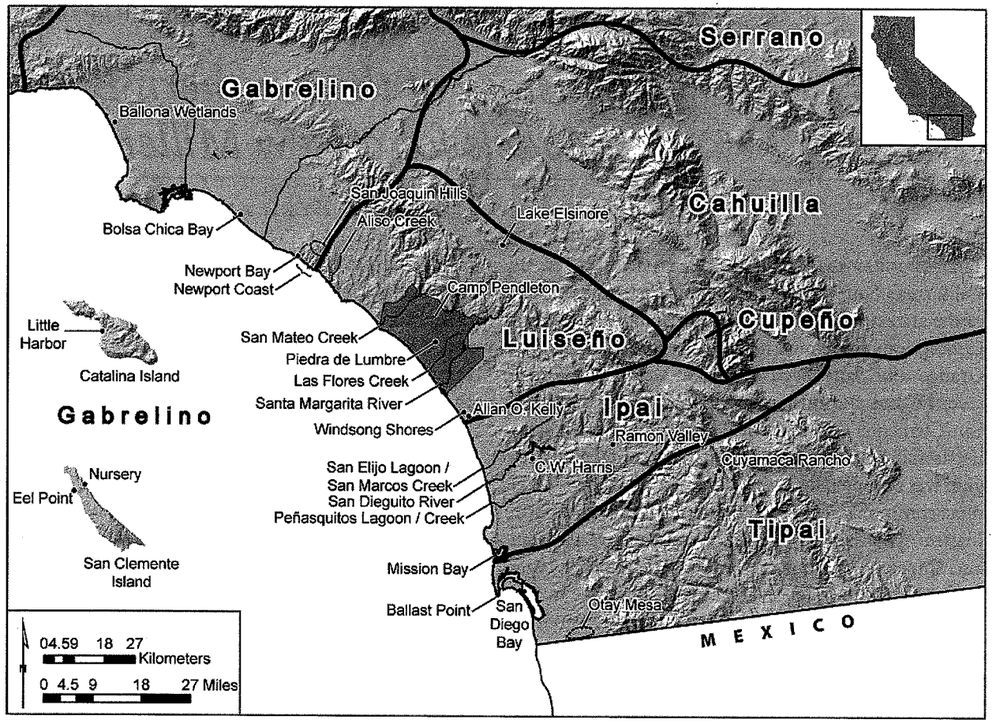


Figure 14.1. Ethnographic divisions, archaeological sites, and locations of the Southern Bight.

promises, one of which is our exclusive focus on the prehistoric era. Although historic-era archaeology has made great strides during the past two decades, space limitations do not allow us to treat this topic here. Literally thousands of reports dealing with the prehistory of the study area have appeared during the past two decades—far too many to cite let alone synthesize here. Instead, we summarize what we consider to be important advances on key research topics. This is partly a subjective decision, but it also reflects the research topics that have dominated peer-reviewed publications from the study area. These research themes largely draw on results from the mainland coastal area and the Southern Channel Islands, and to a much lesser extent on results from the more inland parts of the study area. In taking this approach, we emphasize topics that link this large and varied region together and reflect subject matter largely unexplored in the seminal 1984 books. There is no question that the perspectives presented in this chapter are heavily influenced by our own research experiences in the study region; however, we try to acknowledge divergent theoretical viewpoints and interpretations. We may also be able to bring some useful perspectives to this discussion, since both of us have had the good fortune to be involved in long-term, multifaceted research projects in the region. Moreover, this experience encompasses both mainland and insular (Southern Channel Islands) settings.

Our overall approach in this summary is to highlight selected projects and publications that best illustrate the changing research context of the Southern Bight, including the Ballona wetlands, Marine Corps Base Camp Pendleton, Lake Elsinore, Newport coast and bay projects, San Joaquin Hills projects, San Clemente Island, and San Nicolas Island (Altschul and Grenda 2002; Altschul et al. 1992; Byrd and Berryman 2006; Gamble and Russell 2002; Grenda 1997; Grenda et al. 1994; Koerper et al. 2002; Mason et al. 1997; Raab 1997; Raab et al. 2002; Reddy and Berryman 1999a, b;Vellanoweth et al. 2002) (Figure 14.1; Table 14.1).

THE RADIOCARBON REVOLUTION: HOW OLD IS THE PAST?

Modern archaeology has been aided by many technical advances but none more important than the radiocarbon revolution. Archaeological progress depends directly on accurately determining the age of objects and events from the past. Yet during most of the twentieth century, archaeologists were often forced to work with only a relative sense of time, usually as a result of observing changes in the style of artifacts they excavated from the layers of archaeological sites (Trigger 1989). It was not until the 1970s and 1980s that radiocarbon dating was routinely employed in California archaeology, and the increased levels of research funding afforded by cultural resources management (CRM) archaeology played a major role in this trend. During the past two decades, detailed chronologies of prehistoric cultural development have become available for the first time in many regions of California (Breschini et al. 2004). For example, Koerper et al. (2002:67) note that almost 1,300 radiocarbon dates are now available for Orange County alone. San Clemente Island is currently represented by about 400 radiocarbon dates, San Nicolas Island may rival this number, and Camp Pendleton has more than 200 radiocarbon dates (Byrd and Reddy 2002; Vellanoweth et al. 2002). This rich database is allowing researchers to move away from coarse-grained cultural sequences (Early, Middle, Late; Paleo-Indian, Archaic, Late Prehistoric) and really track the tempo of change, note the precise point in time for key developments, and provide a coherent approach to correlating the timing of external variables and internal social change. Much more rigorous use of radiocarbon data is needed (beyond simple comparisons of aggregate number of dates per century), along with consistent reporting, calibration, and use of the reservoir correction (Byrd et al. 2004).

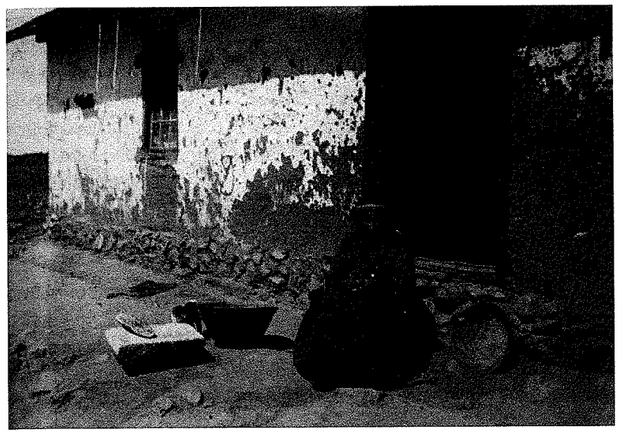


Figure 14.2. Native Luiseño woman, Pi-yum'ko, Coronacion Pauvel, San Diego September 1901. (Courtesy of the Bancroft Library, University of California–Berkeley, photograph by C. Hart Merriam, cat. no. 1978.008/2300/p4 no. 1.)

CHRONOLOGY OF PREHISTORY: EARLY, MIDDLE, AND LATE HOLOCENE

California archaeologists advanced many different prehistoric cultural chronologies during the twentieth century (Moratto 1984:xxxii–xxxiii). While these chronologies were constructed to serve various research objectives, we have essentially adopted Erlandson and Colten's (1991:1–2) division of the Holocene into Early, Middle, and Late subdivisions. This approach offers an intuitive and consistent alternative to the disparate and sometimes confusing chronologies found in the archaeological literature. For our purposes we have broken the Holocene into the following three-part chronology: Early Holocene, 9600 cal B.C. to 5600 cal B.C.; Middle Holocene, 5600 to 1650 cal B.C.; and Late Holocene, 1650 cal B.C. to cal A.D. 1769 (Spanish colonization of California with first mission constructed at San Diego).

The Early Holocene

TRADITIONAL MODELS OF EARLY HUMAN SETTLEMENT As discussed in Chapter 4, traditional models of California prehistory postulate that the state's first inhabitants were Paleo-Indian big-game hunters who ranged across North America during the closing phases of the last Ice Age (Fagan 2003; Moratto 1984; Wallace 1978). Evidence for Paleo-Indian occupation of southern California, particularly the coastal areas, remains scanty at best (Erlandson 1991b), and there is still wide-ranging support for scenarios that derive California's first coastal populations from the interior of western North America, perhaps as a result of the impact of post-Pleistocene climate change (Erlandson 1994:269–272). As the (Wisconsin) Ice Age began to wane, warming and drying conditions between about 10,000 and 8000 cal B.C. are thought to have triggered far-reaching cultural responses in California. In the desert interior, lakes and streams that were once fed by moist Pleistocene climatic conditions began to shrink. Cultures dependent on these lacustrine environments, subsumed under the heading of a Western Pluvial Lakes Tradition (WPLT), responded by exploiting a wider range of plant and animal species and by mi-

Table 14.1. Prominent Archaeological Sites and Projects in the Southern Bight Region

Site / Project Area	*Description*	*Recent Major Reference*
Allan O. Kelly Site (SDI-9649)	Key early La Jollan site	Koerper et al. 1991
Ballast Point Site (SDI-48)	Major Middle Holocene maritime site	Gallegos and Kyle 1998
Eel Point site (SCLI-43)	Major multicomponent (Early Holocene onward) habitation site	Raab et al. 2002
C.W. Harris Site (SDI-149)	Type site of San Dieguito, Early Holocene	Warren et al. 1998
Little Harbor (SCAI-17)	Major Middle Holocene rockshelter	Raab et al. 1995
Nursery Site (SCLI-1215)	Middle Holocene village site	Raab et al. 1994
Piedra de Lumbre Quarry (SDI-10,008)	Unique chert quarry	Pigniolo 1994
Windsong Shores (SDI-10,965)	Early Holocene La Jollan site	Gallegos 1991
Lake Elsinore site (RIV-2798)	Major trans-Holocene site	Grenda 1997
Ballona Wetlands	Major locus of trans-Holocene occupation	Altschul et al. 2005
Bolsa Chica Bay	Major Middle Holocene onward excavations	Koerper et al. 2002
Camp Pendleton	Major survey and excavations, trans-Holocene	Reddy and Berryman 1999a, 1999b; Byrd and Berryman 2006
Cuyamaca Rancho State Park	Late Holocene upland settlement system	Gamble 2004; Gross and Sampson 1990
Newport Coast Project	Major survey and excavations, trans-Holocene	Mason et al. 1997; Koerper et al. 2002
Otay Mesa	Numerous surveys and excavations, trans-Holocene	Kyle et al. 1990, Robbins-Wade 1992
Ramon Valley Project	Cluster of Late Prehistoric inland sites	Cooley and Barrie 2004
San Joaquin Hills Projects	Major survey and excavations, dominated by Late Prehistoric	Koerper et al. 2002, Strudwick 2005
San Clemente Island	Numerous surveys and excavations, trans-Holocene	Yatsko 2000
San Elijo Lagoon Project	Early – Middle Holocene shell middens	Byrd et al. 2004
San Nicolas Island	Surveys and excavations, trans-Holocene	Martz and Rosenthal 2001

grating to regions with more favorable moisture conditions, including the southern California coast.

Some archaeologists see developments of this kind at the C. W. Harris site (SDI-149) in San Diego County (Carrico et al. 1991; Warren et al. 1998). Leaf-shaped and large-stemmed projectile points, scrapers, and other stone tools from the Harris site define the San Dieguito Complex (Warren 1968), which is considered to be technologically similar to interior WPLT sites. Radiocarbon dates of only ca. 8000 to 6500 cal B.C. from the Harris site, the low number of similar sites of comparable age in the region (Pigniolo 2005; Chapter 4 in this volume), and an ongoing debate on the relationship between the Harris site and sites of similar age with different lithic technologies along the coast (e.g., the Windsong Shore and the Allan O. Kelly [SDI-9649] sites; see Table 14.1, Figure 14.1) suggest that this problem needs additional research and new data (Gallegos 1991; Koerper et al. 1991; Moratto 1984:97–99; Warren et al. 1998).

After this initial settlement, traditional models suggest, coastal groups gradually adopted marine foods such as shellfish and fish, particularly after post-Pleistocene sea level rise created estuaries and bays, the remnants of which dot the San Diego and Orange County coastlines today. In this context, the La Jolla Complex of the Archaic Period flourished along the coast (Gallegos 1992; Moratto 1984; Rogers 1966; Warren et al. 1998). These shell middens are generally characterized by flaked cobble tools, basin metates, manos, discoids, and flexed burials. Initial Archaic exploitation of the San Diego area littoral zone is generally considered to have entailed sizable semisedentary populations focused around resource-rich bays and estuaries (Crabtree et al. 1963; Gallegos 1992; Moriarty et al. 1959; Shumway et al. 1961; Warren 1964, 1968; Warren and Pavesic 1963; Warren et al. 1961). Shellfish were interpreted as a dietary staple; plant resources (both nuts and grasses) were also important contributors to the diet, while hunting and fishing were less important.

EARLY HUMAN SETTLEMENT: CALIFORNIA PALEOCOASTAL TRADITION Archaeological findings from the past two decades challenge these traditional scenarios. Current evidence suggests that the initial human settlement of California, including the Southern Bight, was a more complex phenomenon than envisioned in traditional models. Perhaps the most dramatic change in our understanding of this process comes from the coast. At present, the oldest reliably established coastal occupation in California—perhaps the oldest archeological site in the state—is Daisy Cave (SMI-261) on San Miguel Island, about 40 kilometers off the Santa Barbara coast (see Chapters 4, 13 this volume). The oldest cultural layer at Daisy Cave is dated to between 9600 and 9000 cal B.C., making it one of the oldest archaeological sites currently known in California (Erlandson et al. 1996). Orange and San Diego Counties and the Southern Channel Islands have not yet produced equally early dates, but radiocarbon evidence shows occupation of the coastal region between ca. 8000 and 7000 cal B.C. (Byrd 2003; Byrd et al. 2004; Gallegos 1991; Koerper et al. 1991, 2002:Fig. 5.2).

EARLY SETTLEMENT OF THE SOUTHERN CHANNEL ISLANDS Some of the most detailed evidence of early maritime cultural development comes from the Southern Channel Islands, particularly San Clemente Island. During the past 20 years, San Clemente Island has emerged as a major natural laboratory for the study of coastal prehistory. Like the other Channel Islands, archaeological preservation on San Clemente is exceptional owing to many factors, including a lack of both burrowing animals and urban industrial development. Although San Clemente Island has been the scene of numerous archaeological investigations during the past 20 years by university and CRM-based researchers, the Eel Point archaeological site (SCLI-43) is the oldest and most extensively documented site on the island (Cassidy et al. 2004; Raab and Yatsko 1992; Raab et al. 2002; Yatsko 2000). With occupation beginning between 6500 and 6000 cal B.C. and ending about the time of European contact, Eel Point offers important insights about the cultural characteristics of Early Holocene coastal dwellers.

EARLY BOATS, SEA TRAVEL, AND A MARITIME ECONOMY Located about 40 kilometers from the other nearest island (Santa Catalina) and 77 kilometers from the mainland coast, San Clemente Island, even during lowered sea levels of the last Ice Age, could only be reached by water. The occupation of San Clemente and other Channel Islands during the Early Holocene affords circumstantial yet unequivocal evidence of some of the earliest sea travel in North America. However, recent discoveries at Eel Point provide intriguing evidence of early maritime technology, including stone tools capable of fabricating boats. Cassidy et al. (2004) show that this tool kit, dating to 6000 cal B.C., was technologically comparable to tools used by historic Chumash Indians to make wooden seagoing canoes (see Chapter 5 in this volume).

Early settlement of the Channel Islands is significant because these islands offered few land-based foods, resulting in obligatory maritime economies. Studies at Eel Point show that during the Early Holocene, site inhabitants enjoyed a highly productive marine economy, based to a large extent on hunting seals, sea lions, and dolphins and collecting shellfish (Garlinghouse 2000; Porcasi and Fujita 2000; Porcasi et al. 2000). Based on these data, coastal locations, including the Channel Islands, offered attractive settlement locations to early human settlers. These data help explain why paleocoastal cultural traditions appeared in southern California and vindicate Moratto's hypothesis regarding the existence of this tradition.

The Middle Holocene

Traditional models of California prehistory view the Middle Holocene as a time of cultural transition, during which Early Holocene cultural adaptations were gradually modified into forms recognizable during the Late Holocene. For example, across much of central and southern California, millingstone cultures appeared around 6000–5000 cal B.C. featuring an adaptation focused on collection and processing of small plant seeds and the hunting of a variety of medium and small game animals. In the Southern Bight, environmental factors are thought to have played a major role in altering these early, generalized hunting and gathering adaptations.

Traditional reconstruction of Middle Holocene occupation on the mainland has emphasized sizable, semisedentary populations focused around the resource-rich bays and estuaries of San Diego and Orange Counties (Crabtree et al. 1963; Gallegos 1992;

Moriarty et al. 1959; Shumway et al. 1961; Warren 1964, 1968; Warren and Pavesic 1963; Warren et al. 1961). Shellfish have been interpreted as dietary staples; plant resources (both nuts and grasses) were also an important dietary component, while hunting and fishing were thought to be less important.

This adaptive strategy, often referred to as the La Jolla Culture in the San Diego area or the Millingstone Horizon in Orange County, was viewed as remaining largely unchanged for several thousand years. According to Warren et al. (1961:25), "the La Jolla Complex reached its population and cultural climax between 7000 and 4000 years ago when there was a plentiful supply of shellfish in the lagoons along the coast." This reconstruction went on to posit major changes in human adaptations after 4,000 years ago when estuarine silting was considered to have become so extensive that it caused a decline in associated shellfish populations. This in turn was considered to have caused a major depopulation of the coastal zone, with settlements shifting inland to a river valley orientation, intensifying exploitation of terrestrial small game and plant resources, possibly including acorns (Christenson 1992; Crabtree et al. 1963; Gallegos 1985, 1987, 1992; Masters and Gallegos 1997; Rogers 1929:467; Warren 1964, 1968; Warren and Pavesic 1963; Warren et al. 1961). The coast was thought to have been abandoned or only seasonally occupied, with a possible slight increase in coastal occupation after 1,600 to 1,200 years ago.

Today Middle Holocene occupation of the mainland region is recognized as considerably more diverse than initially posited. Important Middle Holocene sites have been documented in inland settings, while considerable variability is recognized in adaptive strategies along the length of the Southern Bight littoral zone (Byrd and Reddy 2002; Mason et al. 1997; Masters and Gallegos 1997). In addition, there are many localities along the coastline where continuity in occupation from the Middle to the Late Holocene is now well documented. For example, San Diego Bay, Mission Bay, the Peñasquitos Lagoon/Sorrento Valley area, San Elijo Lagoon/Escondido Creek, the Santa Margarita River drainage, Las Flores Creek, and San Mateo Creek in the San Diego area all include settlements that were occupied from the later part of the Middle Holocene into the Late Holocene (Byrd et al. 2004; Byrd and Reddy 2002; and references therein). Thus initial impressions of uniform coastal settlement changes near the end of the Middle Holocene have not been widely verified by subsequent archaeological research.

Moreover, independent paleoenvironmental data collected recently from a series of drainages reveals that the exact timing and magnitude of coastal habitat changes varied considerably within the region (Altschul et al. 2005; Anderson and Byrd 1998; Byrd 2003; Byrd et al. 2004; Davis 1992; Pope 1997; Waters et al. 1999). Well-dated, continuous sequences of Holocene geologic deposits extending back prior to 9000 cal B.C. in the three drainage systems (Las Flores Creek, San Elijo Lagoon/ Escondido Creek, and the lower Santa Margarita River valley) reveal complex physiographic histories. Notably, the larger drainage systems were more likely than smaller systems to remain tidally flushed and maintain rich estuarine habitats during climatic downturns. Overall, new data clearly demonstrate that patterns of environmental changes and cultural response along the Southern Bight mainland were quite different and much more diverse than previously suspected.

CULTURAL INTERACTION AND MIGRATION The Middle Holocene has rarely been viewed as a time of large-scale cultural interaction by groups living across California or between California and the rest of the American West. Archaeologists have generally theorized that regional cultural interaction spheres arose during the Late Holocene, as regional trade networks sprang up as an adjunct to increasing techno-economic efficiency and the desires of social elites to acquire social power and wealth through the control of these networks (Arnold, ed. 2001; Gamble and Russell 2002). Intriguing evidence has emerged, however, of geographically expansive trade networks and spheres of culture interaction linking the Southern Bight with a vast region of the American West during the Middle Holocene.

Based initially on excavations on Santa Catalina and San Clemente Islands, Howard and Raab (1993), Raab and Howard (2000), and Raab et al. (1994) proposed that *Olivella* grooved rectangle (OGR) beads, a rare type manufactured from the marine purple olive shell *(Olivella biplicata),* may mark a 5,000-year-old OGR corridor—a trade network extending from the Southern Channel Islands across southern California through the Mojave Desert, along the western fringes of the Great Basin to Oregon. Additional OGR beads were identified on San Nicolas Island, placing these beads on each of the three largest Southern Channel Islands. Yet despite more than a century of archaeological investigations, including considerable attention to marine shell beads, no examples of the OGR type are reported from the Northern Channel Islands. Based on this evidence, Howard and Raab (1993) proposed that OGR beads might mark a discrete Middle Holocene sphere of trade and interaction that included the Southern Channel Islands and portions of the adjacent mainland; a sphere that, remarkably, excluded the Northern Channel Islands, only 80 kilometers distant.

Vellanoweth (1995) subsequently recovered OGR beads on San Nicolas Island from a stratigraphic context dated ca. 3500–2900 cal B.C.; one OGR specimen produced a direct date of 3500–3300 cal B.C. (Vellanoweth 1995:17). Jenkins and Erlandson (1996) also demonstrated the existence of OGR beads at the DJ Ranch site in the Fort Rock Valley of central Oregon. These specimens, the most distant from the southern California coast recorded to date, are close to the younger end of the age spectrum for California OGR beads; they were recovered from context dated ca. 2900–1500 cal B.C. (Jenkins and Erlandson 1996). This discovery added a dramatically greater spatial dimension to the OGR distributional pattern:

> As suggested by Howard and Raab (1993) and others, the distribution of OGR beads along the southern California coast and their presence in Middle Holocene sites in the western and northern Great Basin may support the existence of an early cultural interaction sphere, possibly linking Uto-Aztecan peoples of the southern California coast and the western Great Basin. Remarkably, more OGR beads have now been found at the DJ Ranch site in central Oregon, up to 1,200 km from their probable point of origin on the southern Channel Islands, than have been found in the heavily studied Santa Barbara Channel region immediately to the north of the proposed cultural interaction sphere. (Jenkins and Erlandson 1996:301)

This evidence opened up another intriguing possibility. Based on linguistic evidence, California anthropologists have long hypothesized that, at some time or times during prehistory, speakers of Uto-Aztecan languages migrated from the Great Basin across southern California, and eventually colonized the Southern Channel Islands. The movement of these peoples across southern California is thought to have displaced resident groups, creating a distinctive "Shoshonean wedge" of speakers of Uto-Aztecan languages across southern California (Kroeber 1925; Moratto 1984; see also Chapters 6, 19 this volume). Noting that the distribution of ORG beads closely corresponds to this Shoshonean wedge, some researchers have suggested that they may mark an ancient migration route or alignment of linguistically linked population about 5,000 years ago (Raab and Howard 2000; Vellanoweth 1995). Other researchers point to Middle Holocene human skeletal evidence from the Southern Channel Islands as possible evidence of such a migration, arguing that genetically distinct group of islanders appears in the islands in a time frame that is compatible for Middle Holocene migrations of new populations into California and the Southern Channel Islands, including San Clemente and San Nicolas (Kerr and Hawley 2002; Titus 1987).

MARITIME SEDENTISM Traditionally, Middle Holocene groups have been viewed as Archaic-style hunter-gatherers, with seasonally mobile settlement patterns. According to these scenarios, groups such as Millingstone folk moved their camps with the changing seasons in order to better obtain various food resources. Dynamics of this kind were thought to have provided little incentive to invest large amounts of labor in substantial houses or permanently occupied villages. Recent evidence shows, however, that small maritime villages consisting of substantial house structures appeared on San Clemente Island at least as early as the Middle Holocene.

Some of the most detailed information about house construction on prehistoric San Clemente Island comes from the Nursery site (SCLI-1215) and the Eel Point archaeological site (SCLI-43). At the Nursery site, named after a nearby native plant nursery, UCLA investigators initially discovered saucer-shaped house floors about 0.5 meter deep and 4.0 to 5.0 meters in diameter, with evidence of collapsed whale bone roof structures (Rigby 1985). A charcoal sample from one these structures yielded a radiocarbon date of ca. 2000 cal B.C. (Rigby 1985). Subsequent work at the site exposed a complete house structure (House Pit 2), described by Salls et al. (1993). Like the UCLA discovery, this house was constructed in a circular pit 4.5 meters in diameter and about 0.5 meter deep. This work showed that whale bone roof members had once been set in holes between 10 and 30 centimeters in diameter at the floor perimeter. The stub of a whale rib was still in place in one of these holes. Large quantities of whale bone were found on the house floor, including masses of whale bone at the east and west periphery of the floor (Salls et al. 1993:186–188). This house yielded a date of ca. 2800 cal B.C. (Raab et al. 1994; Figure 14.3). Research at the site suggests that these houses were part of a Middle Holocene village containing at least 18 dwellings (Raab et al. 1994). The Nursery site is not alone in producing evidence of early house construc-



Figure 14.3. House structure at the Nursery site, San Clemente Island.

tion. Fiore (1998) described Middle Holocene house features at SCLI-43, the Eel Point site that produced radiocarbon dates comparable to the oldest house remains from Nursery (Fiore 1998:31).

These data may point to some of the earliest residential structures in coastal California, if not the state. Salls et al. (1993) argue that structures of this kind indicate a substantial degree of residential permanence, and that these structures were part of communities occupied for more than one season each year, if not on a year-round basis. Currently the seasons during which sites such as Nursery and Eel Point were occupied are not known in detail, making it difficult to determine the longevity of annual occupation of the domestic structures. However, middens adjacent to the San Clemente Island houses rival deposits associated with mainland sites that were occupied for multiple seasons during the latter portion of the Late Holocene (Byrd 1998; Byrd and Reddy 2002). In the study region, house structures have been only infrequently encountered in mainland settings (Grenda et al. 1998; Winterbourne 1967), in large part due to more extensive bioturbation and modern development. The presence of daub on some mainland sites does indicate that structures were present (Strudwick 2005). Based on this evidence, the appearance of sedentary communities appears to reflect a more temporally and spatially complex pattern than traditional models of cultural development suggest. It might also be noted that two of the Middle Holocene houses at the Nursery site produced OGR beads from their floors, linking this community to the OGR bead pattern (Howard and Raab 1993; Raab et al. 1994).

The Late Holocene

According to traditional models, the Late Holocene was the time period during which cultural patterns and tribal groups observable by early Euro-American explorers and settlers emerged. Sometime after cal A.D. 500, the bow and arrow appeared, with ceramics adopted after cal A.D. 1000 at the start of (or during) the Late Prehistoric Period (Meighan 1954; Rogers 1945; True 1966; Warren 1964, 1968). Many also supposed that this was a time when migrations created the historic linguistic landscape and new forms of social expression, including mortuary practices with cremations, replaced inhumations. This period was typically characterized as resource rich, and climatic instability not discussed. Surpluses of food, especially acorns, were thought to have sustained the social arrangements documented by anthropologists in the twentieth century. These ideas were in accord with the notions of Kroeber (1925) and other early authorities, who characterized aboriginal California, particularly coastal areas, in terms of virtually assured natural food supplies and some of the world's most benign climatic regimes. Subsequent theorizing and synthetic accounts of coastal adaptations have often elaborated

on this perspective, emphasizing highly successful cultural adaptations and high levels of social complexity. The utopian character of these theories has been characterized as benign environmental determinism by some observers (Raab and Jones 2004).

In contrast, an extensive body of research during the past two decades has revealed more complex and dynamic regional and local patterns of change. The empirical patterns that have emerged from these studies stand in marked contrast to the scenarios described above. The timing of the adoption of new technologies (such as the bow and arrow and ceramics) and social expressions (particularly cremations) vary greatly within the region, typically earlier in the east than the west and occurring very late and minimally in some coastal and insular contexts (Byrd 2003; Christenson 1990; Gallegos 2002; Gamble and Russell 2002; Griset 1996; Koerper et al. 1996, 2002; McDonald and Eighmey 1998). Dynamic patterns of intergroup trade and interaction, as well as intragroup dynamics, played major roles in these trends.

These studies also suggest that culture change was sometimes rapid rather than gradual; stressful times were not limited to postcontact times but occurred periodically during the prehistoric era; littoral and marine resources remained extremely important; and major shifts took place in subsistence practices, settlement patterns, and the organization of labor (Byrd and Reddy 2002; Gallegos 2002; Koerper et al. 2002; Raab et al. 2002; Vellanoweth et al. 2002). In particular, recent research has explored the impact of resource intensification dynamics and paleoenvironmental fluctuations on culture change (Jones et al. 1999).

SUBSISTENCE CHANGE Contrary to the glowing assessments offered by traditional models of Late Holocene coastal adaptation, the long-term trajectory of many California foraging adaptations appears to be marked by overexploitation of high-ranked food items, leading to resource depression and shifts to more costly resources. Dynamics of this kind have been identified for many of the food resources used by the region's prehistoric coastal populations, including shellfish, fish, sea mammals, terrestrial mammals, and plant remains (Byrd 1996; Byrd and Reddy 2002; Koerper et al. 2002; Raab 1992; Raab and Yatsko 1992; Raab et al. 2002; Salls 1988; Vellanoweth et al. 2002). Thus during the Late Holocene, hunter-gatherers throughout the Southern Bight region increasingly focused on smaller resources that generally occurred in greater amounts.

For example, on San Clemente Island, where trans-Holocene maritime hunting-fishing-gathering practices have been studied in detail at the Eel Point and other archaeological sites, the hunting of large sea mammals and relatively productive shellfish gave way during the Late Holocene to enormously intensified fishing, small sea mammal hunting, and collecting of the smallest species of shellfish. These trends appear to reflect a marked decrease in foraging efficiency over time (Broughton and O'Connell 1999; Garlinghouse 2000; Glassow 1996a:36–39; Hildebrandt and Jones 1992; Kelly 1995; Porcasi et al. 2000). Although resource intensification of this kind is currently viewed in various ways, Broughton (1997: 846) defines it as "a process by which the total productivity or yield per areal unit of land is increased at the expense of declines in overall caloric return rates or foraging efficiency." Thus resource intensification is the result of consuming increasing quantities of lower-ranked, less-productive food species.

Turning to a mainland example, an extensive body of data from Camp Pendleton has demonstrated that Late Holocene subsistence practices emphasized the most abundant nearby resources, notably smaller, labor-intensive shellfish, fish, small terrestrial mammals, and small-seeded plants (Byrd 1996; Byrd and Reddy 1999, 2002). Smaller shellfish, most notably *Donax gouldii* but also *Tegula,* became key elements of this subsistence strategy (Byrd 1996; Reddy 1996a, 1999a). The dietary importance of large mammals declined during the Late Holocene, while small terrestrial mammals increasingly dominated the terrestrial meat diet. Fish resources were focused primarily on smaller, nearshore schooling species, and entailed a decrease in diversity (Wake 1999). Similar trends have been noted along the Newport coast and the San Joaquin Hills (Koerper et al. 2002:70–72).

At the same time, a wide range of local plant resources (over four dozen genera) were exploited along the northern San Diego coast during the Late Holocene (Klug and Popper 1995; Martin and Popper 1998, 1999; Reddy 1996b, 1997a, b, 1999a, b, 2001, 2003). Plant resource exploitation was focused on species requiring higher handling costs, particularly grasses (Poaceae) (Reddy 1999b). Grass seeds belonging to *Bromus/Stipa* spp., *Hordeum* sp., *Phalaris* sp., and *Sporobulus* sp. occurred in the highest frequencies. Direct macrobotanical evidence of acorn exploitation is minimal, a trend also noted at more inland Late Holocene sites (Reddy 1997b, 2004). It remains uncertain whether this pattern reflects dietary emphasis, acorn processing methods, or

both. "Fire followers" (plants that thrive in open areas created by regular fires) are represented to varying degrees at Late Holocene coastal sites. These include *Callandria, Lotus, Marah,* corms/bulbs from wild flowers, *Hordeum, Trifolium, Chenopodium,* and *Poaceae.* These patterns may indicate that intentional burning took place to varying degrees along the coast (Blackburn and Anderson 1993).

Bean and Lawton's (1976) publication on protoagriculture (drawing on ethnohistoric and ethnographic observations) argued that when the Spanish first entered the San Diego region, grasses were intensively manipulated, seasonal burning was an important aspect of this process, and in all probability it entailed cultivation in a variety of coastal settings (Shipek 1989). Recently this topic has been explicitly addressed by research examining morphological changes in wild barley in coastal Orange County (Klug and Koerper 1991) and the modeling of crop processing stages and the documentation of intensive exploitation of small-seeded plants near the end of the Holocene on coastal Camp Pendleton (Reddy 1999a, 2001, 2003).

These important studies show the tremendous potential for such research but also highlight how we lag behind our colleagues elsewhere in the United States. For example, systematic and intensive paleoethnobotanical investigations in eastern North America (where literally thousands of liters of sediment have been floated and studied) have revolutionized perspectives on early agriculture and revealed an indigenous pristine hearth for agriculture that entailed small seed resources such as *Chenopodium* (Smith 2001). Only by conducting intensive archaeological research and investing substantial research funds on this topic will researchers in California make comparable advances. Until that time, the alluring possibility of indigenous cultivation in the Southern Bight will remain in the murky realm of conjecture.

SETTLEMENT PATTERN RECONFIGURATION Both mainland and Channel Island locations witnessed the emergence of similarly structured settlement patterns during the Late Holocene (Byrd and Reddy 1999, 2002; Koerper et al. 2002; Raab et al. 2002), suggesting that the study area may reflect robust, widespread shifts in regional land use. Regional settlement organization was powerfully conditioned by techno-economic adaptations and provides another line of evidence to examine intensification dynamics. Late Holocene coastal southern California was dramatically affected by several correlates of resource intensification. A key aspect was the emergence of a distinctive type of Late Holocene settlement pattern characterized by comparatively large residential camps linked to numerous ephemeral satellite sites. The smaller sites were nonrandomly distributed, short-term encampments, some of which were dedicated to relatively specialized subsistence tasks. Such patterns are now documented on San Clemente Island (Raab et al. 2002) and on the mainland coast in the San Joaquin Hills and on Camp Pendleton (Brewster et al. 2003; Byrd and Reddy 1999, 2002; Koerper et al. 2002). Site types in each area include major residential bases, short-term residential camps, and limited activity sites (Rosenthal et al. 2001).

These trends are undoubtedly tied to changes in subsistence practices. As subsistence strategies increasingly focused on smaller resources that required more time and effort to procure and process, their exploitation entailed more complex settlement configurations that included both targeting and encounter strategies. These trends accelerated during the Late Holocene, particularly after about cal A.D. 1300.

RELATED CHANGES IN HUNTER-GATHERER SOCIETIES These changes in settlement and subsistence strategies were undoubtedly tied to broader changes in social interaction. Associated changes in social discourse may have included increasing community size, greater lengths of stay at major residences, and shifts in intracommunity organization. The latter may have entailed major social reorganization (with political and economic leaders emerging), more need for structured decision making with respect to the assignment of economic tasks, and formal mechanisms for dealing with scheduling conflicts. A particularly intriguing aspect of this issue entails whether the gender-based division of labor noted ethnohistorically emerged with the shift to intensive mass collection and harvesting of shellfish and grasses (Jones 1996; McGuire and Hildebrandt 1994).

CAUSAL FACTORS The key question arises, What were the causal factors underlying these changes in subsistence practices, settlement organization, and other related activities? Recent years have seen arguments linking critical changes in economy and settlement patterning with paleoenvironmental fluctuations, which in turn initiated productive debates over periodic overexploitation as a factor in structuring Late Holocene island adaptations based largely on fishing and the nature of mainland littoral adaptations (Laylander and Christenson 1988; Rosenthal et al. 2001). Despite the research advances engendered by these models and related debates, a number of important questions remain unresolved. One of the most important of these involves unraveling the potential causal interrelationship between paleoenvironmental fluctuations and social factors in bringing about Late Holocene cultural patterns.

Research of the past several decades has emphasized the high population density of the region's hunter-gatherers, their intensified economies, and their relatively complex sociopolitical systems. Depending on a few ubiquitous but low-ranked, labor-intensive, and storable resources put Late Holocene people in ecological jeopardy, since few alternative foodstuffs were available in times of resource stress. While much of the Holocene archaeological record may reflect a process of intensification and population growth, it is also probable that this long-term trend toward intensification put coastal populations at increasing risk in the event of severe fluctuations in the climate. With the Late Holocene emphasis on low-ranked resources and mass harvesting, more limited options were available to increase production, and these economies may have been more vulnerable to high-intensity environmental change (Jones et al. 1999:155).

Recent evidence derived from a series of problem-oriented projects along the coast in this region reveal that the settlement and subsistence responses to paleoenvironmental changes were dynamic and locally innovative as well as nonenvironmentally deterministic, and did not entail coastal abandonment (Altschul et al. 2005; Byrd and Reddy 2002; Gallegos 2002; Gamble and Russell 2002; Koerper et al. 2002). These new results demonstrate intensification in the exploitation of littoral resources and coastal occupation. Those who championed the traditional interpretations of southern California coastal prehistory noted earlier viewed this pattern as evidence of an extraordinary degree of adaptive continuity across time. This seems simplistic at best; however, since profound differences in settlement and subsistence patterns that emerged during the Late Holocene have been revealed by recent research.

A particularly important aspect of this discussion has been the impact of unusually severe and persistent medieval-era droughts (often referred to as the Medieval Climatic Anomaly, MCA) on longer-term adaptive trends (Jones et al. 1999). An important part of this argument has been that long-term shifts in foraging efficiency prior to the MCA positioned Late Holocene hunter-gatherers for disaster (Jones et al. 1999). Studies of the MCA anomaly have been productively pursued in mainland and insular settings. For example, Yatsko's (2000) research on San Clemente Island shows that this semiarid island, acutely sensitive to changes in moisture, reflects dramatic changes in settlement patterning between about cal A.D. 1100 to 1300, shifts that appear to reflect the reorganization of settlement around areas with a greater geological potential for surface water.

We do not mean to imply that all Late Holocene adaptive changes were caused by negative environmental change, but rather that rapid external changes may have served as catalysts for internal changes within hunter-gatherer communities. Indeed it is possible that recent discussion has on occasion overemphasized negative external change as a driver of social change. At Camp Pendleton, the proliferation of more specialized sites occurs immediately after the end of the Medieval Climatic Anomaly around cal A.D. 1300, and this is the time frame after which most small sites flourish on San Clemente as well. These post-MCA changes imply that rapid improvement in the environment may have released some of the environmental pressures on population levels and their spatial distribution, and fostered an increased presence of hunter-gatherers on the landscape.

Overall, two major points have emerged from recent Late Holocene research. First, external change was rapid and often negative, and communities in the Southern Bight reacted in a variety of novel ways to these fluxes in external conditions. Second, casual relationships between shifts in social organization and external variables were extremely complex, and will require high-resolution data to fully resolve. We suspect that these trends toward greater intensification imply that potentially profound changes occurred with respect to the social institutions of these hunter-gatherer communities. Although new types of gear and equipment were also needed, we do not consider that these social changes required major technological breakthroughs. From our perspective, the crucial changes in intracommunity socioeconomic organization were related to the greater investment in time necessary to collect, process, and store smaller food resources, and the impact of changes in the organization of labor on settlement structure.

PREHISTORY UPSIDE DOWN

Based on recent research in the Southern Bight, prehistory turns out to be much different than once thought. Once accepted notions about prehistoric cultural development have been turned upside down. Intensively maritime economies, seafaring, residential sedentism, and large-scale trade networks were viewed traditionally as hallmarks of a Late Holocene

cultural climax in southern California, culminating millennia of incremental cultural improvements. A large body of evidence now shows that these traits were all present thousands of years earlier than once supposed, and culture change was highly variable across time and space. Substantial evidence shows that sea travel and distinctively maritime cultural adaptations were well established during the Early Holocene, if not the Terminal Pleistocene. Residential sedentism and large cultural interaction spheres, including trade, appeared at least as early as the Middle Holocene. Our understanding of the Late Holocene is also shifting. This time period was often conceptualized as a time of paramount socioeconomic elaboration, based on studies of the Chumash Indians of the Santa Barbara coastal region. This picture has given way to appreciation of much greater variation in social complexity and settlement patterns across southern California, including groups such as the Kumeyaay of southern San Diego County. Where monolithic reconstructions of cultural elaboration once held sway, we now have competing theoretical models, some of which view Late Holocene culture change as far more punctuated than once imagined and far more driven by stresses such as climate change and resource depression than adaptive optimality.

These data suggest that a fundamental rethinking is under way about California prehistory and the ways it is studied. We are learning that the prehistoric past contained complex and varied cultural patterns that do not necessarily have analogs in the ethnohistoric present and cannot be explained on the basis of traditional reconstructions of California prehistory.

MODELS FOR A NEW MILLENNIUM

Since the 1984 publication of *California Archaeology* and the *Archaeology of California*, perhaps the most profound change we have witnessed is not simply the dramatic increase in archaeological data, but rather how these data force us to model the past. Earlier we alluded to the fashion in which California archaeology was overshadowed during much of the twentieth century by an anthropological establishment focused to a large extent on ethnohistory. Particularly in an era when archaeological practitioners lacked a detailed sense of prehistoric time, ethnohistoric analogies afforded attractive analogies for reconstructing prehistoric cultural arrangements. Given that Late Holocene archaeological records were frequently the best preserved and most visible, and therefore the most intensively studied, it should come as no surprise that theorizing about culture change across the whole of prehistory frequently revealed the heavy impression of Late Holocene cultural arrangements. While many recognized in the abstract that different kinds of cultural arrangements probably existed in the past, reconstructions of prehistory often reflected a reverse engineering of the Late Holocene—theorizing about the long-term changes that would have been necessary to produce the Late Holocene/Early Historic archaeological/ethnohistoric record. Until the past two decades, this theorizing had to be undertaken with modest stocks of archaeological data, particularly from Middle and Early Holocene time periods. Given the information available to archaeologists during the first three-quarters of the twentieth century, the results are impressive. Whatever questions may now be raised about these reconstructions, these efforts did afford a logical and coherent basis for theory development and analysis of archaeological data.

We increasingly understand, however, that California's prehistoric past was complex, multidirectional, and multicausal. As the data on Early Holocene seafaring, maritime adaptations, Middle Holocene sedentism and trade, and Late Holocene climatic flux and resource scarcity suggest, we can only be misled by imagining the native cultural patterns of the early historic era as analogous to much older time periods. The rich ethnohistoric data on native Californians and ethnographic reconstructions based on early-twentieth-century interviews (rather than participant-observer data) is the envy of archaeologists working on hunter-gatherers in other areas of the world. This information is unquestionably important in understanding how historic native groups adapted to the study region. On the other hand, research of the past two decades demonstrates with increasing clarity that this information has very real limitations. Above we noted increasing agreement that prehistoric culture change was much more variable across time and space than was once suspected. The prehistoric past contained cultural patterns that have no historic analogs. To continue to model large expanses of prehistoric time and space largely on the basis of historical ethnographic analogies is an increasingly questioned practice. However, we are not suggesting that archaeologists ought to ignore ethnohistoric information, since historical patterns tell us how particular groups adapted to cultural and physical environments.

A good approach for the future is the use of modern ethnohistoric research techniques to better understand immediate precontact patterns of social interaction. For example, mission period baptismal, death, marriage, and census registers provide new insight into the size of Native American coastal villages and intervillage relationships. Recent research along these lines suggests, for example, that eight villages of at least 100 individuals existed within the area of modern-day Camp Pendleton and that there was strong patterning in village intermarriage (Johnson and Crawford 1999). These results are inconsistent with the long-held view that settlement patterning in the study region was seasonally bipolar, with only temporary or seasonal camps along the coast (Quintero 1987; Rosenthal et al. 2001; Waugh 1986). Similar techniques are also yielding new insights in the Southern Channel Islands (Johnson 1989).

In contrast to the studies above, we have seen countless reports and publications that first describe alleged native cultural patterns in the Late Prehistoric/Early Historic time frame, then go on to offer opinions about how far back in time these patterns can be recognized in the archaeological data. Many of these reports do not seem to recognize that inferring patterns of behavior from ethnohistoric accounts is as theory-laden an exercise as archaeological inferences drawn from material culture. Through assertion and repetition, popular interpretations of ethnohistory are represented as objectively established facts. We are all entitled to our own opinions, but we are not entitled to our own facts. Ethnohistoric accounts tend to depend on the theoretical assumptions they are paired with. In our view, California research could benefit from a far more open and rigorous discussion of this problem.

Whatever the fate of such a debate, research of the past twenty years confronts us with cultural patterns that cannot be accounted for by reference to historic Indian groups. This is where archaeology can make powerful new contributions. Archaeologists are in a position to understand how the past was different from the ethnohistoric present, and why. To achieve this purpose we need to expand on a couple of trends that have emerged during the past two decades. One of these is the diversification of theoretical models. An examination of the literature cited above shows the deployment of a spectrum of theoretical approaches to the study area, ranging from foraging optimization models to neo-Darwinian selectionist perspectives to culture-historical orientations. The application of a wide range of modern theories of hunter-gatherer behavior (Bettinger 1991; Kelly 1995) is a trend that should be encouraged.

A second major change forced by new data is growing debate among researchers. As theoretical models increasingly compete to explain the past, debate is not only inevitable but highly desirable, for example, questions about whether Early Holocene coastal dwellers were effective seafarers, whether Middle Holocene groups moved away from the mainland coast after bays silted in, whether climatic stress played a role in Late Holocene cultural patterning, whether Late Holocene economic patterns reflect resource depression or abundance, and others. This is a trend that should also be encouraged.

Finally, those who may have worried that archaeological progress would be hampered by the lack of formal regional research designs, the split of archaeology into "academic" and "contract" branches and other ostensible problems, can take heart. The past two decades suggest that archaeologists of all kinds continue to seek explanations of the past in more creative and productive ways. Moratto (1984) and Chartkoff and Chartkoff (1984) helped us gather our thoughts for this task. Their books distilled what many were thinking as California archaeology approached the end of the twentieth century. With these works as reference points, we can now see that California's ancient peoples achieved complex and interesting cultures earlier than we might have imagined. Just as importantly, the Moratto and Chartkoff and Chartkoff volumes signaled the rise of an increasingly sophisticated and intellectually autonomous California archaeology. As these trends continue into the new millennium, archaeology is forging new research models that will undoubtedly transform our understanding of California prehistory yet again.

9.0 INTRODUCTION

The General Plan is an expression of the community's vision for the physical, social, cultural and economic development of Moreno Valley. It supports the City Council's vision for creating a positive future for Moreno Valley. Goals are general expressions of conditions that the City would like to attain. Objectives are specific conditions that the City would like to achieve. Policies are principles or guidelines intended to direct future activities and decisions in order to achieve the goals and objectives. Programs are plans of action to implement or advance the goals, objectives and policies.

9.1 ULTIMATE GOALS

The ultimate goals of the City of Moreno Valley General Plan are to achieve a community which:

I. Exhibits an orderly and balanced land use pattern that accommodates a range of residential, cultural, recreational, business and employment opportunities.

II. Is clean, attractive and free of blight and deteriorated conditions.

III. Provides public services and public facilities that are needed and desired by the community, including, but not limited to, a library(s) and library services.

IV. Enjoys a healthy economic climate that benefits both residents and businesses.

V. Provides recreational amenities, recreation services and open space, including, but not limited to, parks, multi-use trails, community centers and open space.

VI. Enjoys a circulation system that fosters traffic safety and the efficient movement of motor vehicles, bicycles and pedestrians.

VII. Emphasizes public health and safety, including, but not limited to, police, fire, emergency and animal services and protection from floods and other hazards.

VIII. Recognizes the need to conserve natural resources while accommodating growth and development.

9.2 COMMUNITY DEVELOPMENT ELEMENT GOALS, OBJECTIVES POLICIES AND PROGRAMS

9.2.1 COMMUNITY DEVELOPMENT ELEMENT GOALS

Goal 2.1

A pattern of land uses, which organizes future growth, minimizes conflicts between land uses, and which promotes the rational utilization of presently underdeveloped and undeveloped parcels.

Goal 2.2

An organized, well-designed, high quality, and functional balance of urban and rural land uses that will meet the needs of a diverse population, and promote the optimum degree of health, safety, well-being, and beauty for all areas of the community, while maintaining a sound economic base.

Goal 2.3

Achieves an overall design statement that will establish a visually unique image throughout the City.

Goal 2.4

A supply of housing in sufficient numbers suitable to meet the diverse needs of future residents and to support healthy economic development without creating an oversupply of any particular type of housing.

Goal 2.5

Maintenance of systems for water supply and distribution; wastewater collection, treatment, and disposal; solid waste collection and disposal; and energy distribution which are capable of meeting the present and future needs of all residential, commercial, and industrial customers within the City of Moreno Valley.

9.2.2 COMMUNITY DEVELOPMENT ELEMENT OBJECTIVES AND POLICIES

Objective 2.1

Balance the provision of urban and rural lands within Moreno Valley by providing adequate land for present and future urban and economic development needs, while retaining the significant natural features and the rural character and lifestyle of the northeastern portion of the community.

Objective 2.2

Provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups.

Policies:

2.2.1 In determining allowable density for residential parcels an "adjusted net acreage" shall be used. Adjusted net acres shall mean the land area that would remain after dedication of ultimate rights-of-ways for arterial streets, freeways and park dedications.

2.2.2 The primary purpose of areas designated ***Hillside Residential*** is to balance the preservation of hillside areas with the development of view-oriented residential uses.

a. Within the Hillside Residential category, appropriate residential uses include large lot residential uses. Lots smaller than one acre may only be permitted as clustered units to minimize grading, and other impacts on the environment, inclusive of the Multi-Species Habitat Conservation Plan.

b. The maximum residential density within Hillside Residential areas shall be determined by the steepness of slopes within the project. The maximum allowable density shall not exceed one dwelling unit per acre on sloping hillside property and shall decrease with increasing slope gradient.

c. Future development within Hillside Residential areas shall occur in such a manner as to maximize preservation of natural hillside contours, vegetation and other characteristics. Hillside area developments should minimize grading by following the natural contours as much as possible.

d. Development within Hillside Residential areas shall be evaluated to determine the precise boundaries of the area. If the Community Development Director determines that adequate slope information is not available, applicants requesting to develop within these areas shall complete a slope analysis for the proposed development site. Portions of the development that exceed an average slope of 10% shall adhere to the policies within the Hillside Residential category. Portions of the development where the slopes are less than 10% on average shall adhere to policies within the adjacent land use category.

2.2.3 The primary purpose of areas designated ***Rural Residential*** is to provide for and protect rural lifestyles, as well as to protect natural resources and hillsides in the rural portions of the City.

a. The maximum residential density within Rural Residential and areas shall be determined by the steepness of slopes within the individual project area. The maximum allowable density shall be 0.4 dwelling units per acre (an average lot size of 2.5 acres) on flat terrain and shall decrease with increasing slope gradient.

b. Within the Rural Residential category, appropriate residential uses include large lot residential uses. Lots smaller than 2.5 acres may only be permitted as clustered units to minimize grading and other impacts on the environment, inclusive of the Multi-Species Habitat Conservation Plan.

2.2.4 The primary purpose of areas designated ***Residential 1*** is to provide for and protect rural lifestyles. The maximum allowable density for projects within the Residential 1 areas shall be 1.0 dwelling unit per acre.

2.2.5 The primary purpose of areas designated ***Residential 2*** is to provide for suburban lifestyles on residential lots larger than commonly available in suburban subdivisions and to provide a rural atmosphere. The maximum allowable density shall be 2.0 dwelling units per acre.

2.2.6 The primary purpose of areas designated ***Residential 3*** is to provide a transition between rural and urban density development areas, and to provide for a suburban lifestyle on residential lots larger than those commonly found in suburban subdivisions. The maximum allowable density shall be 3.0 dwelling units per acre.

2.2.7 The primary purpose of areas designated ***Residential 5*** is to provide for single-family detached housing on standard sized suburban lots. The maximum allowable density shall be 5.0 dwelling units per acre.

2.2.8 The primary purpose of areas designated ***Residential 10*** is to provide for a variety of residential products and to encourage innovation in housing types. Developments within Residential 10 areas are typically expected to provide amenities not generally found in suburban subdivisions, such as common open space and recreational areas. The maximum allowable density shall be 10.0 dwelling units per acre.

2.2.9 The primary purpose of areas designated ***Residential 15*** is to provide a range of multi-family housing types for those not desiring dwellings on individual lots that include amenities such as common open space and recreational facilities. The maximum allowable density shall be 15.0 dwelling units per acre.

2.2.10 The primary purpose of areas designated ***Residential 20*** is to provide a range of high density multi-family housing types. Developments within Residential 20 areas shall also provide amenities, such as common open spaces and recreational facilities. The maximum density shall be 20 dwelling units per acre.

2.2.11 Densities in excess of the maximum allowable density for residential projects may be permitted pursuant to California density bonus law.

2.2.12 Planned Unit Developments (PUD) shall be encouraged for residential construction in order to provide housing that is varied by type, design, form of ownership, and size. PUD's shall also provide opportunities to cluster units to protect significant environmental features and/or provide unique recreational facilities.

2.2.13 Discourage costly "leap-frog" development patterns by encouraging in-fill development wherever feasible, thereby reducing overall housing costs. Development within an area designated as SP 212-1 (Moreno Highlands) is not considered to be leapfrog development.

2.2.14 Encourage a diversity of housing types, including conventional, factory built, mobile home, and multiple family dwelling units

2.2.15 Encourage the use of innovative and cost effective building materials, site design practices and energy and water conservation measures to conserve resources and reduce the cost of residential development.

2.2.16 Affordable housing developments should be compatible in visual design with surrounding development.

2.2.17 Discourage nonresidential uses on local residential streets that generate traffic, noise or other characteristics that would adversely affect nearby residents.

Objective 2.3

Promote a sense of community and pride within residential areas through increased neighborhood interaction and enhanced project design.

Policies:

2.3.1 Within individual residential projects, a variety of floor plans and elevations should be offered.

2.3.2 Encourage building placement variations, roofline variations, architectural projections, and other embellishments to enhance the visual interest along residential streets.

2.3.3 Discourage the development of single-family residences with a bulk (building mass) that is out of scale with the size of the parcels on which they are located.

2.3.4 Design large-scale small lot single family and multiple family residential projects to group dwellings around individual open space and/or recreational features.

2.3.5 Ensure that all multiple family housing is well-designed, attractive and livable by:

a. Ensuring all structures are architecturally compatible and include decorative architectural features and articulation in walls and roofs;

b. Providing adequate parking, walkways, lighting, landscaping, amenities and open space areas;

c. Providing private open space areas such as patios and balconies.

Objective 2.4

Provide commercial areas within the City that are conveniently located, efficient, attractive, and have safe and easy pedestrian and vehicular circulation in order to serve the retail and service commercial needs of Moreno Valley residents and businesses.

Policies:

2.4.1 The primary purpose of areas designated **Commercial** is to provide property for business purposes, including, but not limited to, retail stores, restaurants, banks, hotels, professional offices, personal services and repair services. The zoning regulations shall identify the particular uses permitted on each parcel of land, which could include compatible noncommercial uses. Commercial development intensity should not exceed a Floor Area Ratio of 1.00 and the average floor area ratio should be significantly less.

2.4.2 The commercial area located at the intersection of **Alessandro Boulevard and Redlands Boulevard** shall provide for commercial land uses that are compatible with the historical, small town nature of the original Moreno town site. The zoning regulations shall identify the particular uses permitted on each parcel of land, which could include compatible noncommercial uses.

2.4.3 The commercial area located on the **north side of State Route 60 at the intersection of Moreno Beach Drive** shall provide for the establishment of commercial land uses that serve the daily needs of the surrounding residential neighborhood and the traveling public. It is not intended to serve the needs of the region for goods, services, entertainment or

recreation. The zoning regulations shall identify the particular uses and type of development permitted on each parcel, which could include office uses and compatible noncommercial uses.

2.4.4 An overlay district limiting land uses to those that are supportive and compatible with medical uses shall be established around the **Riverside County Regional Medical Center and the Moreno Valley Community Hospital**. The zoning regulations shall identify the particular uses and type of development permitted on each parcel.

2.4.5 The primary purpose of locations designated **Mixed-Use** on the Moreno Valley General Plan Land Use map is to provide for the establishment of commercial and office uses and/or residential developments of up to 20 dwelling units per acre. The zoning regulations shall identify the particular uses and type of development permitted on each parcel. Overall development intensity should not exceed a floor area ratio of 1.00.

2.4.6 The primary purpose of areas designated **Residential/Office** on the Moreno Valley General Plan Land Use map is to provide areas for the establishment of office-based working environments or residential developments of up to 15 dwelling units per acre. The zoning regulations shall identify the particular uses and type of residential development permitted on each parcel of land. Overall development intensity should not exceed a Floor Area Ratio of 1.00.

2.4.7 The primary purpose of areas designated **Office** is to provide for office uses, including, administrative, professional, legal, medical and financial offices. The zoning regulations shall identify the particular uses permitted on each parcel of land, which could include limited non-office uses that support and are compatible with office uses. Development intensity should not exceed a Floor Area Ratio of 2.00 and the average intensity should be significantly less.

2.4.8 Orient commercial development toward pedestrian use. Buildings should be designed and sited so as to present a human-scale environment, including convenient and comfortable pedestrian access, seating areas, courtyards, landscaping and convenient pedestrian access to the public sidewalk.

2.4.9 Require reciprocal parking and access agreements between individual parcels where practical.

2.4.10 Design internal roadways so that direct access is available to all structures visible from a particular parking area entrance in order to eliminate unnecessary vehicle travel, and to improve emergency response.

2.4.11 The commercial area located in the vicinity of the intersection of Gilman Springs Road and Jack Rabbit Trail shall provide those commercial support activities necessary and/or incidental to adjacent recreational uses and emphasize tourist-oriented activities and retail services. Recreation-oriented residential land use types may be appropriate to the extent that they are incidental to and complement the recreational character of the area. At such time as the area is annexed to the City, the zoning regulations shall identify the particular uses permitted on each parcel of land.

Objective 2.5

Promote a mix of industrial uses which provide a sound and diversified economic base and ample employment opportunities for the citizens of Moreno Valley with the establishment of industrial activities that have good access to the regional transportation system, accommodate the personal needs of workers and business visitors; and which meets the service needs of local businesses.

Policies:

2.5.1 The primary purpose of areas designated **Business Park/Industrial** is to provide for manufacturing, research and development, warehousing and distribution, as well as office and support commercial activities. The zoning regulations shall identify the particular uses permitted on each parcel of land. Development intensity should not exceed a Floor Area Ratio of 1.00 and the average floor area ratio should be significantly less.

2.5.2 Locate manufacturing and industrial uses to avoid adverse impacts on surrounding land uses.

2.5.3 Screen manufacturing and industrial uses where necessary to reduce glare, noise, dust, vibrations and unsightly views.

2.5.4 Design industrial developments to discourage access through residential areas.

Objective 2.6

Maintain an adequate inventory of lands for the conduct of public, quasi-public, and institutional activities, including protection of areas needed for future public, quasi-public, and institutional facilities.

Policies:

2.6.1 The primary purpose of areas designated ***Public/Quasi-Public*** is to provide property for civic, cultural and public utility uses, including, but not limited to schools, libraries, fire stations, museums, and government offices. The zoning regulations shall identify the particular uses permitted on each parcel of land. Development intensity should not exceed a Floor Area Ratio of 1.00 and the average Floor Area Ratio should be significantly less.

Objective 2.7

Encourage open space preservation through appropriate land use policies that recognize the valuable natural resources and areas required for protection of public safety that exist in the City.

Policies:

2.7.1 The primary purpose of areas designated ***Open Space***, is to provide areas that are substantially unimproved, including, but not limited to areas for outdoor recreation, the preservation of natural resources, the grazing of livestock and the production of crops. Development intensity should not exceed a Floor Area Ratio of 0.10 and the average Floor Area Ratio should be significantly less.

2.7.2 The primary purpose of areas designated ***Floodplain*** is to designate floodplain areas where permanent structures for human occupancy are prohibited to protect of the public health and safety. Development intensity should not exceed a Floor Area Ratio of 0.05.

Objective 2.8

The major purpose of specific plans is to encourage and promote the development of larger-scaled mixed-use developments for the purpose of providing adequate flexibility and innovation in residential building types, land use mixes, site design, and development concepts.

Policies:

2.8.1 In order to provide superior design solutions, reduce adverse environmental impacts, preserve scenic values, and enhance the provision of open space and other amenities, transfers of residential densities permitted under the General Plan may be accomplished in accordance with the following:

a. The transfer of residential densities may be accomplished only pursuant to approval of a planned unit development or hillside development.

b. Up to one hundred percent (100%) of the density indicated on the General Plan Land Use map may be transferred within a single hillside development or planned unit development project. Densities may not be transferred from one project to another.

c. The proposed transfer of densities shall be accomplished such that the project results in a superior use of land, increased sensitivity to the environment, and/or enhanced project amenities without an increased burden on public facilities and services.

2.8.2 To the extent that development policies, land use standards, design guidelines, and other provisions of the adopted specific plans are, by their content, intended to address issues contained in the objectives, policies, and implementation programs of the Moreno Valley General Plan, and are inconsistent with the provisions of the General Plan, then the provisions of those specific plans shall be controlling; otherwise, all other provisions of the Moreno Valley General Plan shall remain in effect.

Objective 2.9

Maintain City boundaries that are logical in terms of City service capabilities, economic development needs, social and economic interdependencies, citizen desires, and City costs and revenues.

Policies:

2.9.1 Support and encourage the annexation of unincorporated areas within the General Plan study area for which:

a. Long-term benefits will be derived by the City;

b. Adequate infrastructure and services have been or can be economically provided in accordance with current City standards;

c. The proposed annexation will generate sufficient revenues to adequately pay for the provision of City services within a reasonable period of time.

Objective 2.10

Ensure that all development within the City of Moreno Valley is of high quality, yields a pleasant living and working environment for existing and future residents, and attracts business as the result of consistent exemplary design.

Policies:

2.10.1 Encourage a design theme for each new development that is compatible with surrounding existing and planned developments.

2.10.2 Screen trash storage and loading areas, ground and roof mounted mechanical equipment, and outdoor storage areas from public view as appropriate.

2.10.3 Require exterior elevations of buildings to have architectural treatments that enhance their appearance.

a. A design theme, with compatible materials and styles should be evident within a development project;

b. Secondary accent materials, colors and lighting should be used to highlight building features;

c. Variations in roofline and setbacks (projections and recesses) should be used to break up the building mass.

d. Industrial buildings shall include architectural treatments on visible facades that are aesthetically pleasing.

2.10.4 Landscaping and open spaces should be provided as an integral part of project design to enhance building design, public views, and interior spaces; provide buffers and transitions as needed; and facilitate energy and resource conservation.

2.10.5 Development projects adjacent to freeways shall provide landscaped buffer strips along the ultimate freeway right-of-way.

2.10.6 Buildings should be designed with a plan for adequate signage. Signs should be highly compatible with the building and site design relative to size, color, material, and placement.

2.10.7 On-site lighting should not cause nuisance levels of light or glare on adjacent properties.

2.10.8 Lighting should improve the visual identification of structures. Within commercial areas, lighting should also help create a festive atmosphere by outlining buildings and encouraging nighttime use of areas by pedestrians.

2.10.9 Fences and walls should incorporate landscape elements and changes in materials or texture to deter graffiti and add visual interest.

2.10.10 Minimize the use and visibility of reverse frontage walls along streets and freeways by such treatments as landscaping, berming, and "side-on" cul-de-sacs.

2.10.11 Screen and buffer nonresidential projects from adjacent residential property and other sensitive land uses when necessary to mitigate noise, glare and other adverse effects on adjacent uses.

2.10.12 Screen parking areas from streets to the extent consistent with surveillance needs (e.g. mounding, landscaping, low profile walls, and/or grade separations).

2.10.13 Provide landscaping in automobile parking areas to reduce solar heat and glare.

2.10.14 Preserve or relocate existing mature trees and vegetation where practical. Mature trees shall be replaced when they cannot be preserved or relocated.

2.10.15 Emphasize the "gateway status" of lands in the vicinity of the intersection of I-215 and State Route 60, at the intersection of Alessandro Boulevard and I-215, at the intersection of Perris Boulevard and State Route 60, and at State Route 60 and Gilman Springs Road. In the vicinity of those areas designated as having "gateway status", the City shall encourage community identification signing.

Objective 2.11

Maintain a water system that is capable of meeting the daily and peak demands of Moreno Valley residents and businesses, including the provision of adequate fire flows.

Policies:

2.11.1 Permit new development only where and when adequate water services can be provided.

Objective 2.12

Maintain a wastewater collection, treatment, and disposal system that is capable of meeting the daily and peak demands of Moreno Valley residents and businesses.

Policies:

2.12.1 Prior to the approval of any new development application ensure that adequate septic or sewer service capacity exists or will be available in a timely manner.

Objective 2.13

Coordinate development activity with the provision of public infrastructure and services to eliminate possible gaps in service provision.

Policies:

2.13.1 Limit the amount of development to that which can be adequately served by public services and facilities, based upon current information concerning the capability of public services and facilities.

2.13.2 Unless otherwise approved by the City, public water, sewer, drainage and other backbone facilities needed for a project phase shall be constructed prior to or concurrent with initial development within that phase.

2.13.3 It shall be the ultimate responsibility of the sponsor of a development project to assure that all necessary infrastructure improvements (including system wide improvements) needed to support project development are available at the time that they are needed.

2.13.4 Encourage installation of advanced technology infrastructure, including, but not limited to, infrastructure for high speed internet access and solar energy.

Objective 2.14

Establish and implement comprehensive solutions to the financing of public facilities that adequately distribute costs based on the level of benefit received and the timing of development.

Policies:

2.14.1 Conduct periodic review of public facilities impact mitigation fees in accordance with state statutes to ensure that the charges are consistent with the costs of improvements. Utilize the service and mitigation standards contained in the Moreno Valley General Plan as the basis for determining improvement costs.

2.14.2 Promote the establishment of benefit assessment districts, Mello-Roos Community Facilities Districts, tax increment financing, and other financing mechanisms in combination with programmed capital improvements to eliminate existing public service and facility gaps, and to provide necessary facilities in advance of the impacts created by development.

2.14.3 Review development projects for their impacts on public services and facilities including, but not necessarily limited to, roadways, water, sewer, fire, police, parks, and libraries and require public services or facilities to be provided at the standards outlined in the Moreno Valley General Plan and the standards of applicable service agencies.

Objective 2.15

Ensure that all Moreno Valley residents have access to high-quality educational facilities, regardless of their socioeconomic status or location within the City.

Policies:

2.15.1 Encourage an ongoing open liaison with all school districts regarding proposed school design and siting to maximize access and minimize impacts to adjacent uses.

Objective 2.16

Maintain local library facilities and reserves in accordance with the following minimum standards: 0.5 square feet of library space and 1.2 volumes per capita.

Policies:

2.16.1 Encourage inter-library loan agreements with the County library system and those of surrounding cities to provide the widest possible variety of materials to library patrons.

2.16.2 Provide for the expansion of library facilities as needed to keep pace with the growing population of Moreno Valley.

Objective 2.17

Provide cultural facilities, including history (natural, cultural and children's) and art museums and performing arts facilities.

Policies:

2.17.1 Promote the development and construction of a civic/cultural center and museums.

Objective 2.18

Promote social services programs that meet the special needs for childcare, the elderly, and the disabled.

Policies:

2.18.1 Ensure that a full range of human service programs are available to meet the lifetime development needs of residents of all ages, including the special needs of seniors, families, children, disabled persons, and youth groups.

2.18.2 Encourage day care through zoning regulations by permitting such facilities in all compatible zoning classifications.

2.18.3 Work closely with local schools, private companies, churches, non-profit agencies, government social service agencies, and community groups to facilitate the provision of community services.

2.18.4 Encourage the development of senior citizens independent living and congregate care facilities in locations with convenient access to social, commercial, and medical services.

2.18.5 Promote volunteer involvement in all public programs and within the community as a whole.

9.2.3 COMMUNITY DEVELOPMENT ELEMENT PROGRAMS

2-1 Develop a community signing scheme for street corridors, public buildings and selected entrances to the community and its sub-communities.

2-2 Review and revise the Municipal Code to implement the goals, objectives and policies stated in the General Plan.

2-3 Conduct a detailed capital improvement program using the revised population projections and proposed land use characteristics of the General Plan.

2-4 Periodically study the feasibility of extending the sphere of influence north of the city limits and annexing unincorporated areas along the city boundary.

2-5 Disseminate local childcare resource information and provide referral service to residents and businesses.

2-6 Encourage demand-response public transportation facilities, such as the mini-bus or dial-a-ride systems in order facilitate the transportation needs of the elderly and the disabled.

2-7 Provide City information identifying available social services and facilities in a broad range of formats.

2-8 Evaluate existing social programs under the City's purview, and determine if they adequately address the needs of the aged, the disabled, low-income families and persons in crisis situations.

2-9 Work with other jurisdictions to seek changes in state law to allow reasonable controls on the location of community care facilities, foster homes and sober living facilities.

9.3 ECONOMIC DEVELOPMENT ELEMENT GOALS, OBJECTIVES, POLICIES AND PROGRAMS

9.3.1 ECONOMIC DEVELOPMENT ELEMENT GOALS

To be inserted after development of Economic Development Strategy.

9.3.2 ECONOMIC DEVELOPMENT ELEMENT POLICIES

To be inserted after development of Economic Development Strategy.

9.3.3 ECONOMIC DEVELOPMENT ELEMENT PROGRAMS

To be inserted after development of Economic Development Strategy.

9.4 PARKS, RECREATION AND OPEN SPACE ELEMENT GOALS, OBJECTIVES, POLICIES AND PROGRAMS

9.4.1 PARKS RECREATION AND OPEN SPACE ELEMENT GOALS

Goal 4.1

To enhance Moreno Valley as a desirable place in which to live, work, shop, and do business.

Goal 4.2

To retain an open space system that will conserve natural resources, preserve scenic beauty, promote a healthful atmosphere, provide space for outdoor recreation, and protect the public safety.

9.4.2 PARKS, RECREATION AND OPEN SPACE ELEMENT OBJECTIVES AND POLICIES

Objective 4.1

Retain agricultural open space as long as agricultural activities can be economically conducted, and are desired by agricultural interests, and provide for an orderly transition of agricultural lands to other urban and rural uses.

Policies:

4.1.1 Encourage grazing and crop production as a compatible part of a rural residential atmosphere.

Objective 4.2

Provide safe, affordable and accessible recreation facilities and programs to meet the current and future needs of Moreno Valley's various age and interest groups and promote the provision of private recreational facilities.

Policies:

4.2.1 Neighborhood parks shall serve as the day-to-day recreational areas of the City, Neighborhood parks should be within a reasonable walking distance of the population served. Community parks may also serve day-to-day recreation needs. That portion of the community and/or regional facilities that provide similar amenities to those found in neighborhood parks shall also be considered as meeting this objective.

4.2.2 Community parks shall provide opportunities for participation in sports and related athletic activities, water-oriented recreation and other special interest activities (e.g. golf, tennis, equestrian, etc).

4.2.3 Employ a multifaceted approach in the financing and acquisition, development and maintenance of parkland, including the financing of parklands through development fees, state and federal grant-in-aid programs, gifts and donations, and other sources.

4.2.4 Encourage special events (tournaments, festivals, celebrations) that reflect the uniqueness of Moreno Valley and contribute to community identity, cohesiveness and stability.

4.2.5 Work in conjunction with private and public school districts and other public agencies to facilitate the public use of school grounds and facilities for recreational activities. The City shall also encourage the development of park sites adjacent to school facilities to maximize recreational opportunities in Moreno Valley.

4.2.6 The City shall use cost effectiveness, demand and need for service and potential return on investment as

criteria for the development and operation of future recreational facilities and programs.

4.2.7 The City level of service standard is 3 acres of developed parkland for every 1,000 new residents. Exceptions from this ratio may be made in exchange for extraordinary amenities of comparable economic value. Land not suitable for active recreation purposes may not be counted toward fulfilling parkland dedication requirements.

4.2.8 Encourage the development of recreational facilities within private developments, with appropriate mechanisms to ensure that such facilities are properly maintained and that they remain available to residents in perpetuity.

4.2.9 In conjunction with the school districts, civic organizations, and other private, civic-minded entities, encourage and participate in the provision of organized recreational activities for Moreno Valley residents of all ages.

4.2.10 Involve individuals and citizen groups reflecting a cross section of Moreno Valley citizens (including youth and adults) in the planning, design and maintenance of parks, recreation facilities and recreation programs.

4.2.11 Emphasize joint planning and cooperation with all public agencies as the preferred approach to meeting the parks and program needs of Moreno Valley citizens.

4.2.12 Include multi-functional spaces and facilities in parks to facilitate cultural events.

4.2.13 Provide recreation programs and access to facilities at reasonable costs.

4.2.14 Establish linear parks in agreement with public and private utilities, including the State of California along the California Aqueduct, for the use and maintenance of utility corridors and rights-of-way for recreational purposes.

4.2.15 Work closely with Riverside County Parks Department in its open space program to ensure that trail systems within Moreno Valley effectively link open space components.

4.2.16 Acquire land jointly with the local school districts for future school/park sites.

4.2.17 Require new development to contribute to the park needs of the City.

4.2.18 Provide lighted sports fields to increase availability and utilization of courts and playing field facilities.

Objective 4.3

Develop a hierarchical system of trails which contribute to environmental quality and energy conservation by providing alternatives to motorized vehicular travel and opportunities for recreational equestrian riding, bicycle riding, and hiking, and that connects with major regional trail systems.

Policies:

4.3.1 The City's network of multiuse trails, including regional trails, community trails, and local feeder trails, shall (1) be integrated with recreational, residential and commercial areas, schools and equestrian centers; (2) provide access to community resources and facilities, and (3)

connect urban populations with passage to hillsides, ridgelines, and other scenic areas.

4.3.2 The City shall establish an agreement with public and private utilities for the use and maintenance of utility corridors and rights-of-way for trail purposes.

4.3.3 All new development approvals shall be contingent on trail right-of-way dedication and improvement in accordance with the Master Plan of Trails (Figure 4-5).

4.3.4 In conjunction with all development review, the City shall consider multiuse trail access and traditional travel routes through the property.

4.3.5 In conjunction with the review and approval of nonresidential developments, the City should consider the use of multiuse trail amenities such as hitching posts, benches, rest areas, and drinking facilities.

4.3.6 Wherever possible, development of residential areas conditioned for animal keeping on lots of ½ acre or larger, shall include a decomposed granite trail on one side of the street and traditional concrete sidewalk on the other.

4.3.7 Trail design and construction should take into consideration the safety and convenience of all trail users as the primary concern.

4.3.8 The City should facilitate the development of a multiuse regional trail system.

4.3.9 Unless otherwise specified due to fire department requirements, access or as established by a specific plan, city trails along roadways shall be ten (10) feet wide and shall be constructed with decomposed granite or equal material and shall provide appropriate fencing or other devices where needed to delineate trails from vehicular rights-of-way.

4.3.10 Where firefighting access is required, trails shall be 20' wide to meet the needs of the Fire Department and its equipment. Fire Department requirements shall be met in all conditions where access is required.

4.3.11 In unusual situations where legal or topographical barriers exist (e.g., excessive slope, the configuration of right-of-way, existing vegetation, etc.), the City shall have the discretion to amend the trail requirement as needed to accomplish the goals of this General Plan.

4.3.12 Local feeder trails shall connect residential lots in property zoned for horse keeping to the community trail system.

4.3.13 The City will encourage volunteer programs for the improvement of existing trails for the purpose of providing an integrated trail network that is safe, functional and readily accessible.

4.3.14 Where feasible, use drainage courses, utility rights-of-way and other such opportunities to incorporate trail and open space elements in the design of major development projects.

4.3.15 Utilize the Citizen's Advisory Board on Recreational Trails in making recommendations to City Council for the distribution of funds for the construction of new trails.

9.4.3 PARKS, RECREATION AND OPEN SPACE PROGRAMS

4-1 Develop a parks and recreation facilities master plan to implement the Parks and Recreation Element.

4-2 Develop policies and criteria for the establishment of trails and rest/picnic areas in natural open space areas.

4-3 Set policies and criteria for the establishment of greenbelt standards and design guidelines to allow flexibility in design of greenbelt/parks/open spaces areas within new development as long as non-auto circulation corridors (for equestrians, bicycles, pedestrians, etc.) are provided and the overall dedication requirement for greenbelt and park facilities is met.

4-4 Explore the feasibility of requiring new development to provide a percentage of the development in greenbelt area.

4-5 Provide on-going opportunities for public involvement and input into the park planning process.

4-6 Maintain advisory committees, such as the Parks and Recreation Advisory Committee, created by City Council in 1988, to serve in an advisory capacity on parks and recreation issues.

4-7 Work with coalitions of sports organizations to define mutually compatible facility needs and mechanisms for the development, construction, operation and maintenance of these facilities.

4-8 Investigate the feasibility of establishing a non-profit foundation to seek and receive donations from private sources for the support of Parks and Recreation programs and facilities.

4-9 Acquire land and develop neighborhood and community parks in the "Recommended Future Parkland Acquisition Areas" shown in Figure 4-4.

4-10 Prepare a comprehensive plan of trails that clearly defines the routing of city trails and is part of the General Plan.

4-11 Develop policies and criteria for the establishment of multiuse trails and rest/picnic areas in natural open space areas.

4-12 Periodically review the Master Plan of Trails to show existing and planned trails.

4-13 Enact ordinances requiring developers to incorporate trail corridors into their development plans in accordance with the Master Plan of Trails.

4-14 Develop standards for residential feeder trails to guide developers in locating and constructing trails and for the arrangement of on-going maintenance requirements of the trails.

4-15 Establish a fee system for the equitable distribution of the cost of developing and maintaining trails citywide.

4-16 Investigate the feasibility of creating a special district(s) for the purpose of acquiring and managing open space and trails.

4-17 Seek out and apply for grants sponsored by state and federal agencies, such as the Recreational Trails Program administered by the Federal Highways Administration and the State Department of Parks and Recreation.

9.5 CIRCULATION ELEMENT GOALS, OBJECTIVES, POLICIES AND PROGRAMS

9.5.1 CIRCULATION ELEMENT GOALS

Goal 5.1

Develop a safe, efficient, environmentally and financially sound, integrated vehicular circulation system consistent with the City General Plan Circulation Element Map, Figure 9-1, which provides access to development and supports mobility requirements of the system's users.

Goal 5.2

Maintain safe and adequate pedestrian, bicycle, and public transportation systems to provide alternatives to single occupant vehicular travel and to support planned land uses.

9.5.2 CIRCULATION ELEMENT OBJECTIVES AND POLICIES

Objective 5.1

Create a safe, efficient and neighborhood-friendly street system.

Policies:

5.1.1 Plan access and circulation of each development project to accommodate vehicles (including emergency vehicles and trash trucks), pedestrians, and bicycles.

5.1.2 Plan the circulation system to reduce conflicts between vehicular, pedestrian and bicycle traffic.

5.1.3 Require adequate off-street parking for all developments.

5.1.4 Driveway placement shall be designed for safety and to enhance circulation wherever possible.

5.1.5 Incorporate American Disability Act (ADA) and Title 24 requirements in roadway improvements as appropriate.

5.1.6 Design new developments to provide opportunity for access and circulation to future adjacent developments.

Objective 5.2

Implement access management policies.

Policies:

5.2.1 Locate residential units with access from local streets. Minimize direct residential access from collectors. Prohibit direct single-family driveway access on arterials and higher classification roadways.

5.2.2 Feed short local streets into collectors.

5.2.3 Encourage the incorporation of traffic calming design into local and collector streets to promote safe vehicle speeds.

5.2.4 Design new subdivisions to minimize the disruptive impact of motor vehicles on local streets. Long, broad and linear streets should be avoided. Residential streets should be no wider than 40 feet, and should have an uninterrupted length of less than one half mile. Curvilinear streets and cul-de-sacs are preferred. Streets within the subdivision should be designed to facilitate access to residences and to discourage through traffic.

Objective 5.3

Maintain Level of Service (LOS) "C" on roadway links, wherever possible, and LOS "D" in the vicinity of SR 60 and high employment centers. Figure 9-2 depicts the LOS standards that are applicable to all

segments of the General Plan Circulation Element Map.

Policies:

5.3.1 Obtain right-of-way and construct roadways in accordance with the designations shown on the General Plan Circulation Element Map and the City street improvement standards.

5.3.2 Wherever feasible, promote the development of roadways in accordance with the City standard roadway cross-sections, as shown in Figure 9-3. Cross-sections range from two-lane undivided roadways to 8-lane divided facilities.

5.3.3 Create new roadway classifications to accommodate future traffic demand, including; Divided Major Arterial – Reduced Cross-Section, and Divided Arterial – 6-lane. These cross-sections are shown on Figure 9-3.

5.3.4 For planning purposes, utilize LOS standards shown on Table 5 –1 to determine recommended roadway widths.

5.3.5 Ensure that new development pays a fair share of costs to provide local and regional transportation improvements and to mitigate cumulative traffic impacts. For this purpose, require new developments to participate in Transportation Uniform Mitigation Fee Program (TUMF), the Development Impact Fee Program (DIF) and any other applicable transportation fee programs and benefit assessment districts.

5.3.6 Where new developments would increase traffic flows beyond the LOS C (or LOS D, where applicable), require appropriate and feasible mitigation measures as a condition of approval. Such measures may include extra right-of-way and improvements to accommodate left-turn and right-turn lanes at intersections, or other improvements.

5.3.7 Provide consideration to projects that have overriding regional or local benefits that would be desirable even though the LOS standards cannot be met. These projects would be required to analyze traffic impacts and mitigate such impacts to the extent that it is deemed feasible.

5.3.8 Pursue arterial improvements that link and/or cross the State route 60 (SR-60) Freeway, including an additional over-crossing at Graham Street.

5.3.9 Address additional widenings at arterials providing access to SR-60 at Day Street, Frederick Street/Pigeon Pass road and Perris Boulevard.

Objective 5.4

Maximize efficiency of the regional circulation system through close coordination with state and regional agencies and implementation of regional transportation policies.

Policies:

5.4.1 Coordinate with Caltrans and the Riverside County Transportation Commission (RCTC) to identify and protect ultimate rights-of-way, including those for freeways, regional arterial projects, transit, bikeways and interchange expansion.

5.4.2 Coordinate with Caltrans and RCTC regarding the integration of Intelligent Transportation Systems (ITS) consistent with the principles and recommendations of the Inland Empire Regional ITS Architecture Project.

5.4.3 Work with property owners, in

cooperation with RCTC, to reserve rights-of-way for potential Community and Environmental Transportation Acceptability Process (CETAP) corridors through site design, dedication, and land acquisition, as appropriate.

5.4.4 The City Council will commit to establishing ongoing relationships with all agencies that play a role in the development of the City's transportation system. Council members who are appointed to these agencies as City representatives shall seek out leadership roles to maximize their effectiveness on behalf of the City. Council will strive to maintain continuity in their appointments of representatives to promote effective representation.

5.4.5 Work with RCTC, WRCOG, and the TUMF Central Zone Committee to facilitate the expeditious construction of TUMF Network projects, especially projects that directly benefit Moreno Valley.

5.4.6 Cooperatively participate with SCAG, RCTC, and WRCOG in the planning for a transportation system that anticipates regional needs for the safe and efficient movement of goods and people.

5.4.7 Utilizing a combination of regional, state and federal funds, development impact fees, and other locally generated funds, provide needed improvements along SR 60 and the associated interchanges, including interchange and grade separation improvements.

5.4.8 Reserve rights-of-way to accomplish future improvements as specified in the Caltrans District 8 Route Concept Fact Sheet for SR-60. Specifically, SR-60 shall be built to six general purpose lanes and two High Occupancy Vehicle (HOV) lanes through Moreno Valley. Additional auxiliary lanes may be required between interchanges. The need for auxiliary lanes will be determined from future studies.

5.4.9 Lobby the State Legislature to keep triple trailer trucks off highways in developed areas of California.

Objective 5.5

Maximize efficiency of the local circulation system by using appropriate policies and standards to design, locate and size roadways.

5.5.1 Space Collectors between higher classification roadways within development areas at appropriate one-quarter mile intervals.

5.5.2 Provide dedicated left-turn lanes at all major intersections on minor arterials and higher classification roadways.

5.5.3 Prohibit points of access from conflicting with other existing or planned access points. Require points of access to roadways to be separated sufficiently to maintain capacity, efficiency, and safety of the traffic flow.

5.5.4 Wherever possible, minimize the frequency of access points along streets by the consolidation of access points between adjacent properties on all circulation element streets, excluding collectors.

5.5.5 Design streets and intersections in accordance with the Moreno Valley Municipal Code.

5.5.6 Consider the overall safety, efficiency and capacity of street designs as more important than the location of

on-street parking.

5.5.7 For developments fronting both sides of a street, require that streets be constructed to full width. Where new developments front only one side of a street, require that streets be constructed to half width plus an additional 12-foot lane for opposing traffic, whenever possible. Additional width may be needed for medians or left and/or right turn lanes.

5.5.8 Whenever possible, require private and public land developments to provide on-site and off-site improvements necessary to mitigate any development-generated circulation impacts. A review of each proposed land development project shall be undertaken to identify project impacts to the circulation system. The City may require developers to provide traffic impact studies prepared by qualified professionals to identify the impacts of a development.

5.5.9 Design curves and grades to permit safe movement of vehicular traffic per applicable Caltrans and Moreno Valley standards.

5.5.10 Provide adequate sight distances for safe vehicular movement at all intersections and driveways.

5.5.11 Implement National Pollutant Discharge Elimination System Best Management Practices relating to construction of roadways to control runoff contamination from affecting water resources.

Objective 5.6

Support development of a ground access system to March Inland Port in accordance with its development plan as a major cargo airport.

Policies:

5.6.1 Ensure that City arterials that provide access to and from March Inland Port are properly designed to accommodate projected traffic volumes, including truck traffic.

5.6.2 Ensure that traffic routes to March Inland Port are planned to minimize impacts to City residential communities.

Objective 5.7

Design roads to meet the needs of the residents of the community without detracting from the "rural" atmosphere in designated portions of Moreno Valley. (Designated "rural" areas include those encompassed by the Residential Agriculture 2, Residential 1, Rural Residential and Hillside Residential zoning districts. "Urban" areas encompass all other zoning districts.)

Policies:

5.7.1 Pursue development of modified sidewalk standards for local and collector roads within low density areas to reflect the rural character of those areas.

5.7.2 Provide sidewalks on arterials in designated low density areas that provide access to schools and bus stops.

Objective 5.8

Encourage development of an efficient public transportation system for the entire community.

Policies:

5.8.1 Support the development of high-speed transit linkages, or express routes, that would benefit the citizens

and employers of Moreno Valley.

5.8.2 Support the efforts of the March Joint Powers Authority in its pursuit of a Transit Center

5.8.3 Encourage public transportation opportunities that address the particular needs of transit dependent individuals in the City such as senior citizens, the disabled and low -income residents.

5.8.4 Ensure that all new developments make adequate provision for bus stops and turnout areas for both public transit and school bus service.

5.8.5 Continue on-going coordination with transit authorities toward the expansion of transit facilities into newly developed areas.

Objective 5.9

Support and encourage development of safe, efficient and aesthetic pedestrian facilities.

Policies:

5.9.1 Encourage walking as an alternative to single occupancy vehicle travel, and help ensure the safety of the pedestrian as follows:

(a) All new developments shall provide sidewalks in conformance with the City's streets cross-section standards, and applicable policies for designated urban and rural areas.

(b) The City shall actively pursue funding for the infill of sidewalks in developed areas. The highest priority shall be to provide sidewalks on designated school routes.

5.9.2 Walkways shall be designed to minimize conflicts between vehicles and pedestrians.

5.9.3 Where appropriate, provide amenities such as, but not limited to, enhanced paving, seating, and landscaping to enhance the pedestrian experience.

5.9.4 Require the provision of convenient and safe pedestrian access to buildings from the public sidewalk.

Objective 5.10

Encourage bicycling as an alternative to single occupant vehicle travel for the purpose of reducing fuel consumption, traffic congestion, and air pollution. The Moreno Bikeway Plan is shown in Figure 9-4.

Policies:

5.10.1 Bikeways shall link residential neighborhood areas with parks, employment centers, civic and commercial areas, and schools.

5.10.2 Integrate bikeways, consistent with the Bikeway Plan, with the circulation system and maintain Class II and III bikeways as part of the City's street system.

5.10.3 Support bicycle safety programs, and active enforcement of laws relating to the safe operation of bicycles on City streets.

5.10.4 Link local bikeways with existing and planned regional bikeways.

Objective 5.11

Eliminate obstructions that impede safe movement of vehicles, bicyclists, and pedestrians.

Policies:

5.11.1 Landscaping adjacent to City streets,

sidewalks and bikeways shall be designed, installed and maintained so as not to physically or visually impede public use of these facilities.

(a) The removal or relocation of mature trees, street trees and landscaping may be necessary to construct safe pedestrian, bicycle and street facilities.

(b) New landscaping, especially street trees shall be planted in such a manner to avoid overhang into streets, obstruction of traffic control devices or sight distances, or creation of other safety hazards.

5.11.2 Driveways shall be designed to avoid conflicts with pedestrian and bicycle travel.

Objective 5.12

Promote efficient circulation planning for all school sites that will maximize pedestrian safety, and minimize traffic congestion and neighborhood impacts.

Policy:

5.12.1 Coordinate with school districts to identify suggested pedestrian routes within existing and new subdivisions for school children to walk to and from schools and/or bus stops.

9.5.3 CIRCULATION ELEMENT PROGRAMS

5-1 Periodically review current traffic volumes, traffic collision data, and the pattern of urban development to coordinate, program, and as necessary revise the planning and prioritization of road improvements.

5-2 Periodically, reassess the goals, objectives and policies statements of the Circulation Element and propose amendments, as necessary.

5-3 Develop a comprehensive strategy to ensure full funding of the circulation system. The strategy will include the DIF, TUMF, and other funding sources that may be available to the City. In addition, the creation of benefit assessment districts, and road and bridge fee districts may be considered where appropriate.

5-4 Develop a multi-year transportation infrastructure improvement program that, to the extent feasible, phases the construction of new projects in advance of new development.

5-5 The above referenced program will prioritize circulation improvement projects to be funded from DIF, TUMF and other sources. Prioritization to consider the following factors:

(a) Traffic safety;
(b) Congestion relief;
(c) Access to new development;
(d) Equitable benefit.

5-6 Conduct studies of specified arterial segments to determine if any additional improvements will be needed to maintain an acceptable LOS at General Plan build-out. Generally, these segments will be studied as new developments are proposed in their vicinity. Measures will be identified that are consistent with the Circulation Element designation of these roadway segments, such as additional turn lanes at intersections, signal optimization by coordination and enhanced phasing, and travel demand management measures.

The study of specified arterial segments will be required to identify

measures to maintain an acceptable LOS at General Plan build-out for at least one of the reasons discussed below:

(a) Segments will need improvement, but their ultimate volumes slightly exceed design capabilities.
(b) Segments will need improvements but require inter-jurisdictional coordination.
(c) Segments would require significant encroachment on existing adjacent development if built-out to their Circulation Element designations.

5-7 Establish traffic study guidelines to deal with development projects in a consistent manner. The traffic study guidelines shall include criteria for projects that propose changes it the approved General Plan land uses.

5-8 Develop access guidelines for arterials with commercial frontage to facilitate access to development and preservation of safe flow of traffic. A component of guidelines shall address shared access.

5-9 Collaborate with all adjacent jurisdictions to implement and integrate right-of-way requirements and improvement standards for General Plan roads that cross-jurisdictional boundary.

5-10 Support regional projects that improve access to Moreno Valley. Examples of specific ongoing projects that should be supported include:

(a) CETAP Cajalco alignment and extension to State Route 241 in Orange County;

(b) CETAP Moreno Valley to San Bernardino alternative alignments including Reche Canyon Road / Reche Vista Road alignment and the Pigeon Pass Road to Pepper Avenue alignment;

(c) TUMF Backbone Network projects to widen Alessandro Boulevard and Van Buren Boulevard;

(d) Measure A projects to widen SR-60 through the Badlands, widen Interstate 215 (I-215) from Riverside interchange to Interstate 10, and extension of San Jacinto commuter rail line;

(e) Construction of commuter rail stations in Highgrove, and at the intersection of Alessandro at I-215;

(f) Construction of HOV ramp connector from westbound SR-60 to south bound I-215;

(g) Widen SR-60/I-215 from Moreno Valley interchange to Riverside interchange.

5-11 Work with RCTC, Caltrans, County of Riverside, adjacent jurisdictions and other affected agencies to plan and develop a multi-modal transportation system.

5-12 Coordinate with Caltrans to redesign and reconstruct the SR-60 interchanges with Day Street, Perris Boulevard, Nason Street, Moreno Beach Drive, Redlands Boulevard, Theodore Street and Gilman Springs Road.

5-13 Implement Transportation demand management (TDM) strategies that reduce congestion in the peak travel hours. Examples include carpooling, telecommuting, and flexible work hours.

5-14 Implement programs in support of the efforts of Riverside Transit Agency toward the expansion of the existing bus system within the City and the provision of future public transportation consistent with the Riverside County Transit Plan.

5-15 Work with Riverside County Transportation Commission and Riverside Transit Agency to implement the Transit Oasis system.

5-16 Implement programs that mitigate on-street hazards for bicyclists.

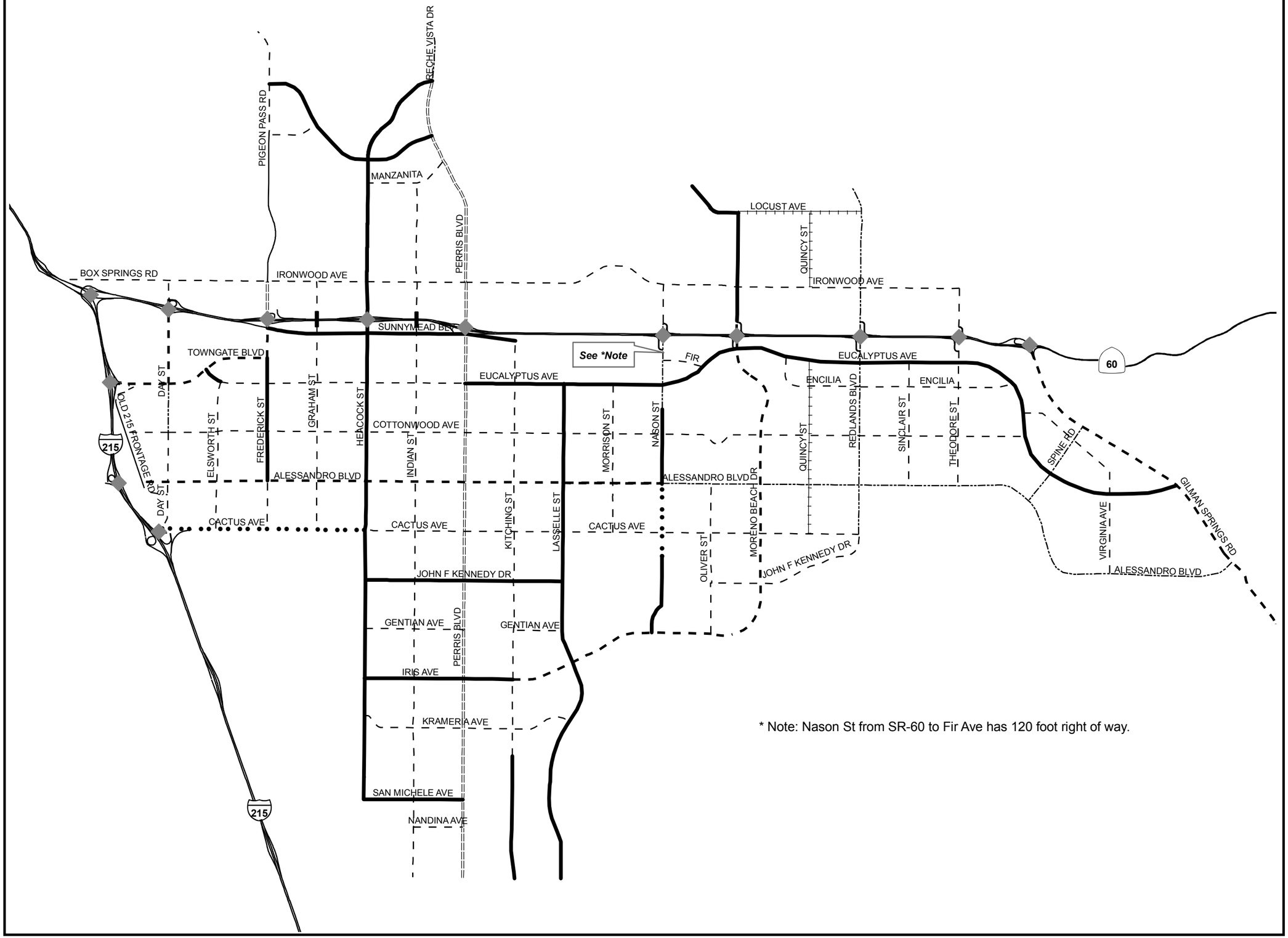
5-17 Pursue regional, state and federal grant opportunities to fund design and construction of the City bikeway system.

5-18 Pursue grant funding that supports traffic safety at and in the vicinity of school facilities.

5-19 Work with school districts and private schools to identify school site locations and designs that will minimize traffic impacts and promote traffic safety.

5-20 Work with school districts and private schools to identify suggested school routes and drop-off/pick-up plans for cars and buses.

5-21 Work with school districts and private schools to develop and promote traffic safety education programs.



* Note: Nason St from SR-60 to Fir Ave has 120 foot right of way.

MORENO VALLEY

FIGURE 9-1
CIRCULATION PLAN

Street Classification

- Freeway
- Divided Major Arterial
- Divided Major Arterial - Reduced Cross Section
- Divided Arterial - 6 lane
- Divided Arterial - 4 lane
- Arterial
- Minor Arterial
- Minor Arterial - Pigeon Pass Cross Section
- Collector
- Freeway Overpass
- Freeway Interchange

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

Date: July 11, 2006
State Plane NAD83 Zone 6
File: G:\arcmap\planning\gen_plan_updates\circ_plan_fig91.mxd

GEOGRAPHIC INFORMATION SYSTEMS

The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

LOS D is applicable to intersections and roadway segments that are adjacent to freeway on/off ramps and/or adjacent to employment generating land uses. LOS is applicable to all other intersections and roadway segments. Boundary intersections are assumed to be LOS D.

CITY OF MORENO VALLEY SPHERE

CITY OF MORENO VALLEY

SUNNYMEAD RANCH PKY
OLD LAKE RD
MANZANITA AVE
PIGEON PASS RD
PERRIS BLVD
LOCUST AVE
MORENO BEACH DR
QUINCY ST
REDLANDS BLVD
BOX SPRINGS RD
IRONWOOD AVE
SUNNYMEAD BLV
FIR AVE
EUCALYPTUS AVE
ENCILIA AVE
DRACAEA AVE
60
GILMAN SPRINGS RD
OLD 215 FRONTAGE RD
DAY ST
ELSWORTH ST
FREDERICK ST
GRAHAM ST
HEACOCK ST
COTTONWOOD AVE
LASSELLE ST
NASON ST
SINCLAIR ST
THEODORE ST
ALESSANDRO BLVD
INDIAN ST
KITCHING ST
MORRISON ST
OLIVER ST
CACTUS AVE
VIRGINIA AVE
JOHN F KENNEDY DR
GENTIAN AVE
IRIS AVE
KRAMERIA AVE
SAN MICHELE AVE
NANDINA AVE
215
MARCH ARB
LAKE PERRIS
CITY OF MORENO VALLEY SPHERE

MORENO VALLEY

FIGURE 9-2
LOS STANDARDS

- LOS C
- LOS D
- Highways
- Moreno Valley
- Moreno Valley Sphere
- March ARB
- Waterbodies

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

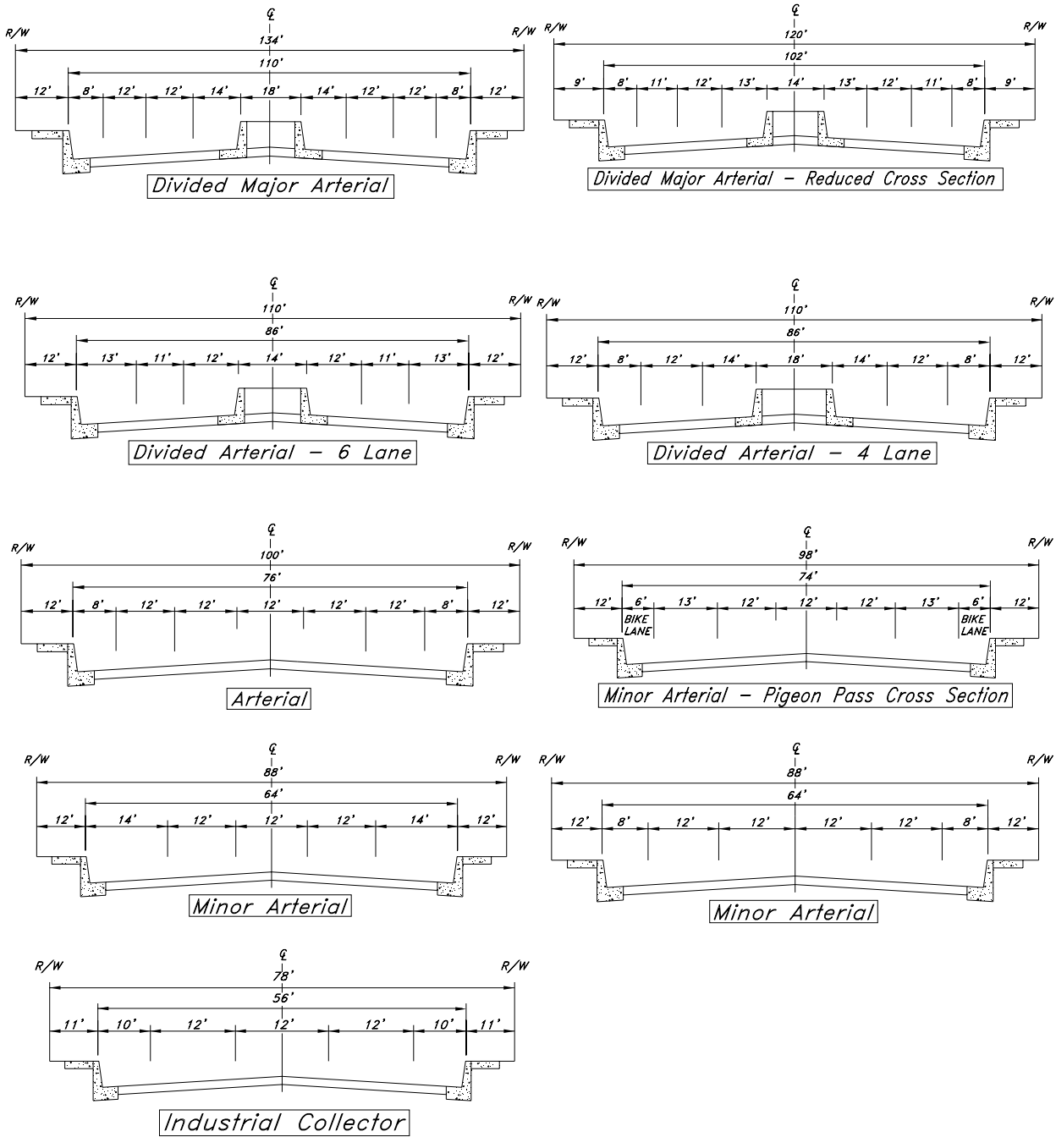
Date: July 11, 2006
State Plane NAD83 Zone 6
File: G:\arcmap\planning\gen_plan_updates\los_standards.mxd

GEOGRAPHIC INFORMATION SYSTEMS

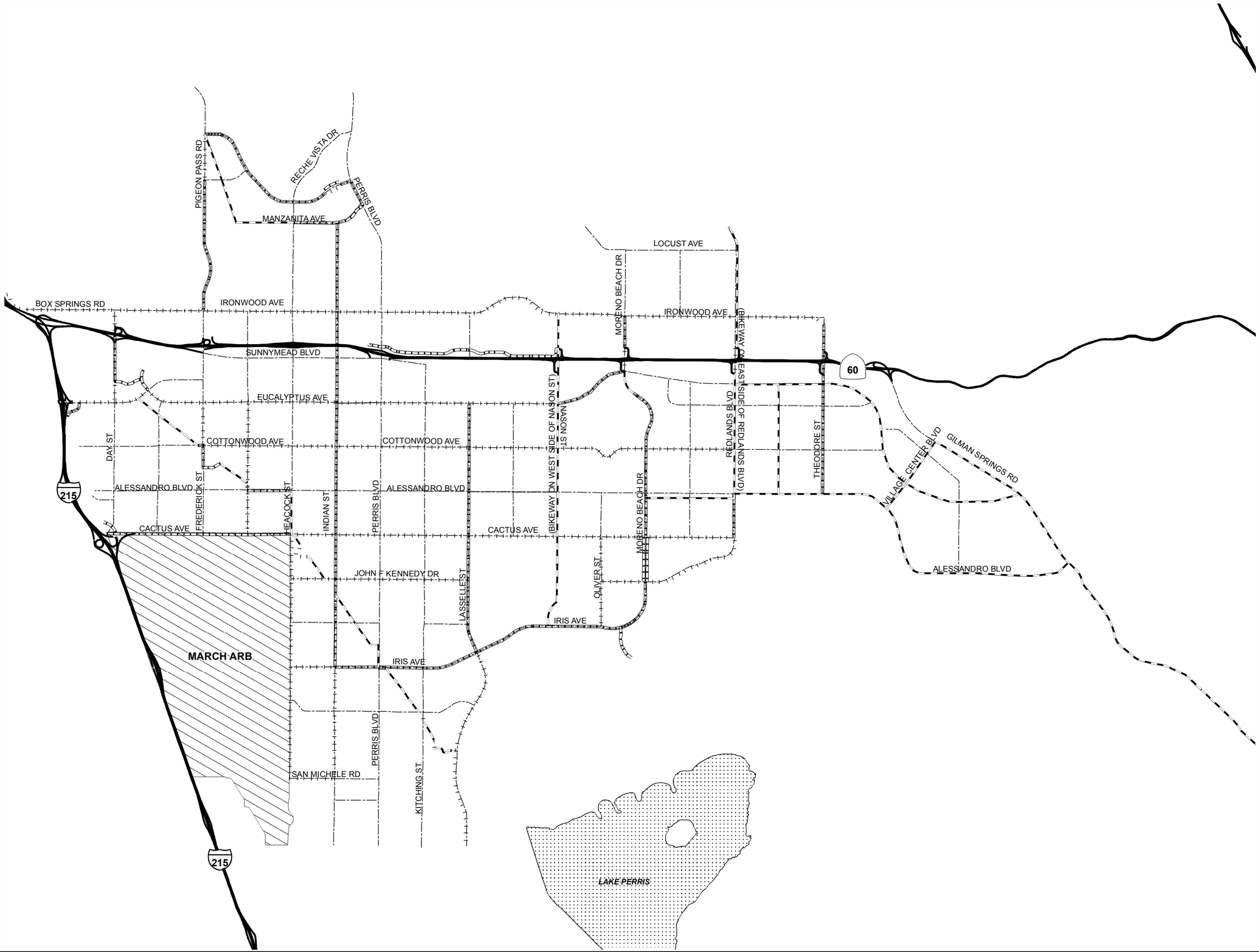
The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Figure 9-3

PROPOSED CITY OF MORENO VALLEY GENERAL PLAN ROADWAY CROSS-SECTIONS



NOT TO SCALE



MORENO VALLEY

FIGURE 9-4
BIKEWAY PLAN

Bikeway Classification

- Class I
- Class II
- Class III
- Roads
- Highways
- March ARB
- Waterbodies

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

Date: July 11, 2006
State Plane NAD83 Zone 6
File: G:\arcmap\planning\gen_plan_updates\bikeway.mxd

GEOGRAPHIC INFORMATION SYSTEMS

The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

9.6 SAFETY ELEMENT GOALS, OBJECTIVES, POLICIES AND PROGRAMS

9.6.1 SAFETY ELEMENT GOALS

Goal 6.1

To achieve acceptable levels of protection from natural and man-made hazards to life, health, and property

Goal 6.2

To have emergency services which are adequate to meet minor emergency and major catastrophic situations.

9.6.2 SAFETY ELEMENT OBJECTIVES AND POLICIES

Objective 6.1

Minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects.

Policies:

6.1.1 Reduce fault rupture and liquefaction hazards through the identification and recognition of potentially hazardous conditions and areas as they relate to the San Jacinto fault zone and the high and very high liquefaction hazard zones. During the review of future development projects, the City shall require geologic studies and mitigation for fault rupture hazards in accordance with the Alquist-Priolo Special Study Zones Act. Additionally, future geotechnical studies shall contain calculations for seismic settlement on all alluvial sites identified as having high or very high liquefaction potential. Should the calculations show a potential for liquefaction, appropriate mitigation shall be identified and implemented.

6.1.2 Require all new developments, existing critical and essential facilities and structures to comply with the most recent Uniform Building Code seismic design standards.

Objective 6.2

Minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

Policies:

6.2.1 Permit only that development in 100-year floodplain that represents an acceptable use of the land in relation to the hazards involved and the costs of providing flood control facilities. Locate critical facilities, such as hospitals, fire stations, police stations, public administration buildings, and schools outside of flood hazard areas.

6.2.2 Storm drains and catch basins owned and operated by the City shall be inspected, cleaned and maintained pursuant to an approved clean out schedule.

6.2.3 Maximize pervious areas in order to reduce increases in downstream runoff resulting from new development.

6.2.4 Design, construct and maintain street and storm drain flood control systems to accommodate 10 year and 100 year storm flows respectively.

6.2.5 The storm drain system shall conform to Riverside County Flood Control and Water Conservation District master drainage plans and the requirements

of the Federal Emergency Management Agency.

Objective 6.3

Provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes.

Policies:

6.3.1 The following uses shall require mitigation to reduce noise exposure where current or future exterior noise levels exceed 20 CNEL above the desired interior noise level:

a. Single and multiple family residential buildings shall achieve an interior noise level of 45 CNEL or less. Such buildings shall include sound-insulating windows, walls, roofs and ventilation systems. Sound barriers shall also be installed (e.g. masonry walls or walls with berms) between single-family residences and major roadways.

b. New libraries, hospitals and extended medical care facilities, places of worship and office uses shall be insulated to achieve interior noise levels of 50 CNEL or less.

c. New schools shall be insulated to achieve interior noise levels of 45 CNEL or less.

6.3.2 Discourage residential uses where current or projected exterior noise due to aircraft over flights will exceed 65 CNEL.

6.3.3 Where the future noise environment is likely to exceed 70 CNEL due to overflights from the joint-use airport at March, new buildings containing uses that are not addressed under Policy 6.3.1 shall require insulation to achieve interior noise levels recommended in the March Air Reserve Base Air Installation Compatible Use Zone Report.

6.3.4 Encourage residential development heavily impacted by aircraft over flight noise, to transition to uses that are more noise compatible.

6.3.5 Enforce the California Administrative Code, Title 24 noise insulation standards for new multi-family housing developments, motels and hotels.

6.3.6 Building shall be limited in areas of sensitive receptors.

Objective 6.4

Review noise issues during the planning process and require noise attenuation measures to minimize acoustic impacts to existing and future surrounding land uses.

Policies:

6.4.1 Site, landscape and architectural design features shall be encouraged to mitigate noise impacts for new developments, with a preference for noise barriers that avoid freeway sound barrier walls.

Objective 6.5

Minimize noise impacts from significant noise generators such as, but not limited to, motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities.

Policies:

6.5.1 New commercial and industrial activities (including the placement of

mechanical equipment) shall be evaluated and designed to mitigate noise impacts on adjacent uses.

6.5.2 Construction activities shall be operated in a manner that limits noise impacts on surrounding uses.

Objective 6.6

Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.

Policies:

6.6.1 Provide sites for new neighborhood commercial facilities within close proximity to the residential areas they serve.

6.6.2 Provide multi-family residential development sites in close proximity to neighborhood commercial centers in order to encourage pedestrian instead of vehicular travel.

6.6.3 Locate neighborhood parks in close proximity to the appropriate concentration of residents in order to encourage pedestrian and bicycle travel to local recreation areas.

Objective 6.7

Reduce mobile and stationary source air pollutant emissions.

Policies:

6.7.1 Cooperate with regional efforts to establish and implement regional air quality strategies and tactics.

6.7.2 Encourage the financing and construction of park-and-ride facilities.

6.7.3 Encourage express transit service from Moreno Valley to the greater metropolitan areas of Riverside, San Bernardino, Orange and Los Angeles Counties.

6.7.4 Locate heavy industrial and extraction facilities away from residential areas and sensitive receptors.

6.7.5 Require grading activities to comply with South Coast Air Quality Management District's Rule 403 regarding the control of fugitive dust.

6.7.6 Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code.

Objective 6.8

As feasible given budget constraints, strive to maintain a police force with a ratio of one sworn officer for each 1,000 residents.

Policies:

6.8.1 Explore the most effective and economical means of providing responsive and adequate law enforcement protection in the future.

Objective 6.9

Reduce the risk and fear of crime through physical planning strategies that maximize surveillance opportunities and minimize opportunities for crime found in the present and future built environment, and by creating and maintaining a high level of community awareness and support of crime prevention.

Policies:

6.9.1 Promote the establishment of neighborhood and business watch programs to encourage community participation in the patrol of neighborhood areas, and increased awareness of any suspicious activity.

6.9.2 Require well-lighted entrances, walkways and parking lots, street lighting in all commercial, industrial areas and multiple-family residential areas to facilitate nighttime surveillance and discourage crime.

6.9.3 Incorporate "defensible space" concepts into the design of dwellings and nonresidential structures, including, but not limited to configuration of lots, buildings, fences, walls and other features that facilitate surveillance and reinforce a sense of territorial control.

Objective 6.10

Protect life and property from the potential short-term and long-term deleterious effects of the necessary transportation, use, storage treatment and disposal and hazardous materials and waste within the City of Moreno Valley.

Policies:

6.10.1 Require all land use applications and approvals to be consistent with the siting criteria and other applicable provisions of the adopted Hazardous Waste Management Plan, which is also incorporated into and as part of the General Plan.

6.10.2 Manage the generation, collection, storage, processing, treatment, transport and disposal of hazardous waste in accordance with provisions of the City of Moreno Valley's adopted Hazardous Waste Management Plan, which is also incorporated into and as part of the General Plan.

Objective 6.11

Maintain an integrated emergency management program that is properly staffed, trained, and equipped for receiving emergency calls, providing initial response, providing for key support to major incidents.

Policies:

6.11.1 Respond to any disaster situation in the City to provide necessary initial response and providing for key support to major incidents.

6.11.2 Provide emergency first aid treatment when necessary.

6.11.3 Support the maintenance of a trauma center within the City.

6.11.4 Aggressively attack uncontrolled fires and hold losses to a minimum.

6.11.5 Minimize uncontrolled fires through support of weed abatement programs.

Objective 6.12

Coordinate with Federal, State and County agencies and neighboring communities in developing a regional system to respond to emergencies and major catastrophes.

Policies:

6.12.1 Support mutual aid agreements and communication links with the County of Riverside and other local participating jurisdictions.

Objective 6.13

Maintain fire prevention, fire-related law enforcement, and public education and information programs to prevent fires.

Policies:

6.13.1 Provide fire safety education to residents of appropriate age.

Objective 6.14

Maintain the capacity to respond rapidly to emergency situations.

Policies:

6.14.1 Locate fire stations in accordance with the Fire Station Master Plan as shown in Figure 6-1. The exact location of each fire station may be modified based on availability of land and other factors.

6.14.2 Relate the timing of fire station construction to the rise of service demand in surrounding areas.

Objective 6.15

Ensure that property in or adjacent to wildland areas is reasonably protected from wildland fire hazard, consistent with the maintenance of a viable natural ecology.

Policies:

6.15.1 Encourage programs to minimize the fire hazard, including but not limited to the prevention of fuel build-up where wildland areas are adjacent to urban development.

6.15.2 Tailor fire prevention measures implemented in wildland areas to both the aesthetic and functional needs of the natural environment.

Objective 6.16

Ensure that uses within urbanized areas are planned and designed consistent with accepted safety.

Policies:

6.16.1 Ensure that ordinances, resolutions and policies relating to urban development are consistent with the requirements of acceptable fire safety, including requirements for smoke detectors, emergency water supply and automatic fire sprinkler systems.

6.16.2 Encourage the systematic mitigation of existing fire hazards related to land urban development or patterns of urban development as they are identified and as resources permit.

6.16.3 Ensure that adequate emergency ingress and egress is provided for each development.

6.16.4 Within the safety zones (e.g. Air Crash Hazard Zones and Clear Zones) shown in Figure 6-5, residential uses shall not be permitted, and business uses shall be restricted to low intensity uses as defined in the March Air Reserve Base Air Installation Compatible Use Zone Report, as amended from time to time.

Objective 6.17

Provide non-emergency public services provided that such demands do not interfere with fire protection and other emergency services.

9.6.3 SAFETY ELEMENT PROGRAMS

6-1 Request that public utility companies inspect their facilities and distribution networks to determine the potential impact of earthquake damage.

6-2 Evaluate historic buildings relative to the need for mitigation of geologic hazards, while weighing their historical value against the potential hazard of their collapse.

6-3 Reevaluate designated truck routes in terms of noise impact on existing land uses to determine if those established routes and the hours of their use

should be adjusted to minimize exposure to truck noise.

6-4 Review existing ordinances to ensure that building and site design standards specifically address crime prevention utilizing defensible space criteria. Incorporate security standards into the Municipal Code.

6-5 Seek state and federal grants to offset any required additions in law enforcement staffing and/or equipment.

6-6 Update the Fire Protection Master Plan as conditions warrant.

6-7 Establish regulations for development along the urban-wildland interface.

6-8 Establish criteria for the design, maintenance, modification and replacement of fire facilities.

6-9 Establish criteria for weed abatement programs.

9.7 CONSERVATION ELEMENT GOALS, OBJECTIVES, POLICIES AND PROGRAMS

9.7.1 CONSERVATION ELEMENT GOALS

Goal 7.1

To achieve the wise use of natural resources within the City of Moreno Valley, its sphere of influence and planning area.

9.7.2 CONSERVATION ELEMENT OBJECTIVES AND POLICIES

Objective 7.1

Minimize erosion problems resulting from development activities.

Policies:

7.1.1 Require that grading plans include appropriate and feasible measures to minimize erosion, sedimentation, wind erosion and fugitive dust.

7.1.2 Circulation patterns within newly developing portions of Moreno Valley, particularly in hillside areas, should follow natural contours to minimize grading.

Objective 7.2

Maintain surface water quality and the supply and quality of groundwater.

Policies:

7.2.1 New development may use individual wells only where an adequate supply of good quality groundwater is available.

7.2.2 The City shall comply with the provisions of its permit(s) issued by the Regional Water Quality Control Board for the protection of water quality pursuant to the National Pollutant Discharge Elimination System.

7.2.3 In concert with the water purveyor identify aquifer recharge areas and establish regulations to protect recharge areas and regulate new individual wells.

Objective 7.3

Minimize the consumption of water through a combination of water conservation and reuse.

Policies:

7.3.1 Require water conserving landscape and irrigation systems through development review. Minimize the use of lawn within private developments, and within parkway areas. The use of mulch and native and drought tolerant landscaping shall be encouraged.

7.3.2 Encourage the use of reclaimed wastewater, stored rainwater, or other legally acceptable non-potable water supply for irrigation.

Objective 7.4

Maintain, protect, and preserve biologically significant habitats where practical, including the San Jacinto Wildlife Area, riparian areas, habitats of rare and endangered species, and other areas of natural significance.

Policies:

7.4.1 Require all development, including roads, proposed adjacent to riparian and other biologically sensitive habitats to provide adequate buffers to mitigate impacts to such areas.

7.4.2 Limit the removal of natural vegetation in hillside areas when retaining natural habitat does not pose threats to public safety.

7.4.3 Preserve natural drainage courses in their natural state and the natural hydrology, unless the protection of life and property necessitate improvement as concrete channels.

7.4.4 Incorporate significant rock formations into the design of hillside developments.

7.4.5 The City shall fulfill its obligations set forth within any agreement(s) and permit(s) that the City may enter into for the purpose of implementing the Western Riverside County Multi-species Habitat Conservation Plan.

Objective 7.5

Encourage efficient use of energy resources.

Policies:

7.5.1 Encourage building, site design, and landscaping techniques that provide passive heating and cooling to reduce energy demand.

7.5.2 Encourage energy efficient modes of transportation and fixed facilities, including transit, bicycle, equestrian, and pedestrian transportation. Emphasize fuel efficiency in the acquisition and use of City-owned vehicles.

7.5.3 Locate areas planned for commercial, industrial and multiple family density residential development within areas of high transit potential and access.

7.5.4 Encourage efficient energy usage in all city public buildings.

7.5.5 Encourage the use of solar power and other renewable energy systems.

Objective 7.6

Identify and preserve Moreno Valley's unique historical and archaeological resources for future generations.

Policies:

7.6.1 Historical, cultural and archaeological resources shall be located and preserved, or mitigated consistent with their intrinsic value.

7.6.2 Implement appropriate mitigation measures to conserve cultural resources that are uncovered during excavation and construction activities.

7.6.3 Minimize damage to the integrity of historic structures when they are altered.

7.6.4 Encourage restoration and adaptive reuse of historical buildings worthy of preservation.

7.6.5 Encourage documentation of historic buildings when such buildings must be demolished.

Objective 7.7

Where practical, preserve significant visual features significant views and vistas.

Policies:

7.7.1 Discourage development directly upon a prominent ridgeline.

7.7.2 Require new electrical and communication lines to be placed underground.

7.7.3 Implement reasonable controls on the size, number and design of signs to minimize degradation of visual quality.

7.7.4 Gilman Springs Road, Moreno Beach Drive, and State Route 60 shall be designated as local scenic roads.

7.7.5 Require development along scenic roadways to be visually attractive and to allow for scenic views of the surrounding mountains and Mystic Lake.

7.7.6 Minimize the visibility of wireless communication facilities by the public. Encourage "stealth" designs and encourage new antennas to be located on existing poles, buildings and other structures.

Objective 7.8

Maintain an adequate system of solid waste collection and disposal to meet existing and future needs.

Policies:

7.8.1 Encourage recycling projects by individuals, non-profit organizations, or corporations and local businesses, as well as programs sponsored through government agencies.

9.7.3 CONSERVATION ELEMENT PROGRAMS

7-1 Support regional solid waste disposal efforts by the County of Riverside.

7-2 Advocate for natural drainage channels to the Riverside County Flood Control District, in order to assure the maximum recovery of local water, and to protect riparian habitats and wildlife.

7-3 Maintain a close working relationship with EMWD to ensure that EMWD plans for and is aware of opportunities to use reclaimed water in the City.

7-4 Provide guidelines for preferred planting schemes and specific species to encourage aesthetically pleasing landscape statements that minimize water use.

7-5 Develop incentives where appropriate, for the maintenance and sensitive rehabilitation of historic structures and properties.

7-6 In areas where archaeological or paleontological resources are known or reasonably expected to exist, based upon the citywide survey conducted by the UCR Archaeological Research Unit, incorporate the recommendations and determinations of that report to reduce potential impacts to levels of insignificance.

9.8 HOUSING ELEMENT GOALS, OBJECTIVES, POLICES AND PROGRAMS

9.8.1 HOUSING ELEMENT GOALS

Goal 8.1

Improve and maintain decent, sanitary and affordable housing.

Goal 8.2

Improve and maintain decent, sanitary and affordable housing for very-low income households and seniors.

Goal 8.3

Reduce substandard housing and health and safety violations.

Goal 8.4

Assist in the revitalization of older neighborhoods.

Goal 8.5

Improve and maintain decent and affordable rental housing.

Goal 8.6

Assist very low, low and moderate-income first time buyers to purchase homes.

Goal 8.7

Add to the number of affordable rental units for very low and low-income households.

Goal 8.8

Create affordable housing units for senior households.

9.8.2 HOUSING ELEMENT OBJECTIVES AND POLICIES

Objective 8.1

Rehabilitate a minimum of fifteen single-family homes under the Home Improvement Loan Program (HILP).

Objective 8.2

Rehabilitate a minimum of fifteen single-family homes under the Homeowner Assistance for Minor Rehabilitation loan program (HAMR).

Policies:

8.2.1 Rehabilitate single-family homes to correct substandard conditions, improve handicap accessibility, and improve the aesthetics of older neighborhoods, thereby contributing to their preservation and revitalization.

Objective 8.3

Rehabilitate a minimum of ninety mobile homes, for very low-income homeowners, in mobile home parks citywide, under the Mobile Home Grant Program.

Policies:

8.3.1 Correct substandard conditions in mobile home parks.

Objective 8.4

Obtain code compliance from a minimum of twenty-five very low and moderate-income property owners, citywide, with emphasis on focus neighborhoods.

Policies:

8.4.1 Enforce correction by property owners of identified housing and code violations in rental properties

occupied by very low to moderate-income households.

Objective 8.5

Conduct five neighborhood clean-ups annually; provide related services to Community Development Block Grant (CDBG) areas in conjunction with other projects, and assist in clean up of 360 housing units.

Policies:

8.5.1 Provide neighborhood improvement programs to CDBG target areas.

Objective 8.6

Assist 300 households citywide.

Policies:

8.6.1 Provide fair housing and landlord/tenant education services to very low to moderate-income households.

Objective 8.7

Rehabilitate fifty multi-family units, citywide, through utilization of the Rental Rehabilitation Program.

Policies:

8.7.1 To eliminate substandard housing conditions for low-income renters, while enhancing the appearance of multi-family developments.

Objective 8.8

Assist households with down payment and closing costs.

Policies:

8.8.1 Provide assistance to facilitate homeownership for very low to moderate-income households

Objective 8.9

Create a minimum of 126 affordable rental units, citywide.

Policies:

8.9.1 Facilitate the creation of affordable rental units.

Objective 8.10

Create a minimum of seventy senior units.

Policies:

8.10.1 Create decent and affordable housing opportunities for low and very-low income seniors.

9.8.3 HOUSING ELEMENT PROGRAMS

8-1 Utilize the Home Improvement Loan Program (HILP) that provides a 3% loan for up to $15,000 deferred for 20 years. Available citywide for very low to lower income homeowners.

8-2 Utilize the Homeowner Assistance for Minor Rehabilitation (HAMR) loan program that provides a 3% to 5% loan for up to $7,500 amortized over a 10-year term.

8-3 Utilize the Mobile Home Grant Program that provides grants up to $10,000 for owner-occupants of mobile homes.

8-4 Provide enhanced code compliance services and referrals to City housing rehabilitation programs.

8-5 Utilize the City Neighborhood Clean-up Program to provide volunteers and equipment to neighborhoods for clean

up activities.

8-6 Contract with a fair housing agency to mediate between landlords and tenants and educate them on their rights and responsibilities.

8-7 Update the City's Analysis of Impediments to Fair Housing.

8-8 Provide rehabilitation loans through the City's Rental Rehabilitation Program that offers 5% loans with the first year deferred and amortized over a 19-year period.

8-9 Through the Homebuyer Assistance Program, provide 30-year deferred silent second loans, with no interest, up to 20% or $200,000 of the purchase price of resale homes.

8-10 Work with local CHDO to construct and/or rehabilitate houses for very low-income households.

8-11 Purchase HUD homes for resale to first time homebuyers.

8-12 Administer new construction home ownership program and youth job training.

8-13 Work with housing developers by providing Agency assistance to write-down the costs of units via loans.

8-14 Provide financial assistance for the development of affordable rental units for larger families.

8-15 Revise General Plan.

8-16 Continue to implement permit streamlining.

8-17 Develop standards for mobile home parks and mobile home subdivisions.

8-18 Review parking standards for multi-family 3 and 4 bedroom units, including covered parking requirements to determine if reductions are appropriate.

8-19 Review second unit regulations to determine if expansion is merited to additional districts.

8-20 Continue to pay the development fees for projects, on a case-by-case basis, that have received State or Federal funds, such as Section 202 and Tax Credits.

8-21 Utilize Redevelopment Agency funds, where appropriate and necessary, to facilitate infrastructure for affordable projects.

8-22 Propose general plan changes for rezoning areas in the city to housing uses or mixed uses that include housing.

8-23 Facilitate the construction of a sixty-nine unit multi-family senior complex.

TABLE OF CONTENTS

Chapter 5: Multipurpose Open Space Element

Introduction **1**

Multipurpose Open Space Conceptual Framework 1
Setting 1

Conservation **3**

Renewable Resources 3
Water Resources 3
Water Supply 4
Water Conservation 9
Watershed Management 9
Water Quality 10
Groundwater Recharge 10
Floodplain and Riparian Area Management 11
Wetlands 13
Agricultural Resources 13
Soil Classifications 13
Prime Farmlands 13
Statewide Important Farmlands 14
Unique Farmlands 14
Local Important Farmlands 14
Williamson Act 14
Forest Resources 19
Vegetation 19
Renewable Energy 20
Wind Energy 20
Solar Energy 25
Geothermal Resources 25
Biomass Resources 26
Non-Renewable Resources 26
Mineral Resources 26
Energy Resources 29
Petroleum Resources 30
Energy Conservation 30

Preservation **33**

Multiple Species Habitat Conservation Plans 33
Coachella Valley Association of Governments MSHCP Program Description 34
Relationship to Area Plans 34
Western Riverside County MSHCP Program Description 34
A Stakeholder Driven Process 35
Relationship to Area Plans 35
Environmentally Sensitive Lands 35
Cultural and Paleontological Resources 36
Open Space, Parks and Recreation 44
Scenic Resources 45
Scenic Corridors 45

LIST OF FIGURES

OS- 1 Water Resources.....5
OS- 2 Agricultural Resources.....15
OS- 3 Parks, Forests, and Recreation Areas.....21
OS- 4 Western Riverside County Vegetation.....23
OS- 5 Mineral Resource Areas.....27
OS- 6 Relative Archaeological Sensitivity of Diverse Landscapes.....37
OS- 7 Historical Resources.....39
OS- 8 Paleontological Sensitivity.....41

LIST OF TABLES

OS-1 South Coast Region Water Budget with Existing Facilities and Programs.....7
OS-2 Colorado River Region Water Budget with Existing Facilities and Programs.....7

Chapter 5: Multipurpose Open Space Element

Introduction

> *"The open space system and methods for its acquisition, maintenance and operation are calibrated to its many functions: visual relief, natural resource protection, habitat preservation, passive and active recreation, protection from natural hazards, and various combinations of these purposes. This is what is meant by a multi-purpose open space system."*
>
> *– RCIP Vision Statement*

MULTIPURPOSE OPEN SPACE CONCEPTUAL FRAMEWORK

The County of Riverside's environmental setting is a critical component of its Vision for the future and its quality of life. The Vision speaks to the importance of the many forms of open space in the County: scenic, habitat, recreation, and their importance in defining the edges for our communities. The Vision also addresses the importance of agriculture to the economy and culture of the County.

In response to the RCIP Vision and the California government code, this element addresses protecting and preserving natural resources, agriculture and open space areas, managing mineral resources, preserving and enhancing cultural resources, and providing recreational opportunities for the citizens of Riverside County.

The California Government Code describes the General Plan as a collection of seven mandatory elements that include: conservation, addressing the conservation, development and use of natural resources; and open space, detailing plans and measures for preserving open-space for natural resources, the managed production of resources, outdoor recreation, public health and safety, and the identification of agricultural land. The policy direction required in these two elements is provided in this single Multipurpose Open Space Element.

This element categorizes issues and policies into those that seek to ***conserve***, or manage the use of, resources and those that seek to ***preserve*** resources for the purpose of sustaining their stocks in perpetuity. Additionally, the resource conservation section of the element is subdivided into ***renewable resources*** and ***non-renewable resources***. Renewable resources, such as forests, are those that can reproduce, grow, and ultimately perish. Non-renewable resources as those that have a finite stock relative to human consumption over time, and that are not alive in the sense of having an ability to grow. Mineral resources, for example, are non-renewable.

Conserve-to protect from loss or harm by using carefully or sparingly.
Preserve-To keep in perfect or unaltered condition; maintain unchanged.
Reserve-A reservation of land or an amount of mineral, fossil fuel or other resource known to exist in a particular location.

SETTING

It is appropriate that the County of Riverside boasts of a "remarkable environmental setting" in the summary statement of its Vision. Within its roughly 7,400 square miles, the County incorporates a wide range of natural features, including mountain ranges, desert areas, riparian areas and rivers, vernal pools, and oak woodlands and forests.
The Colorado Desert bio-region encompasses the southeastern portion of Riverside County, extending from the Colorado River west to the Joshua Tree

National Park, and from San Bernardino County to San Diego County. This bio-region is rich in agriculture, though it is considered semi-arid. The Colorado Desert is the western extension of the Sonoran desert, which is of much lower elevation than the northern Mojave Desert. Common habitat includes sandy desert, scrub, palm oasis, and desert wash. Summers are hot and dry, and winters are cool and moist.

A portion of north-central Riverside County is part of the Mojave bio-region. This is one of the largest bio-regions in the state, encompassing seven counties in California. The Mojave bio-region is the western extension of a vast desert that covers southern Nevada, the southwestern tip of Utah, and 25% of southern California. The climate is hot and dry in the summer, and winters are cool to cold depending upon elevation. Palm oases, streams and springs are water sources for much of the wildlife. Some of the common habitats are the desert wash Joshua Tree Scrub, palm oasis, willow riparian forest, and open sandy dunes.

The South Coast bio-region covers most of western Riverside County. This bio-region is home to the towering San Gorgonio Peak at 11,500 feet, the watersheds of the San Jacinto and Santa Ana Rivers, the Cleveland and Angeles National Forests, and federal wilderness and wildlife areas. Some of the following habitats are found here: chaparral, juniper-pinyon woodland, grasslands, hardwood forests, southern oak, and yellow pine. The climate is considered mild year-round, with hot dry summers inducing wildfires and wet winters that can cause mudslides.

Further, the plant and animal life of the County is diverse, and numerous animal species and narrow endemic plants (species with very limited geographic ranges) found in the County have special status under the Federal Endangered Species Act and/or the California Endangered Species Act. In response to this, the County has participated in two Multiple Species Habitat Conservation Planning processes, one covering western Riverside County, and a second in the Coachella Valley. Implications for County land use and open space planning are briefly described in this element.

Additional information on the physical setting of Riverside County can be found in the Existing Setting Report, which is part of the Environmental Impact Report (EIR) prepared for the General Plan.

The County of Riverside is in a unique position in southern California in that it has experienced, and is poised to continue experiencing in the next 20 years, enormous population growth. At the same time, much of the County's land area remains undeveloped. Unincorporated lands with land use designations under the umbrella of the County's Open Space and Agriculture Foundation Components (refer to the Land Use Element for a description of the Foundation Component system) total roughly 80% of the County's land area. Rural designations that include mountainous and desert areas add about 13% of the County's lands to that total. Therefore, the vast majority of the County of Riverside is affected by policies contained within this element of the General Plan.

★

A sample of the range of Riverside County's natural resources must include: California's largest inland sea, the 360-square mile Salton Sea in the southern most portion of the Coachella Valley; the Joshua Tree National Park; portions of the San Bernardino and Cleveland National Forests; the Santa Ana, Santa Rosa and San Jacinto Mountain Ranges, among others; and portions of the Colorado, Santa Ana and San Jacinto Rivers.

"The true nature lover learns that nature is worth knowing in all her aspects, that the only deserts there are [,are] the deserts of the soul. The best pleasures cost us nothing."

– From a handwritten note by Riverside Naturalist Edmund Jaeger circa 1921

Conservation

Policies within the Conservation section of this element seek to guide decision-making related to renewable and non-renewable County resources. These types of resources require conservation—a conscious effort to consume less of scarce resources so that their stock can be sustained for the future. Conservation of natural resources applies to water, agricultural resources, forests, vegetation, mineral, and energy resources. By conserving resources we prevent degradation of the environment through pollution or loss of productive capacity within our environment.

RENEWABLE RESOURCES

Population growth and development continually require the use of natural resources, including those that are renewable. Following are Vision Statements that represent the guiding principles established by Riverside County to conserve and protect renewable resources for economic, cultural, and aesthetic purposes.

> *"We acknowledge the inter-relatedness of the economic, environmental, cultural and institutional realms of our community life as we continue to plan and build our communities in a manner that enables us to achieve mutually beneficial results."*

> *"We acknowledge and respect the long heritage of economic endeavors that have shaped portions of our environment through mining, agriculture, renewable energy development and similar enterprises and continue to take their value into consideration in shaping our environmental management."*

Additionally, the Vision addresses the need to protect Riverside County's environmental sustainability for future generations:

> *"We are beneficiaries of the past and we value that. We seek the same for our heirs. We declare that they should have an expectation that they will inherit communities and a natural environment that offer them a reasonable range of choices."*

Water Resources

Riverside County incorporates four major watershed areas in which river systems, numerous lakes and reservoirs, and natural drainage areas are located. Water resources are mapped in Figure OS-1. The County's supply of water is limited by its arid climate, agricultural practices, projected population growth and its associated demand and development, and the dependence on low quality imported water. Further, the availability of imported surface water has been reduced due to changing regulations, despite an ever-increasing water demand.

In some areas within Riverside County, contamination from natural or manufactured sources has reduced groundwater quality such that its use requires treatment. Management of the amount of water available (local and imported)

and its quality, is an important response to the gap between supply and demand in Riverside County.

Policies in this section seek to protect and enhance the water resources in the county. These policies address broad water planning issues, and the relationship of land use decisions to water issues.

Water Supply

The economy of the developed portions of western Riverside County—the inland valley—is sustained primarily by water imported from northern California and the Colorado River, and secondarily by production of local groundwater. The eastern portion of the County—the majority of which is desert—also relies on water from the Colorado River, northern California, and local groundwater. This portion of the County is largely undeveloped, with uncertain increases in the water resource available to meet increases in water demand being a major factor that might constrain future development.

★

The Metropolitan Water District, which serves water agencies in the western part of the County, projects at least a doubling of water demand between 2000 and 2020. This agrees with the Department of Water Resources projections for the same period.

Riverside County's water supply is uncertain for two reasons: recent water apportionments from northern California have been reduced as part of the CALFED Bay-Delta Program, as well as decreased supplies to California from the Colorado River. Additionally, most of the County's sources of water are currently at capacity. Water storage to meet peak demand, or a two-day to one-day supply, is provided by many local water agencies within Riverside County. However, long-term storage of large quantities of water is provided only in the Metropolitan Water District (MWD) and California Department of Water Resources (DWR) facilities. Total storage capacity in the existing reservoir system is 871,000 acre-feet (a.f.). Three of these storage facilities are located in Riverside County: Lake Mathews, Lake Skinner, and Lake Perris. Together, these storage facilities have a total of 342,300 a.f. of storage capacity. Diamond Valley Lake triples this capacity with an additional 800,000 a.f. of storage, bringing the total storage capacity available within Riverside County to 1,142,300 a.f. Even though the creation of Diamond Valley Lake has allowed for three times the current storage of water, there is no increase in the total amount of water available to the County that can be identified. This increase in water storage will benefit the whole South Coast region, which includes other significant jurisdictional water users such as San Diego County, as well as Riverside County. Currently, approximately 3/8ths of existing storage capacity may be used to meet seasonal demand. The remaining 5/8ths is reserved for emergency need such as severe droughts and/or use when a natural disaster, such as an earthquake, makes it impossible to meet demand through usual supply facilities.



An acre-foot of water is the volume of water represented by a 1-foot depth of water over a one-acre area (43,560 cubic feet of water or approximately 326,000 gallons), and is enough to supply the water needs of 2 families for 1 year.

Projected 2020 water use and population levels indicate an expected water shortage for the two hydrologic regions that comprise Riverside County: the South Coast and Colorado River regions. Though these regions include most of southern California, and not just Riverside County, they are each representative of the types of supply and demand within the County. The two regions are defined as follows:

- South Coast: Basins draining into the Pacific Ocean from the southeastern boundary of Rincon Creek Basin in western Ventura County to the Mexican border.

Figure OS- 1 Water Resources

This page intentionally left blank.

- Colorado River: Basins south and east of the South Coast and South Lahontan regions; areas that drain into the Colorado River, the Salton Sea, and other closed basins north of the Mexican border.

The DWR produces a California Water Plan every five years that not only includes a statewide water budget but also regional watershed water budgets. These water budgets are based on California Department of Finance population projections, and indicate clearly that demand for water will exceed supply in 2020 whether or not a drought condition exists at that time. Most of the State's regions, except for the North Coast and San Francisco Bay Regions, experience average-year and drought-year shortages now, and are forecasted to experience increased shortages in 2020. The largest average-year shortages are forecasted for the South Coast Region, which heavily relies on imported water. Future average-year shortages in the South Coast Region reflect forecasted population growth plus lower Colorado River supplies as California reduces its use of Colorado River water to the State's basic apportionment. Following are the descriptions of the two hydrologic regions as well as regional water budgets (Tables OS-1 & OS-2):

Table OS-1
South Coast Region Water Budget with Existing Facilities and Programs

	1995		2020	
Water Use	**Average**	**Drought**	**Average**	**Drought**
Urban	4,340	4,382	5,519	5,612
Agricultural	784	820	462	484
Environmental	100	82	104	86
Total	**5,224**	**5,283**	**6,084**	**6,181**
Supplies				
Surface Water	3,839	3,196	3,625	3,130
Groundwater	1,177	1,371	1,243	1,462
Recycled and Desalted	207	207	273	273
Total	**5,224**	**4,775**	**5,141**	**4,865**
Shortage	***0***	***508***	***944***	***1,317***

Note: Figures in thousands of acre-feet of water.

Table OS-2

Colorado River Region Water Budget with Existing Facilities and Programs

	1995		2020	
Water Use	**Average**	**Drought**	**Average**	**Drought**
Urban	418	418	740	740
Agricultural	4,118	4,118	3,583	3,583
Environmental	39	38	44	43
Total	**4,575**	**4,574**	**4,367**	**4,366**
Supplies				
Surface Water	4,154	4,128	3,920	3,909
Groundwater	337	337	285	284
Recycled and Desalted	15	15	15	15
Total	**4,506**	**4,479**	**4,221**	**4,208**
Shortage	***69***	***95***	***147***	***158***

Note: Figures in thousands of acre-feet of water.

Of the two Hydrologic Units of the State, the Colorado River Region is of particular concern because it encompasses the Coachella Valley in the West Basin and the desert in the East Basin (Refer to Figure OS-1, Water Resources). Irrigation needs in the Coachella Valley are met almost exclusively by water imported from the Colorado River. Historical extraction of groundwater in the Coachella Valley has caused overdraft. Currently, an extensive groundwater recharge project is being undertaken by the Coachella Valley Water District that recharges Colorado River Water into spreading basins. Within the East Basin, irrigation and domestic water is provided by the Colorado River with only approximately 1% groundwater use and little direct reclamation. Agricultural runoff and some domestic wastewater do get returned to the Colorado River. Therefore, the water source at the southern end of the watershed is actually a mixture of Colorado River water, agricultural runoff, and reclaimed water.

The following policies are intended to address the County's water supply issues:

Policies:

OS 1.1 Balance consideration of water supply requirements between urban, agricultural, and environmental needs so that sufficient supply is available to meet each of these different demands. (AI 3)

OS 1.2 Develop a repository for the collection of County water resource information. (AI 11, 55)

OS 1.3 Provide active leadership in the regional coordination of water resource management and sustainability efforts affecting Riverside County and continue to monitor and participate in, as appropriate, regional activities, addressing water resources, groundwater, and water quality, such as a Groundwater Management Plan, to prevent overdraft caused by population growth. (AI 4, 55, 58)

The General Plan policy and implementation item reference system:

Identifies which element contains the Policy, in this case the Land Use Element, and the sequential number.

LU 1.3

Neighborhood Commercial uses should be located near residential uses.

(AI 1 and AI 4)

Reference to the relevant Action Items contained in the implementation Program

Water Conservation

In order to help bridge the projected gap between water supply and demand in Riverside County in 2020, water conservation must be a priority. Following are water conservation policies that seek to manage existing supplies, by promoting the efficient use of water to the maximum extent possible, so that they can be maintained for future use.

Policies:

OS 2.1 Encourage the installation of water-conserving systems such as dry wells and graywater systems, where feasible, especially in new developments. The installation of cisterns or infiltrators shall also be encouraged to capture rainwater from roofs for irrigation in the dry season and flood control during heavy storms. (AI 57, 62)

OS 2.2 Where feasible, decrease stormwater runoff by reducing pavement in development areas, and by design practices such as permeable parking bays and porous parking lots with bermed storage areas for rainwater detention. (AI 57, 62)

OS 2.3 Encourage native, drought-resistant landscape planting. (AI 3, 57, 62)

OS 2.4 Support and engage in educational outreach programs with other agencies that promote water conservation and wide-spread use of water-saving technologies. (AI 58)

OS 2.5 Encourage continued agricultural water conservation and recommend the following practices where appropriate and feasible: lining canals, recovering tail water at the end of irrigated fields, and appropriate scheduling of water deliveries. (AI 57)

A watershed is the entire region drained by a waterway that drains into a lake or reservoir. It is the total area above a given point on a stream that contributes water to the flow at that point, and the topographic dividing line from which surface streams flow in two different directions. Clearly, watersheds are not just water. A single watershed may include combinations of forests, glaciers, deserts, and/or grasslands.

Watershed Management

Four distinct watershed areas are incorporated in Riverside County and are mapped in Figure OS-1. These are the Santa Ana River Basin, which drains into the Pacific Ocean; San Diego Basin, the West Basin of the Colorado River, and the East Basin of the Colorado River. The East Basin of the Colorado River drains into the Colorado River and the West Basin of the Colorado River drains primarily into the Salton Sea Trough. The Santa Ana River Basin drains into the Pacific Ocean in Orange County while the San Diego Basin drains into the Pacific Ocean in San Diego County. These large watersheds are further divided into smaller sections by internal surface water drainage areas and groundwater basins.

Watershed management relates to sustaining watersheds at an acceptable level of quality, contributing to resource quality, and maintaining groundwater supplies.

★

The Watershed Approach
According to the U.S. EPA, effective watershed management results in a focus on priority problems; community building wherein stakeholder partners collaborate to seek local solutions; cost savings for regulators, and predictability for those regulated.

Water Quality

Water quality problems that have occurred in Riverside County have related to inadequate subsurface sewage disposal, waste disposal management of the Santa Ana River, agriculturally-related problems such as citricultural runoff in the western County and increasing salinity of the desert groundwater basins, sediment buildup of water bodies from construction-related erosion, lake water quality problems, and pollution due to urban stormwater system runoff. Regional Water Quality Control Boards for Regions 7, 8, and 9 provide state-level water quality policy for the County. Further, the National Pollutant Discharge Elimination system mandates Best Management Practices in order to effectively minimize the adverse effects of pollution and protect water quality. The following policies are intended to provide local guidance for the protection and maintenance of water quality in Riverside County.

Policies:

OS 3.1 Encourage innovative and creative techniques for wastewater treatment, including the use of local water treatment plants.

OS 3.2 Encourage wastewater treatment innovations in rural areas.

OS 3.3 Minimize pollutant discharge into storm drainage systems and natural drainage and aquifers. (AI 3)

Groundwater Recharge

Groundwater resources in the County are defined by their quality as well as quantity. Most groundwater basins within Riverside County store local and imported water for later use to meet seasonal and drought-year demands. Under these groundwater recharge programs, groundwater is artificially replenished in wet years with surplus imported water. Water is then extracted during drought years or during emergency situations. Groundwater recharge that may also involve the recharge of reclaimed water, enhances the region's ability to meet water demand during years of short supply, and increases overall local supply reliability. In order to facilitate groundwater recharge, the following policies may apply:

★

Water banking is a key factor for meeting future water supply needs in southern California. Historically, groundwater extractions have exceeded natural recharge in this region, resulting in declining water levels and water quality. Using groundwater basins for water banking during wet periods will help alleviate southern California's water supply problems.

Policies:

OS 4.1 Support efforts to create additional water storage where needed, in cooperation with federal, state, and local water authorities. Additionally, support and/or engage in water banking in conjunction with these agencies where appropriate, as needed. (AI 56, 57)

OS 4.2 Participate in the development, implementation, and maintenance of a program to recharge the aquifers underlying the County. The program shall make use of flood and other waters to offset existing and future groundwater pumping, except where:

a. groundwater quality would be reduced;
b. available groundwater aquifers are full; or
c. rising water tables threaten the stability of existing structures. (AI 56, 57)

OS 4.3 Ensure that adequate aquifer water recharge areas are preserved and protected. (AI 3, 56, 57)

OS 4.4 Incorporate natural drainage systems into developments where appropriate and feasible. (AI 3)

OS 4.5 Retain storm water at or near the site of generation for percolation into the groundwater to conserve it for future uses and to mitigate adjacent flooding. (AI 57)

OS 4.6 Use natural approaches to managing streams, to the maximum extent possible, where groundwater recharge is likely to occur. (AI 57)

OS 4.7 Offer incentives to landowners whose property is prohibited from development due to its retention as a natural ground water recharge area. These incentives shall be provided to encourage the preservation of natural water courses without creating undue hardship on the owner of properties, and might include density transfer mechanisms. (AI 9)

Also see the Flood and Inundation Hazard Abatement section of the Safety Element.

Floodplains are comprised of the floodway and the floodway fringe. They are the low, flat, periodically flooded lands adjacent to rivers, lakes and oceans inundated by 100-year flood.

The floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the 100-year flood without cumulatively increasing the water surface elevation more than one foot.

The floodway fringe is that portion of the floodplain between the floodway and the limits of the existing 100-year floodplain.

★ *The County of Riverside has adopted the USGS "blue line stream" overlay as its major form of mapping the watercourses in Riverside County (see figure OS-1, the Land Use Element, and Area Plan Maps). Though this overlay is not necessarily the most accurate description of a water course or of the actual running water within the County, it is a general indicator of existing or potential moving water resources, floodways and floodplains.*

Floodplain and Riparian Area Management

Floodplains are subject to geomorphic (land-shaping) and hydrologic (water flow) processes. The watercourse and its floodway are usually the focus of construction and control; while fertile, flat and "reclaimed" floodplain lands are usually the focal points for other activities such as agriculture, commerce, and residential development. These areas form a complex physical and biological system that not only supports a variety of natural resources, but also provides natural flood and erosion control. In addition, the floodplain represents a natural filtering system, with water percolating back into the ground and replenishing groundwater. When a watercourse is divorced from its floodplain with levees and other flood control facilities, then natural, built-in benefits are either lost, altered, or significantly reduced.

The conventional assumption that flooding can be completely eliminated has meant not only an unrealistic reliance on manufactured flood protection, but also the development of a flood control system that squeezes rivers into artificially narrow channels, adds steeply sloped levees (devoid of riparian vegetation), and eliminates historic floodplains, all in the name of reclamation, flood protection and urban growth. Unfortunately, this highlights the fact that floods have been viewed for far too long as everything except part of the natural life cycle of rivers and floodplains. Flooding is part of the dynamic nature of healthy rivers and ecosystems. High flows and flood waters are needed to cleanse the channels of accumulated debris, build stream banks, import gravels for aquatic life, thin riparian forests and create riparian habitat. The open space of floodplains adjacent to rivers and streams helps store and slowly release floodwaters, thus reducing flood flow and peaks and their subsequent impacts during small and frequent flood events.

Further, riparian habitat within floodplains is of great value to resident and migratory animal species, as it provides corridors and linkages to and from the biotic regions of the County. The numerous essential habitat elements provided by the remaining riparian corridors of Riverside County make them a significant contributor to wildlife habitat throughout the County. The intent of the County is to sustain "living" riparian habitats to the maximum extent possible.



Also see the Flood and Inundation Hazard Abatement section of the Safety Element.



***Development** is defined as the division of a parcel of land into two or more parcels; the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any structure that would require a discretionary permit from the County; any mining, excavation, landfill or land disturbance, and any use or extension of the use of land that would require a discretionary permit from the County. Development does not include non-motorized trails, agriculture or other uses for which a discretionary permit is not required. For purposes of this definition, the term, discretionary permit, shall have the same meaning as that set forth in the California Environmental Quality Act and Guidelines.*

***Watercourse** is defined as any natural stream, river, creek, waterway, gully, ravine or wash in which water flows in a definite direction or course, either continuously or intermittently, and has a definite channel, bed and banks. A watercourse also includes any vegetation along the banks as well as any adjacent areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions including swamps, marshes, and bogs.*

The following set of policies address floodways, the floodplain fringe, and riparian areas in the County.

Policies:

OS 5.1 Substantially alter floodways or implement other channelization only as a "last resort," and limit the alteration to:
a. that necessary for the protection of public health and safety only after all other options are exhausted;
b. essential public service projects where no other feasible construction method or alternative project location exists; or
c. projects where the primary function is improvement of fish and wildlife habitat. (AI 25, 59, 60)

OS 5.2 If substantial modification to a floodway is proposed, design it to reduce adverse environmental effects to the maximum extent feasible, considering the following factors:
a. stream scour;
b. erosion protection and sedimentation;
c. wildlife habitat and linkages;
d. groundwater recharge capability;
e. adjacent property; and
f. design (a natural effect, examples could include soft riparian bottoms and gentle bank slopes, wide and shallow floodways, minimization of visible use of concrete, and landscaping with native plants to the maximum extent possible).
A site specific hydrologic study may be required. (AI 25, 59, 60)

OS 5.3 Based upon site, specific study, all development shall be set back from the floodway boundary a distance adequate to address the following issues:
a. public safety;
b. erosion;
c. riparian or wetland buffer;
d. wildlife movement corridor or linkage; and
e. slopes. (AI 59, 60)

OS 5.4 Consider designating floodway setbacks for greenways, trails, and recreation opportunities on a case-by-case basis. (AI 25, 59, 60)

OS 5.5 New development shall preserve and enhance existing native riparian habitat and prevent obstruction of natural watercourses. Incentives shall be utilized to the maximum extent possible. (AI 25, 60)

OS 5.6 Identify and, to the maximum extent possible, conserve remaining upland habitat areas adjacent to wetland and riparian areas that are critical to the feeding, hibernation, or nesting of wildlife species associated with these wetland and riparian areas. (AI 60, 61)

OS 5.7 Where land is prohibited from development due to its retention as natural floodways, floodplains and water courses, incentives should be available to the owner of the land including density transfer and other mechanisms as may be adopted. These incentives will be provided for the purpose of encouraging the preservation of natural

water courses without creating undue hardship on the owner of properties following these policies. (AI 60)

Wetlands

Wetlands in Riverside County might typically occur in low-lying areas that receive fresh water at the edges of lakes, ponds, streams, and rivers. Wetlands provide habitat for a wide variety of plants, invertebrates, fish, and larger animals, including many rare, threatened, or endangered species. The plants and animals found in wetlands include both those that are able to live on dry land or in the water and those that can live only in a wet environment. Wetlands in Riverside County may include vernal pools, palm oases or desert washes.

The term "riparian area" is defined as a wetland which occurs along a watercourse. "Upland habitat" is elevated above lowlands occurring along or within a river, stream, lake etc. Upland habitat is that which does not meet the criteria of federal-and-state jurisdictional wetlands.

Policies:

OS 6.1 During the development review process, ensure compliance with the Clean Water Act's Section 404 in terms of wetlands mitigation policies and policies concerning fill material in jurisdictional wetlands. (AI 3)

OS 6.2 Preserve buffer zones around wetlands where feasible and biologically appropriate. (AI 61)

OS 6.3 Consider wetlands for use as natural water treatment areas that will result in improvement of water quality. (AI 56)

Wetlands are the link between water and land, or the collective term for areas between dry land and bodies of water. In wetlands, the surface of the water, called the water table, is usually at, above, or just below the land surface for enough time to restrict the growth of plants to those that are adapted to wet conditions and promote the development of soils characteristic of a wet environment. Wetlands also act as natural filters, thereby enhancing overall water quality and protecting sources of drinking water.

A wetland buffer is land that provides a buffer area of an appropriate size to protect the environmental and functional habitat values of the wetland, which are integrally important in supporting the full range of the wetland and adjacent biological community. In wetland buffer areas, permitted uses can include access paths, improvements necessary to protect adjacent wetlands, and all uses permitted in wetland areas.

Agricultural Resources

Agriculture is given special recognition as a Foundation Component of the General Plan because of its high socioeconomic value to Riverside County. The two major conservation rationales are to maintain the viability of the agricultural industry, a critical component of the County's economy, and to preserve the resource represented by farmland—its productive soils and its secondary role as an open space amenity. Soil classifications and the Williamson Act are described below because of their importance in defining agricultural resources.

Soil Classifications

The Countywide Agricultural Resources Map (see Figure OS-2) identifies several classifications of important agricultural lands, as established by state and federal agencies. The four mapped classifications of important farmland are based on criteria for soil characteristics, climatic conditions, and water supply. The criteria include soil type, moisture content, water supply, soil temperature, acidity, salinity, depth, drainage, water table, flooding, slope, erodibility, permeability, rock content, rooting depth, growing season, crop type and value, and other economic factors. The four classifications of important farmlands shown on the Agricultural Resources Map are described as follows.

Prime Farmlands

Prime Farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses: cropland, pastureland, rangeland, forest land, or other land, but not urban land or water. It has the soil quality, growing season, and moisture supply needed to economically produce sustained

high yields of crops when treated and managed (including water management) according to modern farming methods.

"Long a major foundation of our economy and our culture, agriculture remains a thriving part of Riverside County. While we have lost some agriculture to other forms of development, other lands have been converted to agriculture. We remain a major agricultural force in California and in the global agricultural market."

– RCIP Vision Statement

Statewide Important Farmlands

Farmland of Statewide Importance is land other than Prime Farmland that has a good combination of physical and biological characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses (the land could be cropland, pastureland, rangeland, forest land or other land, but not urban land or water).

Unique Farmlands

Unique Farmland is land other than Prime and Statewide Important Farmland, that is currently used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to produce sustained high quality of a specific crop when treated and managed according to modern farming methods. Examples of such economically important crops are citrus, olives, and avocados.

Local Important Farmlands

These farmlands are not covered by the above categories but are of locally significant economic importance. They include the following:

- Lands with soils that would be classified as Prime or Statewide Important Farmlands but lack available irrigation water.
- Lands planted in 1980 or 1981 in dry land grain crops such as barley, oats, and wheat.
- Lands producing major crops for Riverside County but that are not listed as Unique Farmland crops. Such crops are permanent pasture (irrigated), summer squash, okra, eggplant, radishes, and watermelon.
- Dairylands including corrals, pasture, milking facilities, hay and manure storage areas if accompanied with permanent pasture or hayland of 10 acres or more.
- Lands identified by the County with Agriculture land use designations or contracts.
- Lands planted with jojoba that are under cultivation and are of producing age.

Williamson Act

The California Land Conservation Act, better known as the Williamson Act, has been the state's premier agricultural land protection program since its enactment in 1965. This program allows owners of agricultural land to have their properties assessed for tax purposes on the basis of agricultural production rather than current market value. Participation in this program is voluntary, and requires 100 contiguous acres of agricultural land under one or more ownerships to file an application for agricultural preserve status with the Riverside County Planning Department.

Figure OS- 2 Agricultural Resources

This page intentionally left blank.

After an agricultural preserve has been established, the land within the preserve is automatically restricted to agricultural and compatible uses. In order to have land within an agricultural preserve assessed on the basis of agricultural production rather than full market value, the property owner(s) and the County of Riverside must enter into a Land Conservation Contract. Either party may file a Notice of Non-Renewal, which will cause the contract to expire in 10 years. After the contract has expired, a landowner may apply to remove that property from an agricultural preserve. The landowner also has the option of petitioning the Board of Supervisors for the cancellation of the contract. Cancellation of the contract involves payment of substantial cancellation fees. Land use decisions related to the use of agricultural lands after cancellation of Williamson Act contracts are subject to the provisions of the Certainty System described in Chapter 1 of this General Plan.

Since 1998, another option within the Williamson Act Program is the rescission process to cancel a Williamson Act contract and simultaneously dedicate a permanent agricultural conservation easement on other land.

This section focuses on policies for the protection of agricultural lands as historical, cultural, and scenic resources. These are the valuable qualities that economic transactions do not account for; therefore, they require special protection.



Also refer to the Agriculture section of the Land Use Element.

Policies:

OS 7.1 Work with state and federal agencies to periodically update the Agricultural Resources map to reflect current conditions. (AI 11)

OS 7.2 In cooperation with individual farmers, farming organizations, and farmland conservation organizations, the County shall employ a variety of agricultural land conservation programs to improve the viability of farms and ranches and thereby ensure the long-term conservation of viable agricultural operations within Riverside County. The County shall seek out available funding for farmland conservation. Examples of programs which may be employed include: land trusts; conservation easements (under certain circumstances, these may also provide Federal and estate tax benefits to farmers); dedication incentives; Land Conservation Contracts; Farmland Security Act contracts; the Agricultural Land Stewardship Program Fund; agricultural education programs; transfer and purchase of development rights; providing adequate incentives (e.g. clustering and density bonuses) to encourage conservation of productive agricultural land in the County's Incentive Program; and providing various resource incentives to landowners (e.g. establish a reliable and/or less costly supply of irrigation water.) (AI 78)

The County of Riverside shall establish a Farmland Protection and Stewardship Committee and the Board of Supervisors shall appoint its members. The Committee shall include members of the farming community as well as other individuals and organizations committed to farmland protections and stewardship. The Committee shall develop a strategy to preserve agricultural land within Riverside County and shall identify and prioritize agricultural lands for conservation. This strategy shall not only address the preservation of

agricultural land but shall also promote sustainable agriculture within Riverside County. In developing its strategy, the Committee shall consider an array of proven techniques and, where necessary, adapt these techniques to address the unique conditions faced by the farming community within Riverside County. County staff shall assist the Committee in accomplishing its task. County Departments, that may be called upon to assist the Committee, include, but are not limited to the following: the Agricultural Commissioner, Planning Department, Assessor's Office and County Counsel. In developing its strategy, the Committee shall consult government and private organizations with expertise in farmland protection. These organizations may include, but are not limited to, the following: USDA Natural Resources Conservation Service; State Department of Conservation and its Division of Land Resource Protection; University of California Sustainable Agriculture Research and Education Program; the University of California Cooperative Extension; The Nature Conservancy; American Farmland Trust; The Conservation Fund; the Trust for Public Land; and the Land Trust Alliance.

The Committee shall, from time to time, recommend to the Board of Supervisors the adoption of policies and/or regulation that it finds will further the goals of the farmland protection and stewardship. The Committee shall also advise the Board of Supervisors regarding proposed policies that curb urban sprawl and the accompanying conversion of agricultural land to urban development, and that support and sustain continued agriculture. Planning policies that may benefit farmland conservation and fall within the purview of the Committee for review include measures to promote efficient development in and around existing communities including clustering, incentive programs, transfer of development rights, and other planning tools.

OS 7.3 Encourage conservation of productive agricultural lands and preservation of prime agricultural lands. (AI 3, 78)

OS 7.4 Encourage landowners to participate in programs that reduce soil erosion, improve soil quality, and address issues that relate to pest management. To this end, the County shall promote coordination between the Natural Resources Conservation Service, Resource Conservation Districts, UC Cooperative Extension, and other agencies and organizations.

OS 7.5 Encourage the combination of agriculture with other compatible open space uses in order to provide an economic advantage to agriculture. Allow by right, in areas designated Agriculture, activities related to the production of food and fiber, and support uses incidental and secondary to the on-site agricultural operation. (AI 1)

Forest Resources

The montane forest is the most complex bio-region in North America, though they can be found all over the world. Parts of Riverside County are within the Sierran Montane bio-region. These bio-regions are characterized by winter snows and summer fires, conifer species, and a great diversity of animal species.

Both of the major forests in Riverside County, the Cleveland and San Bernardino National Forests, are part of the Sierran montane range (see Figure OS-3 Parks, Forests and Recreation Areas). These forests occur on all of the higher mountain ranges of the Pacific Coast region, from southern Oregon to northern Baja California. At lower elevations, these forests commonly border mixed evergreen forest, oak woodland, and chaparral.

Policies in this section seek to protect forest resources in the Cleveland and San Bernardino National Forests. This can be accomplished through careful management of the forest ecosystem, protection of forest resources, and discouragement of the development of land uses that conflict with valuable conservation of forest land.

Policies:

OS 8.1 Cooperate with federal and state agencies to achieve the sustainable conservation of forest land as a means of providing open space and protecting natural resources and habitat lands included within the MSHCPs. (AI 3)

OS 8.2 Support conservation programs to reforest privately held forest lands.

Vegetation

"Native habitat for plants and animals endemic to this area that make up such important part of our natural heritage now have interconnected spaces in a number of locations that allow these natural communities to prosper and be sustained."

– RCIP Vision Statement

The vegetation/flora of Riverside County is exceedingly diverse in its size, shape and form, yet various species share a common unity in their adaptation to climate and environmental conditions. Further, habitat areas are strongly characterized by flora, in addition to the fauna/animal life, that thrives within the vegetation. Although ecological conditions may fluctuate and affect various plant communities, these natural changes occur gradually, with most species adapting by changing their physical form and structure. Over thousands of years, both the landscape and the plants upon it have slowly evolved together, so that those plant species with the best record of survival in a specific setting have usually become the most prominent identifying characteristics of that setting.

As development continues in the County, the natural succession and evolution of vegetation is altered. This disturbance of vegetation results in changes that are often drastic in wildlife habitats, microclimates, water absorption and purification, soil erosion, fires, and aesthetic quality. The management of vegetation will assure the continued viability of habitat communities within the County for present and future generations. See Figure OS-4, Western Riverside County Vegetation, for a map of those vegetation types in the western portion of the County.

Native vegetation must be managed in order to maintain the ecological diversity of the County. The policies that follow are intended to protect superior examples of native vegetation resources in conjunction with permitted uses.

Policies:

OS 9.1 Update the Vegetation Map for Western Riverside County in consultation with the California Department of Fish and Game, the Natural Diversity Data Base, the United States Forest Service, and other knowledgeable agencies. The County shall also provide these agencies with data as needed. (AI 11)

OS 9.2 Expand Vegetation mapping to include the eastern portion of the County of Riverside. (AI 11)

OS 9.3 Maintain and conserve superior examples of native trees, natural vegetation, stands of established trees, and other features for ecosystem, aesthetic, and water conservation purposes. (AI 3, 79)

OS 9.4 Conserve the oak tree resources in the County. (AI 3, 78)

OS 9.5 Encourage research and education on the effects of smog and other forms of pollution on human health and on natural vegetation.

Renewable Energy

Conservation policies in this element direct the protection of the County's physical resources as well as its energy resources, including renewable energy. This category of energy resources includes wind, solar, geothermal, and biomass resources. Although the current use of these resources is not wide-spread, they have considerable potential. Renewable energy can be developed as a substitute for oil, natural gas, and other limited energy supplies used for electricity generation, and to reduce consumption of these supplies. Also refer to the Energy Conservation policies in the Energy Resources section of this element.

Wind Energy

Wind energy generation installation, known also as Wind Energy Conversion Systems (WECS), are a well established industry in the San Gorgonio Pass and Coachella Valley areas of the County. General regulatory issues to be considered in relation to wind energy are aesthetics, safety, noise, air navigation interferences, land use, wildlife and general ecology, slopes and erosion, PM_{10} and dust control, wind access and equity.

Policies:

OS 10.1 Provide for orderly and efficient wind energy development in a manner that maximizes beneficial uses of the wind resource and minimizes detrimental effects to the residents and the environment of the County.

OS 10.2 Continue the County's Wind Implementation Monitoring Program (WIMP) in order to study the evolution of wind energy technology, identify means to solve environmental and community impacts, and provide for an ability to respond with changes in the County's regulatory structure.(AI 72)

Figure OS- 3 Parks, Forests, and Recreation Areas

This page intentionally left blank.

Figure OS- 4 Western Riverside County Vegetation

This page intentionally left blank.

Solar Energy

Solar radiation in the form of sunlight can be utilized for energy production in two ways. Active solar systems involve the use of mechanical devices to convert solar energy to heat or electricity. Passive solar systems utilize natural heating and cooling from the sun through building orientation and building design techniques.

Policies:

OS 11.1 Enforce the state Solar Shade Control Act, which promotes all feasible means of energy conservation and all feasible uses of alternative energy supply sources. (AI 62, 65, 66, 70)

OS 11.2 Support and encourage voluntary efforts to provide active and passive solar access opportunities in new developments. (AI 63, 64)

OS 11.3 Permit and encourage the use of passive solar devices and other state-of-the-art energy resources. (AI 62, 63, 64)

Geothermal Resources



"Geothermal resources" mean the natural heat of the earth, the energy, in whatever form, below the surface of the earth present in, resulting from, or created by, or that may be extracted from, such natural heat, and all minerals in solution or other products obtained from naturally heated fluids, brines, associated gases, and steam, in whatever form, found below the surface of the earth, but excluding oil, hydrocarbon gas or other hydrocarbon substances.

Geothermal resources can be used for electricity production as geothermal steam can be used to run turbines. The exploitation of these resources, however, is frequently accompanied by detrimental impacts on the environment. Among these are the emission of toxic gases and chemical substances that result in the degradation of air quality, the threat of water pollution, damage to living organisms, and hazards to public health. Additional problems arise from the heavily industrial character of geothermal operations for electrical generation; the frequent occurrence of exceptional natural, scenic, and archaeological values in geothermal resource areas; and the adverse effects that geothermal fluid removal may have on nearby hot springs and other natural thermal features. Currently there is no active geothermal energy production in the County, though geothermal resources are known to exist in the County.

Policies:

OS 12.1 Allow for the development of non-electrical, direct heat uses of geothermal heat and fluids for space, agricultural, and industrial heating in situations and localities where naturally occurring hydrothermal features will not be degraded. (AI 71)

The following policies direct the use of present technologies and the extraction and conversion of energy from geothermal fluid and steam reservoirs:

OS 12.2 Base all geothermal decisions on appropriate data relating to anticipated environmental, cultural, aesthetic, archaeological and social impacts.

OS 12.3 Weigh the benefits of geothermal as a viable energy source against the protection of hot springs, geysers, thermal pools, and other thermal features for their ecological, educational, and recreational values.

OS 12.4 Permit geothermal heat utilization for space heating in buildings.

Biomass Resources

Biomass resources refer to organic materials, either wastes, residues, or specific crops, that can be converted to an energy fuel to replace conventional sources or directly used in combustion processes. Due to agricultural production in the County, resources exist that enable this technology to be more widely employed.

Policies:

OS 13.1 Encourage economic biomass conversion under sensible environmental controls. (AI 71)

NON-RENEWABLE RESOURCES

The non-renewable resources discussed in this element are mineral resources and energy resources. The Mineral Resources section of this element addresses those resources that are classified under the State Mining and Reclamation Act of 1975 (SMARA). The Energy Resources section addresses petroleum resources as well as energy conservation.

SMARA mandates the classification of valuable lands in order to protect mineral resources within the State of California subject to urban expansion or other irreversible actions. SMARA also allows the state to designate lands containing mineral deposits of regional or statewide significance. The California Division of Mines and Geology (CDMG) has identified a number of significant aggregate resource areas throughout Riverside County.

Mineral Resources

In addition to agricultural production, mineral extraction is an important component of Riverside County's economy. The County has extensive deposits of clay, limestone, iron, sand, and aggregates. Classification of land within California takes place according to a priority list that was established by the State Mining and Geology Board (SMGB) in 1982, or when the SMGB is petitioned to classify a specific area. The SMGB has also established Mineral Resources Zones (MRZ) to designate lands that contain mineral deposits. The State of California has also designated Aggregate Mineral Resource areas within the County. These mineral resource zones are mapped in Figure OS-5.

The classifications used by the state to define MRZs are as follows:

- **MRZ-1**: Areas where the available geologic information indicates no significant mineral deposits or a minimal likelihood of significant mineral deposits.
- **MRZ-2a**: Areas where the available geologic information indicates that there are significant mineral deposits.
- **MRZ-2b**: Areas where the available geologic information indicates that there is a likelihood of significant mineral deposits.
- **MRZ-3a**: Areas where the available geologic information indicates that mineral deposits are likely to exist, however, the significance of the deposit is undetermined.
- **MRZ-4**: Areas where there is not enough information available to determine the presence or absence of mineral deposits.

Figure OS- 5 Mineral Resource Areas

This page intentionally left blank.

Mineral deposits in the County are important to many industries, including construction, transportation and chemical processing. The value of mineral deposits within the County is enhanced by their close proximity to urban areas. However, these mineral deposits are endangered by the same urbanization that enhances their value.

The non-renewable characteristic of mineral deposits necessitates the careful and efficient development of mineral resources, in order to prevent the unnecessary waste of these deposits due to careless exploitation and uncontrolled urbanization. Management of these mineral resources will protect not only future development of mineral deposit areas, but will also guide the exploitation of mineral deposits so that adverse impacts caused by mineral extraction will be reduced or eliminated.

Policies in this section seek to conserve areas identified as containing significant mineral deposits and oil and gas resources for potential future use, while promoting the reasonable, safe, and orderly operation of mining and extraction activities within areas designated for such use, where environmental, aesthetic, and adjacent land use compatibility impacts can be adequately mitigated.



Also refer to the Open Space-Mineral Resource Land Use Designation policies in the Land Use Element.

Policies:

OS 14.1 Require that the operation and reclamation of surface mines be consistent with the State Surface Mining and Reclamation Act (SMARA) and County Development Code provisions.

OS 14.2 Restrict incompatible land uses within the impact area of existing or potential surface mining areas.

OS 14.3 Restrict land uses incompatible with mineral resource recovery within areas designated Open Space-Mineral Resources. (AI 11)

OS 14.4 Impose conditions as necessary on mining operations to minimize or eliminate the potential adverse impact of mining operations on surrounding properties, and environmental resources.

OS 14.5 Require that new non-mining land uses adjacent to existing mining operations be designed to provide a buffer between the new development and the mining operations. The buffer distance shall be based on an evaluation of noise, aesthetics, drainage, operating conditions, biological resources, topography, lighting, traffic, operating hours, and air quality.

OS 14.6 Accept California Land Conservation (Williamson Act) contracts on land identified by the state as containing significant mineral deposits subject to the use and acreage limitations established by the County.

Energy Resources

Energy resources provide the power necessary to maintain the quality of life enjoyed by most Riverside County residents. Many of the energy resources used within the County are non-renewable. Electricity and natural gas are the primary sources of household energy, while fossil fuels are the primary source of energy



Oil and gas seeps are natural springs where liquid and gaseous hydrocarbons (hydrogen-carbon compounds) leak out of the ground.

for most modes of transportation. Energy conservation and the substitution of renewable resources should be encouraged if these resources are to be preserved for the County's future generations.

Petroleum Resources

Riverside County's petroleum resources are deposited in the form of oil and gas seeps. The State Division of Oil and Gas does not report significant or active petroleum extraction in the County. Should extraction activities be undertaken in the future, the following policy provides direction for the siting of oil and gas facilities.

Policies:

OS 15.1 Enforce California Division of Oil and Gas policies that direct the siting of oil and gas facilities in urban and non-urban areas.

OS 15.2 Development of renewable resources should be encouraged.

Energy Conservation

Conservation is an important component of using energy resources in an efficient manner. Lowering energy demand by conserving both renewable and non-renewable energy is critical. Sensible energy conservation and design practices can also mitigate the "heat island" effects of urban development that increase local temperatures and result in increased energy demand.

In conjunction with the tactics proposed by the Southern California Association of Government's Regional Air Quality Management Plan, the following policies address energy conservation in Riverside County.

Policies:

OS 16.1 Continue to implement Title 24 of the State Building Code. Establish mechanisms and incentives to encourage architects and builders to exceed the energy efficiency standards of Title 24. (AI 62)

OS 16.2 Specify energy efficient materials and systems, including shade design technologies, for County buildings. (AI 68, 70)

OS 16.3 Implement public transportation systems that utilize alternative fuels when possible, as well as associated urban design measures that support alternatives to private automobile use.

OS 16.4 Undertake proper maintenance of County physical facilities to ensure that optimum energy conservation is achieved.

OS 16.5 Utilize federal, state, and utility company programs that encourage energy conservation. (AI 63, 64)

OS 16.6 Assist public buildings and institutions in converting asphalt to greenspace to address the heat island effect.

OS 16.7 Promote purchasing of energy-efficient equipment based on a fair return on investment, and use energy-savings estimates as one basis for purchasing decisions for major energy-using devices. (AI 68, 69)

OS 16.8 Promote coordination of new public facilities with mass transit service and other alternative transportation services, including bicycles, and design structures to enhance mass transit, bicycle, and pedestrian use.

OS 16.9 Encourage increased use of passive, solar design and day-lighting in existing and new structures. (AI 62, 63, 64, 65, 70)

OS 16.10 Encourage installation and use of cogenerating systems where they are cost-effective and appropriate. (AI 62, 70)

This page intentionally left blank.

Preservation

The RCIP Vision directs that,

> *"Preserved multi-purpose open space is viewed as a critical part of the County's system of public facilities and services required to improve the existing quality of life and accommodate new development. Strategies and incentives for voluntary preservation on private land are an integral part of the County's policy/regulatory system and are referred to nationwide as model approaches."*

The following set of policies seeks to preserve natural resources that are sensitive, rare, threatened, endangered and irreplaceable. These resources deserve special protection in order to ensure their continued viability and to improve the quality of life for citizens of Riverside County. Open space preservation can serve many purposes, including the preservation and enhancement of environmental resources for both ecological and recreational purposes, as well as the proper management of environmental hazards.

MULTIPLE SPECIES HABITAT CONSERVATION PLANS



HCP-Habitat Conservation Plan
NEPA-National Environmental Policy Act
NCCP-Natural Communities Conservation Plan
CEQA-California Environmental Quality Act
CESA-California Endangered Species Act
FESA-Federal Endangered Species Act

As urbanization has spread into Riverside County, community development has not only involved the local land use planning process, but coordination with state and federal wildlife agencies in order to obtain "take permits" for impacts to threatened and endangered species. The United States Fish and Wildlife Service and California Department of Fish and Game, hereafter "Wildlife Agencies", have authority to regulate the "take" of threatened and endangered species. The process of issuing "take permits," however, has resulted in costly delays for development interests in addition to the assemblage of piecemeal reserve systems addressing only the needs of single species. Mitigation lands have been preserved, but these have generally been small, unconnected habitat areas in which it is more difficult to sustain wildlife mobility, genetic flow, or ecosystem health. Instead, large interconnected natural areas are preferred in order to assure that the County's entire ecosystem has the potential to remain healthy.

To address the issues of wildlife health and sustainability, the County has participated in or directed the development of two Multiple Species Habitat Conservation Plans (MSHCP's). These proposed MSHCP's are stake-holder driven, comprehensive, and multi-jurisdictional, and focus on the conservation of both species and associated habitats, in order to address biological and ecological diversity conservation needs and provide mitigation for the impacts of development in Riverside County. These plans are two of several large multi jurisdictional habitat planning efforts within southern California which have been developed under the overall goal of maintaining biological diversity within a rapidly urbanizing region. The Western Riverside County MSHCP has been adopted by the County and, as of October 7, 2003, awaits approval by other jurisdictions and the Wildlife Agencies. The Coachella Valley Association of Governments' MSHCP is under preparation.

The proposed MSHCPs will allow the County and other local jurisdictions the ability to manage local land use decisions and maintain economic development flexibility, while providing a coordinated reserve system and implementation program that will facilitate the preservation of biological diversity as well as maintain the region's quality of life. Should these MSHCP's not be adopted, it will be necessary to assess development related impacts and develop associated mitigation measures on a project by project basis.

Coachella Valley Association of Governments MSHCP Program Description

The Coachella Valley Association of Governments (CVAG) is preparing, on behalf of its member agencies, a proposed Multiple Species Habitat Conservation Plan that is intended to cover 28 species of plants and animals in the Coachella Valley. Currently, this plan proposes to conserve between 200,000 and 250,000 acres of privately owned land through general plan land use designations, zoning/development standards and an aggressive acquisition program, for a total conservation area of between 700,000 to 750,000 acres.

Relationship to Area Plans

The Pass, Eastern Coachella Valley, Western Coachella Valley and REMAP Area Plans would be affected by the CVAG MSHCP, if it is adopted. These area plans contain maps and general information about the proposed MSHCP. Consult the area plans for further information.

Western Riverside County MSHCP Program Description

"In western Riverside, a high density of rare species coincides with one of the most swiftly urbanizing areas of the country,"

– Scott Ferguson, Trust for Public Land Senior Project Manager

The proposed Western Riverside County MSHCP encompasses approximately 1.26 million acres (approximately 1,997 square miles). This proposed MSHCP includes unincorporated and incorporated County land (excluding Indian land) west of the crest of the San Jacinto Mountains to the Orange County line. The planis the largest HCP ever attempted and covers multiple species and multiple habitats within multiple jurisdictions. The proposed MSHCP covers a diverse landscape from urban cities to undeveloped foothills and montane forests. In addition to the presence of multiple habitats, the plan stretches across the Santa Ana Mountains, Riverside Lowlands, San Jacinto Foothills, San Jacinto Mountains, Aqua Tibia Mountains, Desert Transition and San Bernardino Mountain bio-regions.

This proposed MSHCP is intended to serve as a Habitat Conservation Plan pursuant to section 10(a)(1)(B) of the Federal Endangered Species Act of 1973, as well as a Natural Communities Conservation Plan under the NCCP Act of 1991. If adopted, it will be used to allow incidental "take" of plant and animal species identified within the proposed MSHCP. The purpose of the proposed MSHCP is for the Wildlife Agencies to grant "take authorization" for otherwise lawful actions that may incidentally take or harm individuals of a species outside of preserve areas, in exchange for supporting assembly of a coordinated reserve system. Conservation and management duties, as well as implementation assurances, will be provided by the County and other signatory agencies or jurisdictions identified as permittees through a corresponding Implementation Agreement.

A Stakeholder Driven Process

To complement the conservation and management responsibilities assigned to the County, a property owner-initiated habitat evaluation and acquisition negotiation process has also been developed for the proposed Western Riverside County MSHCP. The Habitat Evaluation and Acquisition Negotiation Process applies to property which maybe needed for inclusion in the MSHCP Reserve or subjected to other MSHCP criteria. Under the proposed incentive-based MSHCP program, the County may obtain interests in property needed to implement the MSHCP over time. If it is determined that all or a portion of a property is needed for the MSHCP Reserve, various incentives or monetary compensation may be available to the property owner in exchange for the conveyance of property. Incentives are intended to provide a form of compensation to property owners who convey their property. As a property interest is obtained, it will become part of the MSHCP Reserve.

Relationship to Area Plans

Each area plan that is affected by the proposed Western Riverside County MSHCP contains maps that identify the areas potentially affected by the MSHCP, if it is adopted, and identification of plant and animal species to be covered by the plan. Consult the area plans for further information.

The Western Riverside County MSHCP affects the following area plans:

- *Eastvale*
- *Elsinore*
- *Harvest Valley/Winchester*
- *Highgrove*
- *Jurupa*
- *Lake Mathews/Woodcrest Lakeview/Nuevo*
- *Mead Valley*
- *Reche Canyon/Badlands*
- *REMAP*
- *San Jacinto Valley*
- *Southwest (SWAP)*
- *Sun City/Menifee Valley*
- *Temescal Canyon*
- *The Pass*

Policies:

OS 17.1 Enforce the provisions of applicable MSHCP's, if adopted, when conducting review of development applications. (AI 10)

OS 17.2 Enforce the provisions of applicable MSHCP's, if adopted when developing transportation or other infrastructure projects that have been designated as covered activities in the applicable MSHCP. (AI 10)

OS 17.3 Enforce the provisions of applicable MSHCP's, if adopted when conducting review of possible general plan amendments and/or zoning changes. (AI 10)

OS 17.4 Require the preparation of biological reports in compliance with Riverside County Planning Department Biological Report Guidelines for development related uses that require discretionary approval to assess the impacts of such development and provide mitigation for impacts to biological resources until such time as the CVAG MSHCP and/or Western Riverside County MSHCP are adopted or should one or both MSHCP's not be adopted.

OS 17.5 Establish baseline ratios for mitigating the impacts of development related uses to rare, threatened and endangered species and their associated habitats to be used until such time as the CVAG MSHCP and/or Western Riverside County MSHCP are adopted or should one or both MSHCP's not be adopted.

ENVIRONMENTALLY SENSITIVE LANDS

The County's multipurpose open space system will be created and maintained using several different techniques, all related to preservation of significant environmental resources. By preserving multi-species habitat; by creating and maintaining active and passive parks, recreation areas and trail systems; by conserving natural and scenic resources; and avoiding natural hazard areas; a complete system of open space will be achieved that ensures the County's "remarkable environmental setting" remains intact for future generations of citizens to enjoy. This section identifies policies for the preservation of environmentally sensitive land within the County of Riverside, including, but not limited to, the land to be preserved through the MSHCPs.

Also refer to the Open Space, Habitat and Natural Resource Protection policies in the Land Use Element and the policies in the Safety Element that seek to preserve environmentally sensitive lands subject to natural hazards.

Policies:

OS 18.1 Preserve multi-species habitat resources in the County of Riverside through the enforcement of the provisions of applicable MSHCP's, if adopted. (AI 10)

OS 18.2 Provide incentives to landowners that will encourage the protection of significant resources in the County beyond the preservation and/or conservation required to mitigate project impacts. (AI 9)

The California Historic Resources Information System (CHRIS) contains information from surveys of archaeological and cultural resources as well as the built environments. The State Historic Preservation Office (SHPO) coordinates a statewide network of Information Centers that manage and make available survey information for environmental review, planning, and research needs.

"A major thrust of the multipurpose open space system is the preservation of components of the ecosystem and landscape that embody the historic character and habitat of the County, even though some areas have been impacted by man-made changes."

– RCIP Vision Statement

CULTURAL AND PALEONTOLOGICAL RESOURCES

Cultural resources consist of places (historic and prehistoric archaeological sites), structures or objects that provide evidence of past human activity. They are important for scientific, historic, and/or religious reasons to cultures, communities, groups or individuals. The cultural history of Riverside County is divided chronologically into three periods: prehistory, ethnohistory and history. Native American cultures predominate in the prehistorical and ethnohistorical periods of County history. The Relative Archaeological Sensitivity of Diverse Landscapes in the County has been mapped and is shown in Figure OS-6. Three classifications have been used: high, undetermined, and low. Properties with high potential include those listed or determined eligible for listing in the National Register of Historic Places. The historical period includes settlement from 1774, with the expedition of Juan Bautista de Anza into the region, to 45 years before the present as defined by the California Environmental Quality Act (CEQA). An inventory of Historical Resources in the County has been completed and mapped, as shown in Figure OS-7.

Riverside County has also been inventoried for geologic formations known to potentially contain paleontological resources. Paleontological resources are the fossilized biotic remains of ancient environments. They are valued for the information they yield about the history of the earth and its past ecological settings. Lands with low, undetermined or high potential for finding paleontological resources are mapped on Figure OS-8, the Paleontological Sensitivity Resources map. This map is used in the environmental assessment of development proposals and the determination of required impact mitigation. Riverside County has an extensive record of fossil life starting in Jurassic time, 150 million years ago.

Figure OS- 6 Relative Archaeological Sensitivity of Diverse Landscapes

This page intentionally left blank.

Figure OS- 7 Historical Resources

This page intentionally left blank.

Figure OS- 8 Paleontological Sensitivity

This page intentionally left blank.

Policies follow that are intended to ensure the preservation of cultural, historical, archaeological, paleontological, geological, and educational resources in the County.

Policies:

OS 19.1 Make available programs that educate students about the rich natural and manmade environment of the County, and offer them to local schools. (AI 3, 75, 76)

The following policies address cultural resources:

OS 19.2 Review all proposed development for the possibility of archaeological sensitivity.

OS 19.3 Employ procedures to protect the confidentiality and prevent inappropriate public exposure of sensitive archaeological resources when soliciting the assistance of public and volunteer organizations.

OS 19.4 Require a Native American Statement as part of the environmental review process on development projects with identified cultural resources.

The following policies pertain to historical resources:

OS 19.5 Transmit significant development proposals to the History Division of the Riverside County Regional Park and Open-Space District for evaluation in relation to the destruction/preservation of potential historical sites. Prior to approval of any development proposal, feasible mitigation shall be incorporated into the design of the project and its conditions of approval.

OS 19.6 Enforce the Historic Building Code so that historical buildings can be preserved and used without posing a hazard to public safety.

OS 19.7 When possible, allocate resources and/or tax credits to prioritize retrofit of County historic structures, which are irreplaceable.

The following policies provide direction for paleontological resources:

OS 19.8 Whenever existing information indicates that a site proposed for development may contain biological, paleontological, or other scientific resources, a report shall be filed stating the extent and potential significance of the resources that may exist within the proposed development and appropriate measures through which the impacts of development may be mitigated.

OS 19.9 This policy requires that when existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor site grading activities, with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate repository, and file a report with the Planning Department

★

Three million years ago, the white sand beach at the edge of the Pacific Ocean was located near the present Interstate 15/State Route 91 interchange. The Ice Ages left fossils of giant sloths, elephants, camels, and bison that were preyed upon by giant bear, American lion and sabercats. Their remains lie waiting a few feet below the surface to be unearthed by construction excavation.

documenting any paleontological resources that are found during the course of site grading.

OS 19.10 Transmit significant development applications subject to CEQA to the San Bernardino County Museum for review, comment, and/or preparation of recommended conditions of approval with regard to paleontological resources.

OPEN SPACE, PARKS AND RECREATION

"We value the unusually rich and diverse natural environment with which we are blessed and are committed to maintaining sufficient areas of natural open space to afford the human experience of natural environments as well as sustaining the permanent viability of the unique landforms and ecosystems that define this environment."

– RCIP Vision Statement

Riverside County incorporates a wide range of open space, parks and recreational areas, including Joshua Tree National Park, and major state parks such as Anza-Borrego, the Salton Sea State Recreation Area, and Chino Hills State Park. A variety of County parks also serve residents and visitors in the western portion of the County, as well as in the desert, mountain and Colorado River regions. Riverside County maintains 35 Regional Parks, encompassing roughly 23,317 acres. Other local parks fall under the jurisdiction of County Recreation and Park Districts and serve the following areas: the Beaumont-Cherry Valley area; the Coachella Valley; the Jurupa area; the Valleywide area incorporating the San Jacinto Valley, the Winchester area, the Menifee Valley, and the Anza Valley. Parks and Recreation Areas in Riverside County have been mapped earlier in this element on Figure OS-3.

Open space and recreation areas offer residents and visitors myriad recreational opportunities while providing a valuable buffer between urbanized areas. The protection and preservation of open space areas from urbanization is an increasingly important issue for the County.

The following policies relate to the preservation, use and development of a comprehensive open space system consisting of passive open space areas, and parks and recreation areas that have recreational, ecological and scenic value.

Policies:

The following policies pertain to open space:

OS 20.1 Preserve and maintain open space that protects County environmental resources and maximizes public health and safety in areas where significant environmental hazards and resources exist.

OS 20.2 Prevent unnecessary extension of public facilities, services, and utilities, for urban uses, into Open Space-Conservation designated areas. (AI 74)

The following policies pertain to parks and recreation:

OS 20.3 Discourage the absorption of dedicated park lands by non-recreational uses, public or private. Where absorption is unavoidable, replace park lands that are absorbed by other uses with similar or improved facilities and programs. (AI 74)

OS 20.4 Provide for the needs of all people in the system of County recreation sites and facilities, regardless of their socioeconomic status, ethnicity, physical capabilities or age.

OS 20.5 Require that development of recreation facilities occurs concurrent with other development in an area. (AI 3)

OS 20.6 Require new development to provide implementation strategies for the funding of both active and passive parks and recreational sites. (AI 3)

SCENIC RESOURCES

Scenic resources are an important quality of life component for residents of the County. In general, scenic resources include areas that are visible to the general public and considered visually attractive. In addition to scenic corridors, described below, scenic resources include natural landmarks and prominent or unusual features of the landscape. For example, the Santa Rosa National Monument includes mountains or other natural features with high scenic value. Scenic backdrops include hillsides and ridges that rise above urban or rural areas or highways. Scenic vistas are points, accessible to the general public, that provide a view of the countryside. Following are policies to protect these resources and ensure that future development enhances them.

Policies:

OS 21.1 Identify and conserve the skylines, view corridors, and outstanding scenic vistas within Riverside County. (AI 79)

SCENIC CORRIDORS

Many roadway corridors in Riverside County traverse its scenic resources. Enhancing aesthetic experiences for residents and visitors to the County promotes tourism, which is important to the County's overall economic future. Enhancement and preservation of the County's scenic resources will require careful application of scenic highway standards along Official Scenic Routes.

Policies that seek to protect and maintain resources in corridors along scenic highways are incorporated into this section. State and county eligible and designated scenic highways are included and mapped in the Circulation Element of the General Plan, as well as in the Circulation section of those area plans where scenic corridors are located



Also refer to the Scenic Corridor Sections of the Circulation and Land Use Elements.

Policies:

OS 22.1 Design developments within designated scenic highway corridors to balance the objectives of maintaining scenic resources with accommodating compatible land uses. (AI 3)

OS 22.2 Study potential scenic highway corridors for possible inclusion in the Caltrans Scenic Highways Plan.

OS 22.3 Encourage joint efforts among federal, state, and County agencies, and citizen groups to ensure compatible development within scenic corridors.

OS 22.4 Impose conditions on development within scenic highway corridors requiring dedication of scenic easements consistent with the Scenic Highways Plan, when it is necessary to preserve unique or special visual features. (AI 3)

OS 22.5 Utilize contour grading and slope rounding to gradually transition graded road slopes into a natural configuration consistent with the topography of the areas within scenic highway corridors. (AI 3)

D2132

historic resource study

a history of land use

september 1983

JOSHUA TREE

NATIONAL MONUMENT / CALIFORNIA

B&W Scans
2.27.2006

ON MICROFILM

HISTORIC RESOURCE STUDY
A HISTORY OF LAND USE IN
JOSHUA TREE NATIONAL MONUMENT

by

Linda W. Greene

Branch of Cultural Resources
Alaska/Pacific Northwest/Western Team
U.S. Department of the Interior
National Park Service
Denver Service Center
1983

PREFACE

This Historic Resource Study has been prepared in accordance with the approved Task Directive for Joshua Tree NM Package No. 804. It is oriented toward the identification and evaluation of the historical resources within the park to accomplish compliance with Executive Order 11593, "Protection and Enhancement of the Cultural Environment." It also provides basic reference material for planners, managers, and interpreters to facilitate the proper care and management of cultural properties.

The historical resources of the monument are connected primarily with ranching, cattle raising, and mining activities. The first two themes are represented by Keys Ranch, Cow Camp, and numerous tanks. Mining remains are found all over the monument and comprise collapsed buildings, ore bins, mine shafts, foundations, mill ruins, and associated equipment. Several of the more dangerous mine shafts within the monument have been grated for safety reasons, and others have been fenced off. One of the primary purposes of this study was to review the remaining mining areas to determine historical significance before they were impacted by grating or filling activities.

Evaluations of significance of resources of the monument are based on the following criteria: association with events that have made a significant contribution to the broad patterns of American history; association with the lives of significant persons in the past; embodiment of distinctive characteristics of a type, period, or method of construction; or potential to yield information important in prehistory or history. Seven properties within the monument are already listed on the National Register of Historic Places: Keys (Desert Queen) Ranch, Wall Street Mill, Barker Dam, Cow Camp, Ryan House and Lost Horse Well or Spring, Lost Horse Mine, and the Desert Queen Mine. This writer has recommended enlargement of the Desert Queen Mine National Register boundary into a Desert Queen Mine Historic District to include the Eagle Cliff Mine and

the submission of forms for the Pinto Wye Arrastra, (New) Eldorado Mine and mill, and a Piñon Mountain Historic Mining District for formal determinations of eligibility.

Many people and institutions provided help and guidance during this study. Most deserving of the writer's gratitude are the staff of Joshua Tree National Monument. Superintendent Rick T. Anderson, Chief of Interpretation Bill Truesdell, Information Specialist Pat Flanagan, and others were extremely generous of their time and knowledge. Bill accompanied the writer during all field work in the monument and in addition to providing good company, was of invaluable assistance in locating sites. Cottonwood District Ranger Carol Metzger and Resources Management Specialist Bob Moon were also helpful in guiding the writer to historical sites. Thomas D. Mulhern, Chief, Division of Park Historic Preservation, and Gordon Chappell, Regional Historian, both of the National Park Service Western Regional Office, San Francisco, extended their usual gratifying moral support and research and administrative aid. Thanks go to Ruth Larison, Librarian, Rocky Mountain Regional Office, Denver, for obtaining necessary books and articles through inter-library loan, and to Robert H. Todd, Branch of Mapping, Denver Service Center, for the fine base maps that accompany this report. Jan Petrukitas, Joan Manson, Nancy Arwood, and Lou Tidd did an excellent job of typing the final document.

Repositories whose staffs aided in this research include the National Archives and Library of Congress, Washington, D.C.; Denver Public Library and U.S. Geological Survey Library, Denver, Colo.; University of Colorado Library, Boulder; Riverside and San Bernardino County Courthouses and Riverside and San Bernardino County Libraries, Riverside and San Bernardino, Ca.; A.K. Smiley Public Library and San Bernardino County Museum, Redlands, Ca.; Los Angeles Public Library, History Division Archives of the Los Angeles County Museum of Natural History, and History Center, California Historical Society, Los Angeles; Bancroft Library of the University of California, Berkeley; California Historical Society and California Division of Mines and Geology, San Francisco; California Room of the California State Library and the Bureau

of Indian Affairs Area Office, Sacramento; Federal Archives and Records Centers in San Bruno and Laguna Niguel, Ca.; and the Local History Collection of the Twentynine Palms Branch of the San Bernardino County Library, where Cheryl Erickson provided much assistance, and the Joshua Tree National Monument Library and history files at the Twentynine Palms Oasis Visitor Center, Twentynine Palms, Ca.

CONTENTS

PREFACE iii

LIST OF ILLUSTRATIONS xvii

LIST OF MAPS xxi

I. Desert Region of Southern California 1
A. Setting 1
B. Written History of the Desert Begins 4
1. Spanish Explorers 4
2. American Explorers 6
C. Early Southern California Roads and Trails 9
1. Mojave Indian Trail 9
2. El Camino del Diablo 10
3. Anza Road (Anza Trail) 10
4. Cocomaricopa Route 11
5. Sonora Road (Emory's Trail, Southern Emigrant Route, 32nd Parallel Route, Butterfield Overland Mail Route) 12
6. Old Spanish Trail 13
7. Mojave Road (35th Parallel Route) 13
8. Routes to the Goldfields 14
9. Stage Roads 15
a) Butterfield Overland Stage Route 15
b) Smith's Road 16
c) Bradshaw Road 16
d) Fort Yuma Road 17
e) Frink's Cutoff 17
10. Other Early Roads 18
a) Weaver Road 18
b) Clark's Pass and San Diego Branch 18
D. Railroad Surveys 19
1. Williamson Survey 20
2. Whipple Survey 21
3. Railroad Construction 21
E. Land Surveys 22

II. Development of the Desert 25
A. Mining 25
1. Southern California Districts 25
2. Mining in the Joshua Tree National Monument Area 28
3. General Economic Trends 28
B. Settlements 30
1. San Bernardino Area 30
2. Morongo Valley, Yucca Valley 31
3. Impact of Homesteading 32
4. Military and Recreational Growth 34
C. Indian Populations 35
1. Mojave Desert 35
a) Serranos 36
b) Chemehuevis 36

2. Colorado Desert 37
a) Cahuillas 37
3. Indians in Joshua Tree National Monument 38
D. Beginnings of Twentynine Palms 39
1. Early Indian Occupation of the Oasis of Mara 39
2. Establishment of an Indian Reservation 41
3. Whites Find the Oasis 53

III. Cattle Raising in Joshua Tree National Monument 63
A. Origins 63
1. Rustlers 63
2. Cattle Outfits North of the Monument 65
B. Activity in the Monument 67
1. Persons Involved 67
2. Extent of Grazing 73
3. Watering Places 75
a) Outside the Monument 75
b) Inside the Monument 77
4. Sites Associated with Cattle Raising 80
a) Tanks 80
b) Cow Camp 80
c) Ryan Ranch 82

IV. Mining in Joshua Tree National Monument 91
A. Twentynine Palms Mining District 91
1. History 91
2. Mine Sites 94
a) Anaconda Mine (Sullivan No. 1) 94
b) Contact Mine 97
c) Fore Aces Lode 97
d) Silver Bell Mine 97
e) Mymine (My Mine) 98
3. Mill Sites 98
a) Pinto Wye Arrastra 98
4. Evaluation of Resources and Recommendations 100
a) Mine Sites 100
(1) Anaconda Mine (Sullivan No. 1) 100
(2) Contact Mine 102
(3) Fore Aces Lode 104
(4) Silver Bell Mine 104
(5) Mymine (My Mine) 104
(6) Unidentified Mine in SE¼, Section 17, T1S, R9E 106
b) Mill Sites 107
(1) Pinto Wye Arrastra 107
B. Dale Mining District 109
1. History 109
2. Mine Sites 114
a) Gold Crown Mine 114
b) Heely & Cross Mine 116
c) Star Mine 116
d) Big Bozo Claim 117
e) Meek Group 117
f) Frank Hill Group 117

g) McKeith Mine 117
h) Lena Mine 117
i) Ivanhoe Mine 118
j) Carlyle Mine 118
k) Jupiter Mine 118
l) O.K. Mine 119
m) Los Angeles-Brooklyn Mines 119
n) Sunrise Mines 119
o) Goldenrod (Golden Rod) Group 120
p) Mission Gold Mine (Huff and Lane) 120
q) Virginia Dale Mine 121
r) Other Mines 121
3. Evaluation of Resources and Recommendations 122
C. Rattler Mining District 124
1. History 124
2. Mine Sites 125
3. Mill Sites 125
D. Monte Negras Mining District 125
1. History 125
2. Mine Sites 127
a) Ingersoll (Ramona) Mine 127
b) S.S. Mine 131
c) Sunrise Mine 131
d) Standard Mine 135
e) Zulu Queen Mine 135
f) Outlaw Mine 135
g) Mission Mine (Huff and Lane, Lone Star Group) 136
h) San Antonio #1 and #2; Double Jack #1 and #2 137
3. Mill Sites 137
a) Mission Mill 137
b) Sunrise Mill 138
c) Gold Rose Mill 139
d) Unidentified Mills 139
4. Evaluation of Resources and Recommendations 141
a) Mine Sites 141
(1) Sunrise Mine 141
(2) Standard Mine 143
(3) Zulu Queen Mine 143
(4) Outlaw Mine 144
(5) Mission Mine 146
(6) San Antonio #1 and #2; Double Jack #1 and #2 146
b) Mill Sites 146
(1) Mission Mill 146
(2) Sunrise Mill 148
(3) Gold Rose Mill 148
E. Eagle Mountains Mining District 154
1. History 154
2. Mine Sites 154
a) Iron Chief Mine 154
b) Black Eagle Mine 159
c) Blackbird Group 160
d) Eagle Mountain Placer 160
e) Grassy Hill Lode 160

f) Rainbow Lode 161
g) Mule Shoe Lode 161
h) Diane Lode 161
i) Desert Star Lode 161
j) Mystery Mine 161
k) Barrle Tanks Placer 162
l) Lucky Turkey #2 162
m) Hard Digging Mine 162
n) Swastika #1-7 162
o) Storm Jade Mine 162
3. Mill Sites 163
4. Evaluation of Resources and Recommendations 163
a) Mine Sites 163
(1) Kaiser Steel Corporation Properties in the Placer-Mystery Canyons Area 163
(2) Mystery (Mirtry) Mine 164
(3) Mystery Canyon Ruin 164
(4) Blind Mule Placer Mine 164
(5) Lucky Turkey #2 Mine 166
(b) Mill Sites 166
F. Cottonwood Spring Mining District 166
1. History 166
2. Mine Sites 168
a) Coyote Mine 168
b) Snow Cloud Lode 168
c) Southern Cross Lode 169
d) Yucca Butte Lode 169
e) Eureka Mine 169
f) Snow White Mine 169
g) Mastodon Mine 170
3. Mill Sites 170
a) Winona Mill (Cotton Spring) 170
b) Mastodon Mill 171
c) Hopper Mill (Moorten Mill?) 172
d) Desert Star Mill Site 172
e) Moorten Mill 172
4. Evaluation of Resources and Recommendations 175
a) Mine Sites 175
(1) Mastodon Mine 175
b) Mill Sites 177
(1) Winona Mill (Cotton Spring) 177
(2) Moorten (Morton, Morten) Mill 180
c) Other Historical Sites 180
(1) Cary's Castle 180
(2) Little Chilcoot Pass 184
G. Piñon Mining District 184
1. History 184
Southern Section 184
2. Mine Sites 185
a) Pinyon (Tingman-Holland) Mine 185
b) Bonanza Lode Claim 186
c) Lost Angel (Sippi, Laseter) Mine 186
d) Henson (Hansen, Hensen, Hanson) Mine 187
e) White Hill Mine 187

3. Mill Sites 187
a) Pinyon Well Mill (Pinon Mill) 187
b) Henson (Hansen, Hensen, Hanson) Well Mill 189
4. Evaluation of Resources and Recommendations 189
a) Mine Sites 189
(1) Pinyon (Tingman-Holland) Mine 189
(2) Bonanza Lode Claim 193
(3) Lost Angel (Sippi, Laseter) Mine 193
(4) Henson (Hansen, Hensen, Hanson) Mine 193
b) Mill Sites 195
(1) Pinyon Well Mill (Pinon Mill) 195
(2) Henson (Hansen, Hensen, Hanson) Well Mill 197
Northern Section 202
2. Mine Sites 202
a) Desert Queen Mine 202
(1) General History 202
(2) Bill Keys Ownership 209
b) Eagle Cliff (Black Eagle) Mine 211
c) Johns Camp (Gold Hill Mine) 213
d) Elltun (Elton) Mine (Lucky Boy Claim) 214
e) Jumbo Rocks Tunnels 214
f) Pine Springs Lode 214
g) Monstead Tunnels 214
h) Black Butte (Gold Tiger) Mine 214
i) Tungsten (Sheep Pass) Mine 215
j) The Uranium Mine 215
k) Sulphide Bismuth (Lang Copper) Mine 215
l) Unidentified Mine 215
m) Unidentified Mine 216
3. Mill Sites 216
a) Desert Queen Ranch and Mine Mills 216
b) Wall Street Mill 217
4. Evaluation of Resources and Recommendations 220
a) Mine Sites 220
(1) Desert Queen Mine 220
(2) Eagle Cliff (Black Eagle) Mine 226
(3) Johns Camp (Gold Hill Mine) 231
(4) Elltun (Elton) Mine (Lucky Boy Claim) 233
(5) Jumbo Rocks Tunnels 235
(6) Pine Springs Lode 235
(7) Monstead Tunnels 235
(8) Black Butte (Gold Tiger) Mine 235
(9) Tungsten (Sheep Pass) Mine 236
(10) The Uranium Mine 236
(11) Sulphide Bismuth (Lang Copper) Mine 236
(12) Unidentified Mines 238
b) Mill Sites 238
(1) Desert Queen Ranch and Mine Mills 238
(2) Wall Street Mill 238
Middle Section 241
2. Mine Sites 241
a) Gold Point Mine 241
b) Rich Gold (Gold Crown #2) Mine (Blue Bell Mine) 241

c) Unidentified Mine 243
d) Silver Bell Mine 243
e) Golden Bell (Blue Bell) Mine 244
f) Eldorado (New El Dorado) Mine 244
g) Golden Bee Mine 247
h) Paymaster Mine 248
i) Goldfields of America (Sandra K[ay] #1) Mine 249
j) Ruby Lee Mine 249
k) Combination Quartz Mining Claim No. 1 249
l) Captain Jinks (Jenks) Mine (Phyllis Silver Mine) 251
m) Hexahedron (Hexie) Mine 251
n) Gold Galena (Gold Coin) Mine 252
o) Gold Standard Mine 253
p) Optimist Mine 254
q) Lang Mine 254
r) Unidentified Mine 254
s) Lost Horse Mine 255
t) Hidden Gold (Ensperation, Lost Mine Parallel) Mine 261
u) Hersey and Dewey Mines 263
3. Mill Sites 264
a) Eldorado (New El Dorado) Mill 264
b) Hexahedron (Hexie) Mill 264
c) Gold Galena (Gold Coin) Mill 264
d) Lost Horse Mine Mill 264
4. Evaluation of Resources and Recommendations 264
a) Mine Sites 264
(1) Gold Point Mine 264
(2) Rich Gold (Gold Crown #2) Mine (Blue Bell Mine) 265
(3) Unidentified Mine 265
(4) Silver Bell Mine 267
(5) Golden Bell (Blue Bell) Mine 267
(6) Eldorado (New El Dorado) Mine 269
(7) Golden Bee Mine 274
(8) Paymaster Mine 278
(9) Goldfields of America (Sandra K[ay] #1) Mine 278
(10) Ruby Lee Mine 279
(11) Combination Quartz Mining Claim No. 1 279
(12) Captain Jinks (Jenks) Mine (Phyllis Silver Mine) 279
(13) Hexahedron (Hexie) Mine 281
(14) Gold Galena (Gold Coin) Mine 283
(15) Gold Standard Mine 284
(16) Optimist Mine 285
(17) Lang Mine 285
(18) Unidentified Mine 285
(19) Lost Horse Mine 286
(20) Hidden Gold (Ensperation, Lost Mine Parallel) Mine 289
b) Mill Sites 289
(1) Eldorado (New El Dorado) Mill 289
(2) Ruby Lee Millsite 292

(3) Hexahedron (Hexie) Mill 293
(4) Gold Galena (Gold Coin) Mill 294
(5) Lost Horse Mine Mill 294
5. Miscellaneous Mines Filed on in the Pinon District 295
H. Gold Park Mining District 296
1. History 296
2. Mine Sites 298
a) Atlanta (North Star Group) Mine 299
b) Black Warrior (Gold Master?, Paymaster?) Mine 299
c) Boss (Goat Basin) Mine 300
d) California Boy Claim 300
e) Oro Copio Mine 301
f) Gold Park Consolidated Mines Nos. 1-5 301
g) Anaheim Group 301
h) Golden Rule Group 301
i) Golden Star Lode Mining Claim 302
j) Gold Park Mine 302
k) Hornet Group 302
l) Mildred-Ellen Group 302
m) Silver Scorpion Mine (Carlos Jr. Mine?) 302
n) Miscellaneous 303

V. Historical Water Sources in Joshua Tree National Monument 307
A. Development of Dependable Water Sources Opens Desert 307
B. Springs 308
1. Barrel Spring (Dry) 308
2. Black Rock Spring (Dry) 309
3. Cotton Spring (Hulsey Mill Site, Winona Mill Site) 309
4. Cottonwood Spring 309
5. Covington Spring (Dry) 311
6. Dove Spring 312
7. Lost Horse Spring 312
8. Pine Spring 313
9. Quail Spring 314
10. Smithwater (Smith's Water) Springs 314
11. Stubbe Spring 316
12. Willow Spring (Hole) 316
13. Wood Spring 316
C. Tanks 316
1. Eagle Tank 317
2. Ivanpah Tank 318
3. Live Oak Tank 318
4. Mystery Hole 318
5. Rattlesnake Tank 318
6. Split Rock Tank 319
7. Squaw Tank 319
8. Stirrup Tank 320
9. White Tank 320
D. Wells 320
1. Ate (Ake, Mission, Huff and Lane) Well 320
2. Bagley Well 320
3. Black Eagle Well 321
4. Carnara (Caneras, Carnero, Conejo) Well 321

5. County Well 321
6. Covington Well 322
7. Cow Camp Well 324
8. Desert Queen Well 324
9. Gold Rose Well 326
10. Henson (Hansen, Hensen, Hanson) Well 326
11. Huff and Lane (Ake, Ate, Mission) Well 328
12. Keys's Placer Well 330
13. Keys's Ranch Wells 330
14. Morgan Kimball Well 330
15. Lang Well (Lang Millsite) 330
16. Lost Horse Well (Millsite) 331
17. Monstead Well No. 1 333
18. Pinkham Well 335
19. Pinto (Wash) Wells 335
20. Pinyon (Pine) Well 335
21. Ruby Lee Well 337
22. Samuelson Well #2 337
23. Sunrise Well 339
24. Wall Street Millsite Well (Keys Well #3) 339

E. Dams and Reservoirs 339
1. Barker Dam 339
2. Cow Camp Reservoir 345
3. Grand Reservoir Site 345
4. Pinyon Well Reservoir 345
5. Placer Canyon Reservoir 345
6. Queen Reservoir 347
7. Split Rock Reservoir 347
8. Twin Reservoir Site 347

F. Public Water Reserves in the Monument 347
1. No Name (Barrel Spring?) 347
2. Quail Spring 348
3. Stubbe Spring 348
4. Lost Horse Spring 348
5. Stirrup Tanks 348
6. Cottonwood Spring 348
7. No Name 349

G. Recommendations and Evaluations 349

VI. Roads and Trails in the Pre-Monument Period 351
A. Establishment of Trails and Wagon Roads 351
1. Development of Mines Leads to Freighting Activity 351
a) Pleasant Valley Via The Blue Cut 351
b) Eldorado Mine from Mecca Via Cottonwood Spring 351
c) Eldorado Mine from Indo Via Pushawalla Canyon 353
d) Other Routes to the Eldorado Mine 353
e) Fargo Canyon 357
f) Fan Hill Canyon 357
2. Signing the Desert 357
3. Condition of Roads 359
4. Banning-Twentynine Palms-Dale-Amboy Roads 359
5. Banning to Quail Spring, Keys Ranch, Pinyon Well, and the Eldorado Mine 361

6. Mecca to Cottonwood Spring, Iron Chief Mine, Dale, Eldorado Mine, Pinyon Well, and Indio 368
7. Roads from Gold Park Mining District 373
a) Gold Park-New Dale 374
b) Gold Park-Twentynine Palms 374
c) Gold Park-Pleasant Valley 374

VII. Establishment of Joshua Tree National Monument 375
A. Need Seen for Preservation of Desert Areas 375
1. Twentynine Palms Area Attracts Visitors 375
2. Minerva Hamilton Hoyt Organizes the International Deserts Conservation League 375
3. A Desert Park is Proposed 376
B. The Monument is Established 381
1. Geological Features 381
2. Flora and Fauna 382
3. Points of Interest 383
4. Prehistory and Archeological Sites 384
C. Problems with Landownership 387
1. Railroad Lands 388
2. State School Lands 390
3. Homestead Lands 391
4. Mineral Lands 393

VIII. Roads After the Establishment of the Monument 403
A. Road Conditions in the Late 1930s 403
B. Development of a Better Road System 406
C. Agitation for a Blue Cut Access Road 409
D. Agitation for a Berdoo Canyon Access Road 409
E. New Roads in the 1960s and 1970s 411
F. Recommendations and Evaluations 411

IX. Trails of Joshua Tree National Monument 415
A. Nature Trails 416
1. Arch Rock (White Tank) 416
2. Barker Dam 416
3. Cap Rock 416
4. Cholla Cactus Garden 417
5. Cottonwood Spring 417
6. Hidden Valley 417
7. High View 417
8. Indian Cove 417
9. Jumbo Rocks 417
10. Oasis of Mara 417
11. Geology Tour Road 417
B. Hiking Trails 418
1. Fortynine Palms Oasis 418
2. Lost Horse Mine 418
3. Lost Palms Canyon 419
4. Ryan Mountain 419
5. Cottonwood Spring 419
a) Winona Mill 419
b) Mastodon Peak 419
c) Moorten's (Morton's, Morten's) Mill 420
6. California Riding and Hiking Trail 420

7. Recommendations and Evaluations 420

X. Campgrounds of the Monument 421
A. Frontcountry Campgrounds 421
1. Belle 422
2. Black Rock Canyon 422
3. Cottonwood Spring 422
4. Hidden Valley 422
5. Indian Cove 422
6. Jumbo Rocks 423
7. Ryan Riding and Hiking Campground 423
8. Sheep Pass 423
9. White Tank 424
B. Backcountry Campgrounds 424
C. Recommendations and Evaluations 424

XI. Other Structures in Joshua Tree National Monument 425
A. Development of Government Support Facilities 425
1. Utility Areas 425
2. Headquarters 426
3. Ranger Stations 427
4. Employee Residences 427
B. Miscellaneous Structures 427
1. Aircraft Warning Stations, Viewfinders, Plaques 427
2. Ohlson House 429

XII. Other Historical Resources 431
A. Desert Queen Ranch 431
1. Origins of William F. Keys 431
2. Keys and the Desert Queen Ranch 433
3. Keys's Impact on Area 439
4. Evaluation of the Desert Queen Ranch 440
a) Anthropological Concerns 440
b) Recommendations for Management 446
B. Samuelson's Rocks 450
1. History 450
2. Importance 450
C. Graves 452
1. Ryan's Ranch 452
2. Matt Riley 452
3. Johnny Lang 454
4. Keys Ranch 455

XIII. General Recommendations from the Division of Park Historic Preservation, Western Regional Office, National Park Service 457

Bibliography 459

LIST OF ILLUSTRATIONS

1. Plat of survey of Twenty Nine Palms Indian Reservation, 1908 46
2. Plat of survey of Twentynine Palms Indian Reservation, 1909 48
3. Early scenes at Twentynine Palms 56
4. Ivanpah Tank 79
5. Cow Camp lake, 1973 81
6. Chimney and cabin foundation, Cow Camp, 1973 81
7. Back of Ryan ranchhouse, Lost Horse Well, 1932 83
8. Front of Ryan ranchhouse, 1983 83
9. Front of Ryan ranchhouse, 1935 86
10. Front of Ryan ranchhouse, n.d. (ca. 1975) 86
11. Small adobe structure at Ryan Ranch, n.d. (ca. 1975) 87
12. Bunkhouse, Ryan Ranch, n.d. (ca. 1975) 87
13. Bunkhouse, Ryan Ranch, 1983 88
14. Interior of bunkhouse, Ryan Ranch, 1983 88
15. Anaconda mill at Twentynine Palms, 1916 99
16. Anaconda (Sullivan No. 1) Mine, 1982 99
17. Anaconda (Sullivan No. 1) Mine, 1982 99
18. Winch at Contact Mine, 1983 101
19. Site of generator, Contact Mine, 1983 101
20. Pulley and flywheel, cover for generator, Contact Mine, 1983 101
21. My Mine, 1983 103
22. Unidentified mine, Section 17, T1S, R9E, 1982 105
23. Shored road leading to mine in Section 17, 1982 105
24. Cabin site at unidentified mine in Section 17, 1982 105
25. Pinto Wye arrastra, 1976 108
26. Pinto Wye arrastra, 1976 108
27. Mineral survey no. 6295 A & B, Sunrise Claim, 1942 128
28. Mineral survey no. 6294, Standard Lode, 1942 132
29. Sunrise Mine camp, 1983 140
30. Fish pond at Sunrise Mine camp, 1983 140
31. Shaft of Sunrise Mine, 1983 140
32. Mission Mine, 1933 145
33. Mission Mine, 1934 145
34. Mission Mine, 1937-38 145
35. First mill for Mission Mine, 1932 147
36. Mission mill, 1983 147
37. Mission mill, 1983 147
38. Ruins of Sunrise mill, 1983 149
39. Close-up view of settling basin, Sunrise mill, 1983 149
40. Unidentified mill ruin north of Sunrise Well, 1983 150
41. Gold Rose mill, 1983 152
42. Mill for Gold Rose Mine located in Pinto Basin, 1948-49 153
43. Gold Rose mill camp site, 1983 153
44. Kaiser Steel patented mining claims within Joshua Tree National Monument 157
45. Mastodon Mine, 1982 173
46. Mastodon Mine mill structure, 1982 173
47. Mastodon Mine, n.d. 174
48. Revolving crusher at Mastodon Mine, 1982 174
49. Winona mill site residence, 1930-31 176
50. House site along wash near Winona mill, 1982 176

51. Winona mill, probably before 1930-31 178
52. Winona mill, n.d. 178
53. Vats and concrete ruins, Moorteen mill, 1982 179
54. Walls and building platform, Moorten mill, 1982 179
55. Exterior of Cary's rock "castle," 1945 181
56. Interior of "castle," 1945 181
57. Waterfall and road in Cottonwood Wash, 1982 182
58. Little Chilcoot Pass roadbed, 1982 182
59. Little Chilcoot Pass roadbed, 1982 182
60. Pinyon (Tingman-Holland) Mine, 1982 188
61. Stone-walled structure at Pinyon Mine, 1982 188
62. Area of mining activity adjoining Pinyon Mine, 1982 190
63. Henson Mine, 1982 192
64. Pinyon Well Mill, ca 1911 or 1912 194
65. Two rock structures at Henson Well mill site, 1982 196
66. Rock cabin and crushing wheel at Henson Well mill site, 1982 198
67. Rock chimney at Henson Well mill site, 1982 198
68. Possible well site at Henson Well mill site, 1982 200
69. Remains of Chilean mill at Henson Well, 1982 200
70. Picture of Chilean mill in operation, ca. 1914 201
71. Desert Queen Mine cabin ruins, 1982 219
72. Desert Queen mining area, 1982 219
73. Mill (Phelps/Saunders?) at Desert Queen Mine, n.d. 221
74. Rock house at Eagle Cliff Mine, 1976 223
75. View from inside rock house, Eagle Cliff Mine, 1982 223
76. View from inside rock house toward front door, 1982 225
77. Remains of blacksmith shop, Eagle Cliff Mine, 1982 225
78. Improvised blacksmith forge, Eagle Cliff Mine, 1982 225
79. Artifacts found at Eagle Cliff Mine, 1976 228
80. Grated vertical shafts at Gold Hill Mine, 1982 230
81. Mill ruin, Gold Hill Mine, 1982 230
82. Water storage reservoir in wash near Johns Camp, 1982 230
83. Jumbo Rocks tunnels, 1982 232
84. Three views of Monstead property, 1967 234
85. Monument along road to Wall Street mill commemorating Worth Bagley killing 237
86. Gravestone quarry site at Wall Street mill used by William F. Keys 237
87. Well that supplied power to Wall Street mill, 1982 239
88. Exterior of Wall Street mill, 1982 239
89. Interior of Wall Street mill, 1982 239
90. Daniel Stafford in front of the Lost Horse Mine stamp battery, 1932 262
91. Cabins for the workers, Lost Horse Mine, 1935 262
92. Three structures in Silver Bell-Golden Bell mines vicinity, 1982 266
93. Silver Bell Mine, 1982 268
94. View from Silver Bell Mine toward Golden Bell (Blue Bell) and Rich Gold mining areas 268
95. Board of Directors, New Eldorado Mine, 1908 270
96. New Eldorado Mine, 1913 270
97. New Eldorado Mine, 1928 271
98. New Eldorado Mine, 1983 271
99. New Eldorado Mine hoist house, 1911 272
100. A claim at the El Dorado, 1908 272

101. Top level of workings, Eldorado Mine, 1983 273
102. Lower level of workings, Golden Bee Mine, 1983 275
103. Remains of mining office, Golden Bee Mine, 1983 275
104. Golden Bee Mine and mill, 1941 277
105. Golden Bee Mine and mill, 1983 277
106. Road into Hexahedron Mine and cabin ruin, 1983 280
107. Rock cabin and mine workings, Hexahedron Mine, 1983 280
108. Mine workings at Gold Galena (Gold Coin) Mine, 1983 282
109. Road junction in Pleasant Valley, showing Gold Coin Mine mill ruins, 1983 282
110. House foundations east of Gold Coin mill ruin, 1983 282
111. Identification of cabins at Lost Horse Mine 287
112. Close-up view of mill machinery, New Eldorado Mine, between 1911 and 1914 290
113. Close-up view of mill ruin, Eldorado Mine, 1983 290
114. Wood Spring, near Cottonwood Spring oasis, 1982 315
115. Squaw Tank, near Pleasant Valley, 1983 315
116. "Eagle Eye" McFarland at County Well, about 1912 323
117. Old Cow Camp Well, 1973 323
118. Desert Queen Mill Site Well, 1982 325
119. Gold Rose Well in Pinto Basin, 1983 325
120. Huff and Lane (Mission) Well pump engine, 1930s 327
121. Remains of pump house, Huff and Lane Well, 1983 327
122. Pump house and other ruins, Huff and Lane Well, 1983 329
123. Remains of old arrastra (?), Huff and Lane Well 329
124. Location of Lost Horse Mine wells and view of new pumphouse 332
125. Pinyon Well, 1939 334
126. Pinyon Well, showing concrete water storage tanks, 1982 334
127. Cabin at Ruby Lee Well site, 1982 336
128. Ruby Lee Well, 1982 336
129. Sunrise Well in Pinto Basin, 1983 338
130. Original and later Barker Dam, 1983 340
131. Lake created by Barker Dam, 1982 340
132. Barker Dam, showing Barker portion and later addition by Keys, 1973 342
133. View of Barker Dam from south 342
134. "Big Horn Dam" marker on top of Barker Dam 344
135. Concrete stock trough below Barker Dam 344
136. Cow Camp dam, 1973 346
137. Freight wagon, Amboy to Dale mines, n.d. 352
138. Freight wagons at Lost Horse Well, 1893? 352
139. Dale-Amboy stage, 1911 or 1912 352
140. Signposts erected by W.V. Covington in monument and vicinity, 1906 358
141. Map showing desert watering places in Mohave Desert Region (USGS Water-Supply Paper 490-B) 362
142. Map of roads in vicinity of Dale, Twentynine Palms, and Pinyon Well (USGS Water-Supply Paper 497) 365
143. Changes in boundary of monument after 1950 401
144. Road to Keys View, 1940 405
145. Road between White Tank and Pinto Basin, n.d. 405
146. Exterior of Signe Ohlson home in monument, 1975 428
147. Ruins of Ohlson home, 1982 428
148. Ruins of Ohlson home, 1982 430

149. Area of pictographs near Ohlson home, 1982 430
150. Keys ranchhouse, 1982 435
151. Interior of adobe barn, Keys Ranch, 1982 435
152. Examples of mining equipment at Keys Ranch, 1982 438
153. Samuelson's Rocks, 1972 449
154. Grave at Lost Horse Well, n.d. 451
155. Grave at Lost Horse Well, 1967 451
156. Matt Riley's grave, n.d. 453
157. John Lang's grave on Keys View road, n.d. 453

LIST OF MAPS

1. Early southern California roads and trails in the vicinity of Joshua Tree National Monument, California 7
2. Sites associated with cattle raising 61
3. Mining districts 89
4. Twentynine Palms and Gold Park mining districts, mine and mill sites 92
5. Dale and Monte Negras mining districts, mine and mill sites 123
6. Eagle Mountain Mining District, mine and mill sites 155
7. Cottonwood Mining District, mine and mill sites 165
8. Pinon Mining District, southern section, mine and mill sites 183
9. Pinon Mining District, northern section, mine and mill sites 203
10. Pinon Mining District, middle section-eastern portion, mine and mill sites 242
11. Pinon Mining District, middle section-western portion, mine and mill sites 250
12. Historical water sources 305
13. Roads and trails in the pre-monument period: Map A 350
14. Roads and trails in the pre-monument period: Map B 354
15. Roads and trails in the pre-monument period: Map C, 1 of 2 355
16. Roads and trails in the pre-monument period: Map C, 2 of 2 356
17. Trails and campgrounds 413
18. Sites on the National Register of Historic Places 471

I. Desert Region of Southern California

A. Setting

America's public domain was significantly increased by two important land transactions of the nineteenth century. The first was a result of the 1848 Treaty of Guadalupe Hidalgo that ended the Mexican War. By this agreement Mexico ceded to the United States the areas now known as California, Nevada, Utah, most of Arizona, and portions of Wyoming, Colorado, and New Mexico west of the Rocky Mountains and the Rio Grande. A second negotiation, rounding out America's desert parcel, involved the purchase from Mexico of lands comprising present southern Arizona and the southwest corner of New Mexico in 1853. The section of desert with which this study is concerned is found in southern California and is a magnificent scenic wonderland embracing portions of both the Mojave and Colorado deserts. The former designation applies to an extremely arid wedge-shaped section of the state extending from the eastern base of the Sierra Nevada east through the Death Valley area to southwestern Utah and the northwest corner of Arizona. This high desert spreads south over the barren slopes of the San Bernardino Mountains and up the Chuckawalla Mountains. It includes most of San Bernardino County and eastern Los Angeles and Kern counties and extends from Antelope Valley more than 200 miles east to the Colorado River and beyond. The Colorado Desert is an arid valley of about twelve million acres extending from San Gorgonio Pass (a natural gateway into the Los Angeles lowlands) near San Bernardino south to the Gulf of California and from the Peninsular Ranges on the west to the Colorado River on the east. It contains the great depression referred to as the Salton Sink. These two regions are divided by low ranges of rugged hills stretching from San Bernardino Mountain southeast to the mouth of the Gila River and beyond.

The San Bernardino, San Jacinto, and associated mountain ranges that form high barriers on the north and west sides of the Salton Basin intercept moist Pacific air currents and cause high aridity over a wide area to the east. North of the Salton Sea basin are many small disconnected mountain chains. The Hexie, Pinto, Cottonwood, Coxcomb, and Eagle ranges are mostly of volcanic origin and interspersed with low,

arid valleys, floodplains, and playas. This is the area of Joshua Tree National Monument. A member of the Army Corps of Topographical Engineers, Lieutenant Robert S. Williamson, who skirted this area soon after the Gadsden Purchase of 1853, recorded that

> a mountain range extends from San Bernardino mountain in a southeasterly direction, nearly if not quite to the Colorado. Between these mountains and the mountains on the Mohave nothing is known of the country. I had never heard of a white man who had penetrated it. I am inclined to the belief that it is a barren, mountainous desert, composed of a system of basins and mountain ranges. It would be an exceedingly difficult country to explore, on account of the absence of water, and there is no rainy season of any consequence. . . . The country included between the mountain above mentioned, the Coast range, and the Colorado, is level, or but slightly undulating, and is known as the Colorado Desert. . . .[1]

Although survival in the region Williamson described was difficult, the migratory Indian bands who first inhabited it were able to live successfully off the land. A knowledge of water locations, contentment with a diet of acorns, mesquite beans, piñon nuts, and seeds of grasses and weeds, berries, wild fruits, and small game animals; and the ability to obtain fuel and medicine from desert shrubs enabled them to

---

1. This description of the Joshua Tree National Monument portion of the California desert is the earliest written account of this area. United States, War Department, 33d Cong., 2d Sess., Senate Ex. Doc. No. 78, Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean, Made Under the Direction of the Secretary of War, in 1853-4, According to Acts of Congress of March 3, 1853, May 31, 1854, and August 5, 1854. Volume V. Report of Explorations in California for Railroad Routes, to Connect with the Routes Near the 35th and 32d Parallels of North Latitude, by Lieutenant R.S. Williamson, Corps of Topographical Engineers, 1853. (Washington: Beverley Tucker, Printer, 1856), p. 38.

fulfill their basic needs. Linguistically they were primarily of the Shoshonean group and had entered California in recent prehistoric times, ultimately spreading throughout most of southern California. The Gabrielinos occupied extreme southwestern San Bernardino County; the Serranos occupied the San Bernardino Mountains and high desert areas, as well as much of the San Bernardino Valley; the Cahuillas controlled San Gorgonio Pass and the San Jacinto and Santa Rosa mountains; and the Chemehuevis roamed the desert west of the Colorado River. Territorial divisions often overlapped, as at the Oasis of Mara (Twentynine Palms oasis).

One of the most valuable contributions of the Indian population to the early settlement of the region by whites was the establishment of trade paths, many of which later became Spanish trails, wagon roads, and later, highways or railroad routes. Trade routes through the southern California desert ran from one waterhole to another. Some of these prehistoric trails across the dry desert were still visible in the mid-twentieth century, often marked by stone piles or cairns or scatters of potsherds. A scarcity of trails in the desert areas may reflect low population density and a difficult terrain.[2]

Two well-known Indian trails went north and south along both banks of the Colorado River. One of these was the Yuma-Needles Trail, which began southeast of Yuma and followed a course up the western side of the Colorado River to the Needles area (Mohave Villages) where it linked with the Mojave Trail. One of the most important trade trails was made by the Mohave Indians and other Colorado River peoples who traveled to the west coast to procure seashells for barter. This Mojave Trail later became a major portion of the Mojave/Old Government Road through San Bernardino County. The Cocomaricopa Trail from Arizona to the Salton Sink and then leading northwest to meet the Mojave Trail near

---

2. Robert F. Heizer, ed., Handbook of North American Indians, Vol. 8, California (Washington, D.C.: Smithsonian Institution, 1978), p. 692.

San Bernardino is thought to have been widely used for trade and travel before its utilization by Europeans in the Spanish period. A network of other minor trails spread from these major routes throughout the California desert basins and mountains, connecting water sources and leading to favorite hunting and gathering sites.[3]

B. Written History of the Desert Begins

1. Spanish Explorers

The first recorded European penetration of the southern California desert was by an early Spanish army officer--Pedro Fages--commander of California's Spanish forces. This gentleman, later governor of Alta California, in 1772 chased north into the desert after a band of men deserting from the presidio of San Diego; it is possible that these fugitives were actually the first to cross the desert. Although the criminals were never found, Fages continued north toward the San Bernardino Valley, crossing over the San Bernardino mountain range near Cajon Pass, a break between the San Gabriel Mountains on the west and the San Bernardinos on the east. He then made his way into the Mojave Desert, on to the southern end of the San Joaquin Valley, and ultimately home to Monterey. On the desert, but close to the mountains, Fages described passing through groves of "date palms," probably referring to the Joshua Trees. Two years later and then again in 1776 Captain Juan Bautista de Anza crossed a section of the San Bernardino Valley while opening a route overland from Sonora, northern Mexico, to Alta California. His route crossed the Colorado River at Yuma, went into the Salton Basin, and then through San Gorgonio Pass to San Gabriel and Monterey. The famous Spanish priest and Franciscan Friar Father Garces, who traveled extensively in Sonora, Arizona, and California during 1768-81 as a missionary to the Indians, accompanied Anza on his

---

3. Edmund C. Jaeger, The California Deserts, 4th ed. (Stanford: Stanford University Press, 1933), p. 119; Westec Services, Inc., A History of Land Use in the California Desert Conservation Area (San Diego, 1978), pp. 6-7.

first trip in 1774. In 1775 he started with Anza on his expedition to establish a mission and colony at San Francisco. He separated from the party at Yuma, however, at the junction of the Gila and Colorado rivers. After visiting with the Indians of the Colorado, he decided to visit the Mohave nation farther north. He traveled up the California side of the Colorado River, entering the Mojave Desert on the east from the Mohave Villages near present Needles, California. Crossing evidently via the ancient Mojave Indian Trail, he became the first white man to cross the width of present San Bernardino County to Mission San Gabriel near present Los Angeles.

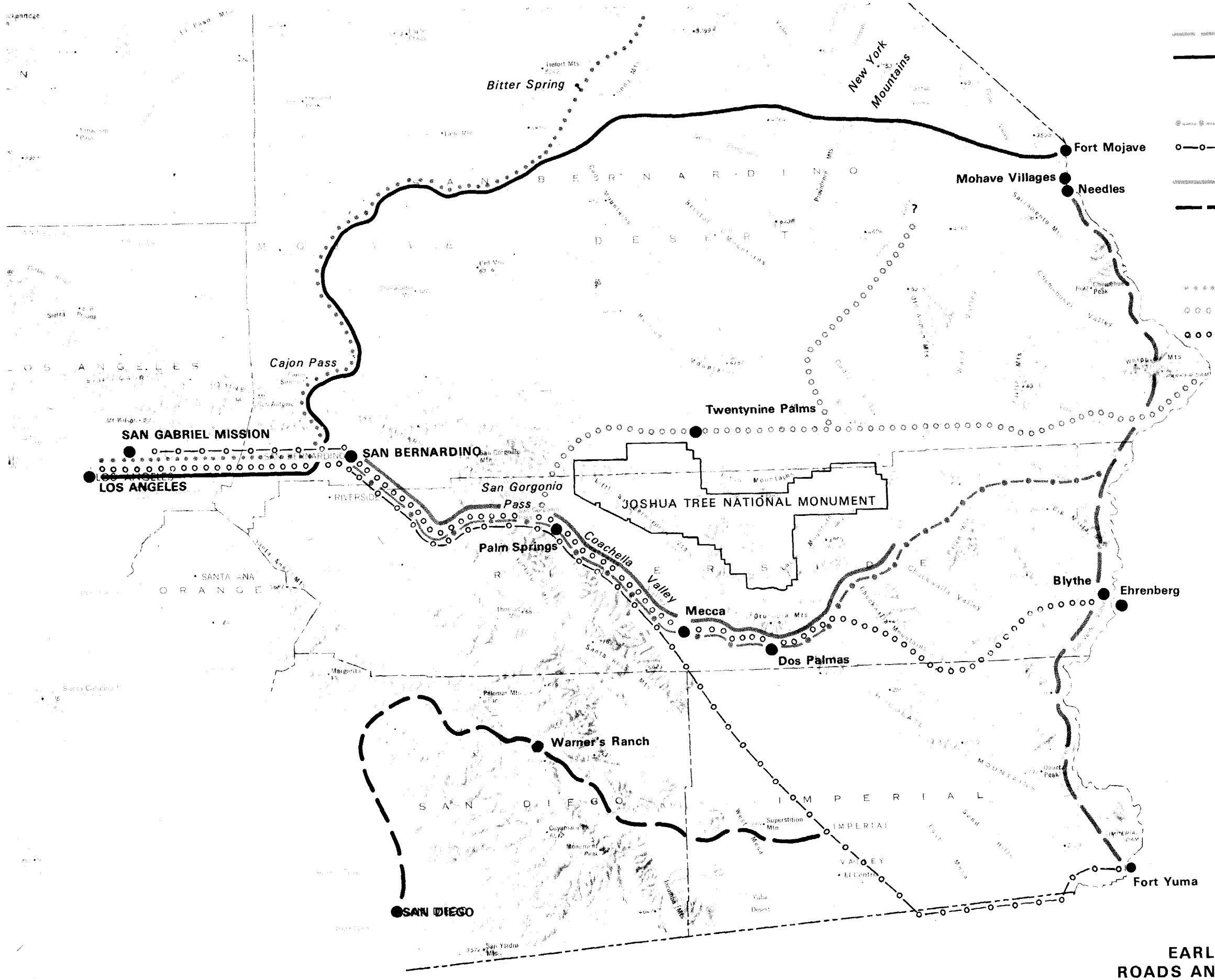
Other small-scale exploring parties went out during the early 1800s in connection with a serious problem threatening the economic life of the California missions. Runaways from the coastal missions were establishing relations with the mountain and desert tribes and leading raids on the bountiful mission, rancho, and pueblo flocks. As early as 1804 plans were underway by Spanish authorities to subdue these renegades by establishing an interior chain of presidios and missions paralleling those on the coast, whose aim would be to lessen the influence of the runaways. A mission of this second line had already been started at San Bernardino. The findings of earlier explorers ultimately became important because of the growing encroachments in California by 1821 of Russians and of British and American fur trappers and traders. It became imperative on the part of the Spanish military authorities to find a more direct land route to the Alta California missions from Sonora via the Colorado River. Except for scattered explorations by Franciscans in connection with mission labors, however, traveling was minimal until after Mexico's successful revolt against Spain, the creation of the short-lived Mexican Empire, and finally the establishment of a federal republic in 1823.

The periphery of the present Joshua Tree National Monument was briefly explored at this time during an effort by the Spanish to establish a safe, faster route connecting their settlement at Tucson with the California coastal missions and thereby strengthening their hold on California. Captain Jose Romero was directed to explore the

route used by the Cocomaricopa Indians to carry Spanish government dispatches between the Colorado River and San Bernardino by way of San Gorgonio Pass. The Romero-Estudillo exploratory expedition of 1823-24 traveled from San Gabriel mission to near the southeastern boundary of the monument but never reached the Colorado River. A second futile attempt to find this Indian trail resulted in a pessimistic assessment of its usefulness, and further attempts to intensively utilize the trail were abandoned. Spanish contact with the desert area was minimal and never resulted in deep familiarity with the region, but some interesting information on the desert region was acquired, providing the first descriptions of the Indians of the area and the topography. It is also possible that this data and the trails described encouraged penetration of the area by Spanish and Mexican miners beginning in the late 1820s and continuing until the 1840s and the discovery of gold in California, thus establishing some indirect contact between the natives and Spanish and Mexican adventurers prior to the American mining boom of the 1870s.

2. American Explorers

The first American to make an overland journey to California was the young trapper Jedediah S. Smith of the Rocky Mountain Fur Company, who in 1826 wanted to trap and explore the country between the Rocky Mountains and the Pacific Ocean. Traveling south from Salt Lake to the Mohave Villages on the Colorado River, his party spent two weeks resting and then were guided across the desert along the old Mojave Indian Trail taken by Father Garces. They followed along the Mojave River course (the Inconstant River, Smith called it) to a spot east of Cajon Pass, crossed the San Bernardino Mountains, and descended onto the San Bernardino plain. Smith returned again in 1827 and this time, though exhausted by an Indian attack, managed to cross the mountains at Cajon Pass into the San Bernardino Valley and on to San Gabriel. Two other notable Western figures, Ewing Young, a fur trapper, and Kit Carson, followed Smith's route across the desert in the later 1820s and early 1830s. For the next several years the area was apparently regarded as of no particular value except for trading purposes. In 1844 Brevet Captain John C. Frémont, with Kit Carson as guide, on his homeward trip to the Great Salt Lake after a year of



MICROFILM

EARLY SOUTHERN CALIFORNIA ROADS AND TRAILS IN THE VICINITY OF JOSHUA TREE NATIONAL MONUMENT CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25011

exploration in Oregon and northern California, traveled south from the San Joaquin Valley and crossed the mountains into the Mojave Desert, collecting geological and botanical specimens and geographical knowledge along the way. In 1846, as the United States and Mexico battled over the future of California, a major army unit, the Mormon Battalion, was garrisoned in Cajon Pass to halt marauding Paiute Indians, and several forts were estabished along the Mojave Indian Trail between later Fort Mojave and San Bernardino. In 1848 Lt. William H. Emory led a military reconnaissance through southern California. This was the extent of major American involvement in the southern desert area until the gold strike of 1849 and its aftermath fully opened the Mojave and Colorado deserts.

C. Early Southern California Roads and Trails

1. Mojave Indian Trail

During his 1775-76 entrada across the desert from the Colorado River toward the Pacific Coast, Father Francisco Garces moved his party along what was referred to as the Mojave Indian Trail. Garces's diary indicates that the trail went by way of Paiute Spring to a pass in the New York-Providence Range. Crossing hills near Cedar Canyon, Garces continued west, probably across the south end of Soda Lake, until he reached the Mojave River. From there the trail led up into the San Bernardino Mountains, via Sawpit Canyon to the summit, and, in descending, crossed the mouth of Cajon Canyon to the valley floor.[4]

Rather than being one route, this trail was more likely a network of prehistoric trails connecting the Mohave Indian Villages with other Indian settlements, other trails, and the Pacific Ocean. Regular use of the trail by the Mohaves apparently continued to the 1850s, although use probably diminished with the increasing presence of and pressure from whites.[5] Jedediah Smith also crossed on this Indian trail

---

4. W.W. Robinson, The Story of San Bernardino County (San Bernardino, Ca.: Pioneer Title Insurance Co., 1958), p. 8.

5. Dennis G. Casebier, The Mojave Road, Tales of the Mojave Road Number Five (Norco, Ca.: Tales of the Mojave Road Publishing Company, 1975), p. 85.

during his 1826 trip from Utah to the San Bernardino Valley. Ewing Young made two desert crossings via essentially the same route, in 1829 and 1831-32.

2. El Camino del Diablo

During his period of exploration in southern California, Father Francisco Garces made several journeys from the Sonoran missions to the Gila-Colorado rivers area. In 1771, while searching for mission sites, he made his way to the Yuma Indians on the Gila, crossed the Colorado River at Yuma, and blazed a trail across the Colorado Desert to near the San Jacinto Mountains. This was the beginning of the basic overland route of the Spanish period. A virtually waterless trail, it became known as the "Devil's Road."[6]

3. Anza Road (Anza Trail)

Juan Bautista de Anza, on his first exploratory journey for an overland route to the California missions in 1774, crossed the Colorado River at its junction with the Gila, and pushed across the desert to "Puerto de San Carlos" (San Gorgonio Pass) and then through "El Valle de San Jose" (San Bernardino Valley). He used the same route again in 1776, further breaking a trail with a large company of colonists, soldiers, and animals. Although this overland route by way of the Yuma Indian territory was long and dangerous, it was less perilous and much more practicable than a sea voyage. The revolt of the Yuma Indians in 1781 and their destruction of the Spanish settlements along the Colorado River gave travel over this route a setback, although it continued to be used sporadically. In 1782 Don Pedro Fages and an escort traveled the route from the Yuma crossing to San Gabriel carrying official dispatches and that same year traveled the desert stretch of it again, leaving it at San Sebastian and making their way through the mountains to San Diego

---

6. Warren A. Beck and Ynez D. Haase, Historical Atlas of California (Norman: University of Oklahoma Press, 1974), p. 15.

by way of later Warner's Ranch. He was the last white man known to have used this arduous road before it fell into disuse. In fact travel across the Colorado Desert by whites virtually ceased for the next several years.[7]

4. Cocomaricopa Route

The Spanish were still interested, however, in reestablishing a workable land route connecting their settlements near Tucson with missions on the California coast, especially to facilitate the transmittal of mail. The military commander at Tucson finally engaged the Cocomaricopas--a tribe friendly to the Spanish and hostile to the Yumas--to undertake this task. The route they established ran north of Yuma territory, crossed the Colorado River near present Blythe and Ehrenberg, continued through the mountains and over the Colorado Desert via Chuckwalla Spring, skirted the basin of the Salton Sea, and entered the San Bernardino Valley through Coachella Valley and San Gorgonio Pass, a route feasible only for foot traffic.[8]

The Mexican government wanted to establish this as a road over which colonists and soldiers carrying mail and supplies could travel--a route replacing the Anza Road abandoned more than forty years earlier. The expedition under Captain Jose Romero was dispatched to find the route of the Cocomaricopa Indians and determine its feasiblity for overland travel. The Romero-Estudillo expedition of December 1823 and January 1824 traveled east from San Bernardino through San Gorgonio Pass, Cabazon, and Palm Springs to Dos Palmas.

From there the party traveled northeast up Salt Creek Canyon and possibly skirted the southeastern slopes of the Eagle Mountains, advancing as far north as the vicinity of the opening between

---

7. George William Beattie, "Reopening the Anza Road," Pacific Historical Review (Glendale, Ca.: Arthur H. Clark Co., 1933), II, pp. 52-53.

8. George William Beattie and Helen Pruitt Beattie, Heritage of the Valley: San Bernardino's First Century (Oakland, Ca.: Biobooks, 1951), pp. 14-15.

the Eagle Mountains and the Coxcombs at Pinto Wash. Romero failed to reach the Colorado River on this trip and returned to San Gabriel to locate Indian guides for a second attempt to find the route. Returning to Tucson several months later, Romero decided that the Cocomaricopa Road was unfit for cavalry or supply trains. He successfully discouraged other government officials, and attempts to open this Indian trail to Mexican use were abandoned.[9]

5. Sonora Road (Emory's Trail, Southern Emigrant Route, 32nd Parallel Route, Butterfield Overland Mail Route)

Although the opening of the Cocomaricopa mail route had had a stimulating effect upon the missionaries of San Gabriel, who assumed that this would become a road for general travel between Sonora and California, such was not to be the case. Romero's expedition proved the fruitlessness of such a venture, and instead the road from Sonora via Yuma and Warner's Ranch to San Diego was made the official Spanish route to California for mail and travel while California government headquarters remained at San Diego. By means of roads connecting it with Warner's Pass, it also became the official route between Sonora and Monterey. San Gabriel was not off the road entirely, for two roads from that mission connected with the San Diego-Colorado River road: one, the "Canyon road to the Colorado," ran by way of Temescal and Temecula, and joined the San Diego-Colorado River road in Warner's Valley; the other road, by San Bernardino, later officially designated the San Bernardino-Sonora Road, crossed the summit of San Gorgonio Pass, turned south, and led through the San Jacinto Mountains to the vicinity of Aguanga on the Canyon road.[10] By this route the missions of Mexico, New Mexico, and Arizona were connected with those of San Diego, San Luis Rey, Capistrano, San Bernardino, San Gabriel, and San Fernando Rey.

---

9. United States, Department of the Interior, National Park Service, Patricia Parker, One Hundred Years of History in the California Desert: An Overview of Historic Archeological Resources at Joshua Tree National Monument. Publications in Anthropology, No. 13 (Tucson, Az.: Western Archeological Center, NPS, 1980), pp. 24-25; Beattie and Beattie, Heritage of the Valley, pp. 18-20.

10. Beattie, "Reopening the Anza Road," pp. 67-68.

6. Old Spanish Trail

The Old Spanish Trail, used by packtrain caravans moving from Santa Fe to Los Angeles across Cajon Pass, was established in 1830. This route was an extension of the Santa Fe Trail and crossed Colorado, Utah, and Nevada before approaching San Bernardino County from the springs at Las Vegas, Nevada. It continued west to near Death Valley and then dropped south and west through present Barstow and Victorville, across Cajon Pass, and into San Bernardino.[11] This became the main route between New Mexico and California. To Los Angeles were brought Mexican silver and New Mexican woolen blankets, and taken to Santa Fe were California horses and mules, silks, Chinese goods, and furs. Old Spanish Trail traffic ended following the Mexican War, about 1848.[12]

7. Mojave Road (35th Parallel Route)

Another main route of travel started in Los Angeles, went east through the Los Angeles Basin to San Bernardino, and crossed the mountains by way of Cajon Pass. Entering the Mojave Desert, the route continued northeast for about forty miles. Near the 35th parallel of north latitude it turned east and followed close to that parallel all the way to Albuquerque, New Mexico. In early historic times this route was frequently referred to as the 35th Parallel Route. That portion of the road across the California desert to the Colorado River evolved from the ancient Mojave Indian Trail mentioned earlier.[13]

During the Mexican War a major army unit, the Mormon Battalion, was garrisoned in Cajon Pass to control the Paiutes. Several forts were established along the Mojave Indian Trail between the future

---

11. E.I. Edwards, Desert Voices: A Descriptive Bibliography (Los Angeles: The Westernlore Press, 1958), p. xx.

12. Casebier, Mojave Road, p. 37.

13. Ibid., Foreword, p. 1.

Fort Mojave and San Bernardino. This stretch of road became known as the Old Government Road, stretching east from the Mojave River to Fort Mojave on the Colorado River, across Arizona to Fort Defiance, and on to Santa Fe.[14] Although traversed in part by trappers before and immediately after the Mexican War, and for some distance by Captain Lorenzo Sitgreaves in 1851 as a possible route to connect settlements on the Rio Grande with southern California, the 35th Parallel Route was first examined in its entirety from California to New Mexico by Francois Xavier Aubry in 1853.[15] In 1857 Edward F. Beale, a former lieutenant, U.S. Navy, laid out the 35th parallel wagon road. The prospect of trouble with Mormons in the Salt Lake area became a factor in selection of the 35th Parallel Route by California-bound emigrants in the late 1850s. The Mojave Road served as a wagon route for the next twenty years and was one of the main lifelines for development in the eastern Mojave Desert in California and northwestern Arizona. Prospectors and miners kept the level of traffic high on the road in the 1870s and it was provided with regular stage service. Herds of sheep were driven over the road to Arizona and New Mexico. It lasted as a major desert wagon road into the 1880s, until the Southern Pacific Railroad and Atlantic and Pacific Railroad (later a subsidiary of the Atchison, Topeka and Santa Fe Railroad) joined lines about twenty miles north of the Old Mojave Road trace.

8. Routes to the Goldfields

By the spring of 1849 the rush to the California goldfields was on. Although the more direct northern routes to the goldfields were more popular, they were impassable in winter, while southern routes were open all year. Several important roads entered southern California before

---

14. L. Burr Belden, "Forgotten Roads . . . ," San Bernardino (Ca.) Sun-Telegram, Jan. 22, 1956.

15. Ralph P. Bieber, ed., Exploring Southwestern Trails, 1846-1854, The Southwest Historical Series, VII (Glendale, Ca.: The Arthur H. Clark Co., 1938), pp. 55-56.

1850. One hosted the first wagons ever to cross the Colorado Desert, brought by Col. Philip St. George Cooke and his Mormon Battalion, in 1847, all the way from Santa Fe to San Diego. Cooke was merely following the earlier route pioneered by Pedro Fages in 1782 from the Colorado River to San Diego and recently revived by Brig. Gen. Stephen Watts Kearny and his Army of the West on their way to battle the Mexican forces under General Andres Pico. A year later Lt. W.H. Emory led a military reconnaissance from Fort Leavenworth, Kansas, to the coast along this route, which ran from present Yuma west on the north side of the Colorado River, south of Pilot Knob and the Sand Hills, across Mexican territory, turned north along the channel of the Alamo River, then west up the valleys of Carrizo, Vallecito, and San Felipe creeks to Warner's Ranch, and on to San Diego and other coastal points.[16] This road became the Southern Emigrant Route from Santa Fe and later the Butterfield Overland Mail Route. Another important early wagon road was the Salt Lake Trail, connecting Salt Lake City and Los Angeles and using part of the Old Spanish Trail. It was firmly established as a wagon road by California-bound emigrants during the gold rush.

9. Stage Roads

a) Butterfield Overland Stage Route

Several stage roads crossed the desert of southeast California. In 1858 the Overland Mail Company stagecoach line was established over a southern route laid out by its president John Butterfield. Within California the stage route went west from Fort Yuma for a brief distance, dipped into Mexico, reentered the state near New River, and skirted the inside edge of the mountains into Los Angeles. This was without question the most important development in pre-railroad

16. United States, Department of the Interior, Geological Survey, The Salton Sea Region, California: A Geographic, Geologic, and Hydrologic Reconnaissance With a Guide to Desert Watering Places, Water-Supply Paper 497, by John S. Brown (Washington: Government Printing Office, 1923), p. 4.

transportation and communication for southern California. Operating between St. Louis and San Francisco, the Butterfield Route was abandoned in 1861 when U.S. troops withdrew from California, Arizona, and New Mexico at the outbreak of the Civil War, opening the way for harassment along the Overland Mail Route. When stock, equipment, and stations were seized by Confederate forces after Texas joined the Confederacy, the company was forced to withdraw farther north.[17]

b) Smith's Road

In the late 1850s Dr. Isaac W. Smith opened a road from San Gorgonio Pass to Fort Yuma. It was referred to as the Yuma or Smith Road.

c) Bradshaw Road

This route came into existence because of the heavy traffic developing between southern California and the Arizona mines at La Paz, Wickenburg (near Prescott), and in the Castle Dome District between La Paz and Yuma. During the 1860s and 1870s vast numbers of men--Americans, Mexicans, and Chinese--passed back and forth over this area, gradually expanding the system of roads and trails near the Colorado River. A road already existed from San Bernardino through Cajon Pass to Fort Mojave; from there a trail could be followed down along the river to the mines. Another less direct stage route existed from Los Angeles through to the Colorado River that followed the old Butterfield Stage line to Yuma, Arizona. A rough sixty-mile trail led north from there parallel to the Colorado River.[18]

In 1862 William D. Bradshaw mapped a stage and freight line to serve the new placer goldfield at La Paz, Arizona, following what was basically a prehistoric commerce trail used by Colorado

---

17. W. Turrentine Jackson, "Stages, Mails and Express in Southern California: The Role of Wells, Fargo & Co. in the Pre-Railroad Period," Southern California Quarterly (Fall 1974), pp. 240, 246.

18. Franklin Hoyt, "Bradshaw's Road to the La Paz Diggin's," Desert Magazine (February 1956), p. 4.

Valley tribes when dealing with the Indians of California. Bradshaw's route started from Los Angeles, went to San Bernardino, came through San Gorgonio Pass, over to Agua Caliente (Palm Springs), across the Coachella Valley to the Mecca area, to Dos Palmas Spring, then around along the southern edge of the Chuckawalla Mountains to the ferry on the Colorado River north of present Blythe. From there miners hurried on to La Paz and other mining centers in Arizona.[19] This route was discontinued with the coming of the Southern Pacific Railroad in the late 1870s. It was important because it diverted travel from the Warner's Ranch route and gave San Gorgonio Pass an importance to desert travel it never lost. Freight wagons, pack trains, and stages all began operating on the Bradshaw Road soon after it opened.

d) Fort Yuma Road

In 1855 Phineas Banning and David Alexander had inaugurated mule-drawn wagon trains to carry freight from Los Angeles to San Bernardino, over Cajon Pass, across the Mojave Desert, to Salt Lake City. Passengers occasionally hitched rides on these wagons. By the 1860s this freight wagon traffic had increased tremendously, and Banning and Company became one of the leading southern California transportation companies. In 1867 the company tried to use the route through San Gorgonio Pass for its stages to Yuma. Their route followed the Bradshaw Road to a point one mile east of Dos Palmas where the road to Yuma branched off to the south. This road later proved impracticable because of lack of water.[20]

e) Frink's Cutoff

This competitive road paralleled the Bradshaw route, but struck out almost straight from northeast of Dos Palmas to the Colorado River, running north of the Chuckawalla Mountains.

---

19. John Hilton, "Henry Kaiser Came to the Desert for Iron," Desert Magazine (March 1949), p. 9.

20. Robinson, Story of San Bernardino County, p. 36; Hoyt, "Bradshaw's Road," p. 7.

10. Other Early Roads

a) Weaver Road

Pauline(o) Weaver, a pioneer cattleman and guide for the Mormon Battalion, trapper, army scout, and discoverer of gold at La Paz, had established himself in the San Gorgonio area by the middle 1840s. In the early 1850s he is believed to have pioneered a private road through the Morongo Basin over which he drove cattle from Cajon Pass to Arizona. He had evidently been shown the route, and watering sites, by friendly Indians, and managed to keep it a secret from the other cattle drivers who took their herds via Indio and always arrived several days later. This road has been equated with the "Old Road to the Providence Mountains" appearing on Colonel Henry Washington's 1855 land survey map. This route would have gone north before turning southeast toward Parker Dam. It has also been surmised that Weaver's road took a more direct route east, following the San Bernardino Base Line from Yucca Valley to the Colorado River which it crossed at the present site of Parker Dam before ascending the Bill Williams River.[21]

b) Clark's Pass and San Diego Branch

Other routes in the general area were one leading from the oasis at Twentynine Palms east over Clark's Pass and one outlined by Col. William J. Palmer in a roadbed survey of 1867 for the Kansas Pacific Railway Company. Palmer suggested a route to San Diego from the Needles crossing inland fifty miles to the vicinity of Amboy and then south through a pass in the Bullion Mountains (old Bagdad-Twentynine Palms Road?), thence through the Morongo Basin via Bunch Grass Mountain up to San Gorgonio Pass.[22]

---

21. L. Burr Belden, "Pauline Weaver had Own Route," San Bernardino (Ca.) Sun-Telegram, Feb. 12, 1956.

22. L. Burr Belden, "Cattlemen, Mine Operators Give Way to Tourists," History in the Making series, San Bernardino (Ca.) Sun-Telegram, May 24, 1959.

D. Railroad Surveys

Although the establishment of wagon roads had been a great boon in opening up new sections of the American Southwest to settlement and mining, by the 1840s and 1850s railroads were seen as the necessary adjunct to further successful westward expansion. The vast area of land acquired after the Mexican War began attracting ever-increasing numbers of settlers, cattlemen, and merchants. The additional stampede of goldseekers to the Mother Lode region and to gold camps along the Colorado River and in Arizona during the late 1840s emphasized the need for better communication and transportation systems to guarantee the cohesiveness of these sections with the rest of the country and to ensure their proper control by military authorities.

As early as the summer of 1848, the subject of a railroad to the Pacific was being discussed in Congress, with the primary topic being what route such a road should take. Geographical information on the new territories acquired by the war with Mexico was relatively scant, augmented only slightly by the activities of early Spanish explorers whose ventures into the area have just been discussed. In the early 1850s the great public interest in the subject suddenly resulted in the approval by Congress on March 3, 1853, of a Military Appropriations Bill that included funds for several detailed and extensive Pacific Railroad surveys. This measure authorized Secretary of War Jefferson Davis to cause surveys to be made by the U.S. Army Corps of Topographical Engineers to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean. These explorations constituted the federal government's first attempt at a comprehensive, systematic, and integrated geographical and geological examination of its new Western domain. By the time the surveys were over, four east-west lines had been examined and detailed explorations made of passes through the Sierra Nevada. The possible lines examined ran between the 47th and 49th parallels, between the 38th and 39th parallels, along the 35th parallel, and along the 32nd. Only two of these surveys affected the area of Joshua Tree National Monument--that of Lt. Robert S. Williamson, who surveyed passes through the Sierra Nevada, and the one conducted from Fort Smith west, approximately along the 35th parallel, by

Lt. Amiel Weeks Whipple. These two surveys coincided somewhat in San Bernardino County in the area between the Mojave River sink and San Francisco.

1. Williamson Survey

In 1853 Williamson was sent to explore the southern part of the San Joaquin Valley, the passes leading from it to the Mojave Desert, those connecting the Mojave with the valley of southern California, and those connecting that valley with the Colorado Desert.[23] After examining the southern Sierra passes, Williamson was instructed to locate a route across the desert connecting the 32nd Parallel Route (Southern Emigrant Trail) or the 35th Parallel Route to the newly discovered passes. For this reason Williamson entered the eastern Mojave Desert. As was usual during this period, a naturalist--in this case, Prof. William P. Blake, a geologist and mineralogist--accompanied the expedition to report on interesting scientific matters along the way. Blake's report on his trip to the Colorado Desert between November 13 and December 19, 1853, published after the survey disbanded, presented the most scientific and complete account of the physical features of that desert area that had been written to date. According to Lieutenant Williamson's notes, the Joshua Tree National Monument region was still uninhabited by and basically unknown to whites. Professor Blake and the surveying party, under one of Williamson's engineers, Lt. John G. Parke, entered the desert from San Bernardino through San Gorgonio Pass and descended into the Coachella Valley toward Salton Basin, stopping on the way at Palm Springs and then at Indian Well. They also visited the springs at Toro and Agua Dulce around which Indian habitations were clustered. The expedition encountered difficulties in attempting to reach the old stage road that followed Carrizo Valley from the desert floor to the base

---

23. United States, Department of the Interior, Geological Survey, Ground Waters of the Indio Region, California with a Sketch of the Colorado Desert, Water-Supply Paper 225, by Walter C. Mendenhall (Washington: Government Printing Office, 1909), p. 6.

of the Peninsular Range due to a lack of potable water along the west side of the Salton Sea.[24] Finally finding water at McCain Springs, the party continued on to the Southern Emigrant Road, or Emory's Trail, at New River and followed this to Warner's Ranch. They later crossed the desert to Yuma from there and ultimately returned to the coast via this Warner's Ranch road.[25]

Professor Blake's contributions to knowledge of this region were many. In addition to important notes and sketches, much valuable geologic and scientific data was obtained. The first accurate knowledge of the physical aspects of the Salton Sea region was obtained and the name "Colorado Desert" first applied to the area.

2. Whipple Survey

On July 14, 1853, Lt. Amiel Whipple began the formal survey of the 35th Parallel Route at Fort Smith, Arkansas; he completed his work in March 1854. The Whipple party crossed the Colorado River near Needles, followed up the Mojave River to northwest of the Spanish Trail, and on to Barstow; from there they proceeded south through Cajon Pass, then west to Los Angeles and San Pedro.[26] Whipple's survey did not produce nearly as much new valuable geographical data as did that under Williamson.

3. Railroad Construction

Railroad construction, strongly encouraged by the federal government and long desired by western expansionists and settlers, ultimately resulted in three transcontinental lines that, among other benefits, drastically increased the accessibility and thus the development of the California deserts: in 1869 the Central Pacific and Union Pacific

---

24. Ibid.

25. USGS Water-Supply Paper 497, 1923, p. 5.

26. Grant Foreman, ed., A Pathfinder in the Southwest (Norman: University of Oklahoma Press, 1941), p. 20.

met at Promontory, Utah, completing the first transcontinental railroad in the U.S.; by 1883 the Southern Pacific Railroad had a main line stretching from New Orleans to San Francisco along the 32nd parallel; the Atchison, Topeka and Santa Fe Railroad by 1883 ran to Los Angeles via Needles over a combination of its own and leased tracks, along the 35th parallel.

Construction of the San Pedro, Los Angeles, and Salt Lake Railroad southwestward from Las Vegas to Barstow provided a second route into the desert in 1905. Extensive wagon travel ceased, and railroads dominated traffic through the Mojave and Colorado deserts until the 1920s. They provided an important measure of economic support that not only permitted successful settlement but also reduced transit costs and thereby encouraged mining development.[27]

E. Land Surveys

In another branch of the federal government--the General Land Office--appropriations were obtained to commence a survey of California. One aspect of this project involved letting contracts to survey township lines throughout the desert country. Contracts for work on the eastern Mojave Desert were let to private individuals, designated Deputy Surveyors, beginning in late 1854. During the next few years small surveying parties wandered over the desert erecting mounds, markers, stakes, and other signs as required by the GLO. As a result of this work, further detailed knowledge of the desert region was acquired. Part of this information resulted from closer contact with the desert Indians encountered along the way.

In preparation for survey work, it was necessary to establish independent initial points to serve as a base for surveys. Principal

---

27. David W. Lantis in collaboration with Rodney Steiner and Arthur E. Karinen, California: Land of Contrast (Belmont, Ca.: Wadsworth Publ. Co., Inc., 1963), p. 36.

meridians and base lines were then surveyed from these. One of the private desert surveyors, Colonel Henry Washington, in 1852 erected such a point on the top of Mt. San Bernardino, at 116°55'17" west longitude and 34°07'20" north latitude. From this base line, which passes through the center of present San Bernardino, are derived all sections, townships, and official surveys in southern California. During his trip into the desert in 1855, Washington stopped at the Oasis of Mara (Twentynine Palms). This visit resulted in the first written account of that spot. Interest in the area was increasing, as evidenced by the enthusiasm generated upon Washington's arrival in Los Angeles after his survey trip in the summer of 1855. According to one early writer, the colonel was overwhelmed with questions concerning the lands between the San Bernardino Mountains and the Colorado River.[28] A year later another surveyor, Alex P. Green, visited Twentynine Palms and, in addition to surveying and describing Section 33 more fully, bestowed upon the place its first recorded name--Palm Springs.

---

28. Lulu Rasmussen O'Neal, A Peculiar Piece of Desert: The Story of California's Morongo Basin (Los Angeles: Westernlore Press, 1957), p. 28.

II. Development of the Desert

A. Mining

1. Southern California Districts

The California Gold Rush of 1849, about which so much has been fantasized and romanticized, was only the inital manifestation of a long and varied mining history in California. East and south of the Mother Lode remnants can still be found today of a much longer and broader era of Western mining activity. This region was thought to contain gold for many years before it was actively worked during the American mining rushes of the 1870s. It is highly probable that Spanish and Mexican miners and possibly Chinese worked the area sporadically much earlier. Possibly mission padres gathered some placer gold with the aid of Indian labor, but this sort of activity was kept as quiet as possible. They evidently found no deposits of great significance and ultimately traces of their activity largely disappeared. Very few of these mining operations were ever documented.

Gold is widely scattered over the desert, occurring either as placer gold or in veins in granitic rocks and mineralized zones in schist.[1] In many of the mountain ranges that rise above the desert washes, metalliferous veins carrying gold, copper, and silver-lead have been exposed. Indians and Spanish explorers probably produced small quantities of gold in the region around the Salton Sea in the 1700s. Gold was first recovered in California sometime around 1780 on the lower Colorado River. These early operations were of small scale and sporadic. Activity spread west and north into the Cargo Muchacho and Picacho districts in later Imperial County, where mining was conducted on a large scale at various times beginning in the mid-1800s. Some promising gold mines were opened at Julian, forty miles northeast of San Diego, in 1870. Most of the metal obtained in the early days of desert mining was laboriously recovered from dry placers, where small rounded grains of gold could be found in the loose sand in streambeds of gulches or canyons where the gold had been carried after eroding from veins or

---

1. USGS Water-Supply Paper 497, 1923, p. 61.

stringers on the mountain side. These deposits, because of the lack of water, were worked on a small scale by dry washing, which involved putting the gravel through a machine that blew the dirt away with fans or bellows and caught the gold on dry riffles.

Later, between the 1820s and 1840s, placer gold was recovered near San Diego and in the San Gabriel Mountains, but production was not very significant statewide. During the decade between 1850 and 1860 a number of rushes took place to new diggings reputed to be rich in precious metals. At the beginning of 1855 sensational reports concerning gold in the Kern River region precipitated a rush to southern California. The boom quickly collapsed due to limited amounts of gold, difficulties in reaching the area, meager returns for strenuous labor, and the high cost of essential supplies.[2]

With the discovery of gold at Sutter's Mill on the American River, thousands of people braved the parched desert solitudes to reach the bonanza fields. Many perished due to insufficient equipment, unfamiliarity with the geography of the region, and hardships inflicted by heat and lack of water. Despite the awesome reputation the desert acquired during that time, most prospectors remained undaunted in their continual search for wealth.

In San Bernardino County there were gold finds on the Amargosa River by 1850, and later in the Leach Lake district north of Barstow and at Lytle Creek. In 1859 the silver mines of the Washoe were discovered and a great rush commenced to the Comstock lodes. A rush to the San Bernardino Mountains began in 1860 due to gold discoveries in Bear and Holcomb valleys. For two or three years, until the shallow diggings petered out, a mining camp in Holcomb Valley attracted considerable attention. During this decade prospectors who spread out looking for another Comstock Lode or La Paz goldfield discovered ore in

---

2. Jackson, "Stages, Mails," pp. 234-35.

the Clark, Providence, New York, Whipple, Turtle, and Sacramento mountains, and in the Slate Range. Prospectors kept penetrating inaccessible canyons and finding more ore. During the 1860s and 1870s the Panimint mines were productive. In 1865 the Cerro Gordo silver-lead deposits were discovered. Ivanpah, in the northeast corner of the county, became the chief silver-producing district in the 1870s. The Providence Mountains yielded silver in the 1870s and 1880s. Other silver districts were the Grapevine, north of Barstow, and the Vanderbilt, to the east. Gold claims were located in 1880 in the Oro Grande area. The county's biggest boom was set off in 1881, resulting in formation of the Calico silver mining district. In Riverside County gold was discovered in 1886 in the Chuckwalla Mountains. The Rand Mining District was the scene of several big booms between 1895 and 1919, and the Bagdad-Amboy Mining District was a rich producer of gold between 1900 and 1910. A description of southern California mining in 1899 stated that

> the area in which the greatly diversified mineral wealth chiefly exists is the desert region to the east of the coast mountains. It is an area of rugged mountains and bare and forbidding hills and sandy plains, divided by a series of mountainous elevations into the Mohave and Colorado deserts. Mines are scattered all over this area, which includes a large number of recognized mining districts. . . .
>
> The climatic conditions present the most formidable difficulties to mining and prospecting. Of wood there is practically none. Streams and springs are few and far apart, as are the wells that have been developed here and there, and the intense heat of the desert makes water as precious as it is scarce. Transportation is difficult and costly. These conditions have retarded the mineral development, as active and extensive as it has been in recent years. Lines of transportation are the great need of the important mining districts scattered over these many thousands of square miles, and it is the supplying

of this need over railroads and highways that will do most to cheapen production and stimulate development.[3]

All of this activity drastically changed the desert. Burro trails developed into freight roads to service the various mining camps; ultimately railroad lines encouraged settlement and industry. By the early 1900s the Southern Pacific Railroad crossed the Colorado Desert, the Santa Fe crossed the Mojave, and the Randsburg Railroad stretched from Kramer and served several mining districts. The ability to transport ore cheaply to mills and smelters made even the mining of low-grade ores worthwhile.

2. Mining In the Joshua Tree National Monument Area

The Twentynine Palms Mining District came into prominence in the early 1870s, although gold had possibly been mined there as early as 1860. Activity began soon thereafter in the Virginia Dale, Piñon, Monte Negras, Eagle Mountain, and Cottonwood mining districts. These will be discussed in more detail in a later chapter.

3. General Economic Trends

Although desert prospecting was simplified by the lack of dense vegetation and a light soil cover that made it easier to trace veins and correlate formations, after all the placer gold had been removed it was necessary to turn to more involved mining processes. The sophisticated technology that evolved for quartz mining involved tremendous capital investment and therefore required involvement by mining companies as well as individual prospectors. Several factors, however, tended to discourage investment in desert mining operations, such as the scarcity of wood for construction and fuel, the lack of water, and the intense heat prevailing at certain seasons. Even more important to companies considering investment in the early days was the great

---

3. A. Ekman, I.H. Parker, W.H. Storms, et al., Old Mines and Ghost Camps of California (Statewide for 1899) (Fort Davis, Tx.: Frontier Book Co., 1968, pp. 134-35.

difficulty in reaching many of the mines and the high cost of transporting ore to mills or smelters.

A revival of interest in mining began immediately after the Civil War and lasted until the panic and depression of 1873, which severely curtailed speculative capital. The 1880s brought prosperity with the coming of the railroads and the attendant stimulation to mining provided by having local railheads from which ores could be shipped to reduction works. Gold dominated the 1890s and many prospectors roamed the high desert in its pursuit. The Panic of 1893 again affected mining trends, especially silver producers, by repealing the Silver Purchase Act. By 1902, however, the cyanide process for the treatment of gold was being introduced on a large scale, enabling the successful working of old dumps and tailing beds. The Panic of 1907, a brief crisis in the New York financial district, did not severely affect all mining districts in Southern California. The price of silver held steady, and considerable prospecting was still carried on.

In the years preceding World War I, mining in the desert experienced a revival as old dumps were searched for manganese, copper, lead, zinc, talc, tungsten, and other new and desirable products. By 1918, however, most active mines had almost stopped operations. Gold production in the entire West dropped due to high mining costs, delays in receiving supplies and materials, reductions in the labor force and its decreased efficiency--a trend that had begun about 1915. Investment in gold properties became almost negligible.[4] High operating costs forced many operators to close down or suspend operations for a time. As time passed, the cost of reconditioning some of these closed mines and plants increased so tremendously that many properties had to be abandoned. Into the 1920s, post-war economics severely affected the mining industry. Low metal prices and the high cost of labor and materials due to the inflationary economy of the 1920s made severe inroads on this industry. The Depression of the 1930s tended to encourage mining again, as lower operating costs and the chance for a steady job prompted people to begin prospecting. This rise was accelerated in 1934 by the increase in the

---

4. Engineering and Mining Journal 106, no. 9 (Aug. 31, 1918): 426.

price of gold from $20.67 to $35.00 per ounce. Many mines in older established districts were reopened and further exploration resulted in significant new discoveries in the southern California counties. The development of the flotation process for recovering gold ore also boosted the trend by making the reopening of old properties even more profitable.

The region around Barstow, Vanderbilt, Stedman, and Dale were the principal centers of mining activity up to World War II. This promising state of affairs ended abruptly in December 1942 when, in accordance with War Production Board Limitation Order L-208, all gold mining in the county was stopped, with the exception of one or two properties whose ores carried a little copper and whose high silica content made them desirable in the smelting of copper ores. The purpose of this law was to make gold miners available for work in strategic metal mines. The order was lifted in 1945 and gold production increased slightly for four years. Several properties that had operated successfully before being closed down, however, were unable to meet reopening costs that had to be added to current high operating costs. The fact that the U.S. Treasury ultimately stabilized the price of gold at $35.00 an ounce meant that, with rising mine operating costs, some domestic mines had to close and others curtail operations. Leasing, prospecting, and small-scale operations proceeded, but appreciable production of gold and silver had to wait on either lower costs or an increased price that would allow profit. In 1950 this decline was accelerated by the Korean War.

B. Settlements

1. San Bernardino Area

During the period of Spanish and Mexican rule of California--from the 1770s until around 1847--the southern part of the state was a slowly developing agricultural province characterized by large ranchos. With the discovery of gold in the Sierra Nevada in 1848 and the ensuing migration of thousands to the coastal areas, profound changes were wrought. Los Angeles became an important trade center, new settlements were founded, and as opportunities for staking claims on the Mother Lode dwindled, prospectors began fanning out into other parts of the region. All of this ultimately resulted in division of the large ranchos.

As early as the 1830s immigrants were coming to southern California in ever-increasing numbers, their entry facilitated by the opening of the Spanish Trail. These first pioneers turned toward the coastal plain after coming through Cajon Pass. The earliest inland agricultural settlements tended to be placed along the trail and the Mojave River. Used as stations, they were located where lands were moist and the river's flow could support the growing of hay to feed cattle and supply freighters. Other choice locations were in the vicinity of Victorville and near the San Bernardino Mountains.[5]

In 1851 the first Anglo-Saxon settlement in Southern California was established--by a colony of Mormons sent out from Utah by Brigham Young. Coming through Cajon Pass, the Mormons purchased the already cultivated areas of the San Bernardino Rancho in a region long occupied by the Spanish. In 1870 settlers largely from New England established a colony at Riverside. The growth of the area was detrimentally affected, however, by the withdrawal of the Mormons in 1857 and 1858 and by the outbreak of the Civil War in 1861. When U.S. troops were withdrawn from Forts Tejon and Mojave, the frontier was left unprotected from Indian attack. For several years raids were frequent upon stock ranches, freighters, and miners. In 1868 Camp Cady was established on the old Mojave Road as a military post to protect the Mojave region. Manned by 100 U.S. troops, it was maintained until about 1870.

2. Morongo Valley, Yucca Valley

In 1873 the de Crevecoeur brothers with their families moved into the Morongo Valley. The first known white settlers in the valley, they ran cattle and sheep on the open range and into the Twentynine Palms area. Another early white settler was Mark (Chuck) Warren, who had established his main ranch in Little Morongo Valley

---

5. State of California, The Resources Agency of California, Department of Water Resources, Desert Areas of Southeastern California, Land and Water Use Survey, 1958, Bulletin No. 101 (Sacramento, Ca.: Dept. of Water Resources, 1963), p. 19.

(present Morongo) by 1878. In 1881 he and his two sons leased grazing land from the federal government and bought eighty acres of school land in Big Morongo Valley (present Yucca Valley) on which to graze his herefords. In this area, about nine miles from his ranch, he dug a well that would play an important part in the valley's history. Here he established a small outpost where he built a bunkhouse and barn and a large corral. He also erected a windmill to pump water from the well, which he contained in a large reservoir. The main trail through the valley passed by Chuck Warren's well, and the complex here soon became a wayside station for travelers and later a stage stop. It was also used as a watering place for Indians, prospectors, miners, freighters, and of course, cattlemen. As a result of the well, the Big Morongo Valley became known as Warren's Valley for many years.

While digging for gold in the southwest part of their valley, the family hit water, and this also became a main water supply for cattle and residents of the area. Other water sources were found in the region, and with the resultant availability of this commodity the cattle era began on the open range.[6] Warren's well was the focus of life in Yucca Valley for many years, functioning as a permanent stock watering place and as a social center. Here calves were branded, mail was left, and freight wagons and mine stages watered and rested. Later, homesteaders washed their laundry there and filled their water tanks from the reservoir. Chuck Warren died in 1917 and his ranch was taken over by a neighbor, William V. Covington, who ran cattle in the area.

3. Impact of Homesteading

Early homesteads, comprising one-quarter section each, were begun in the Yucca Valley area about 1910 and farther east, near the present town of Joshua Tree, by 1913. During the Depression of the 1930s, many people moved to the deserts in an attempt to escape the worst of the hardships. By the late 1930s many people had homesteads

---

6. May Lillian Clark and Twila G. Couzens, "Yucca Valley and its History," a paper providing research material to be used to supplement the social science program of the Yucca Valley Elementary School, 1966, p. 8.

in the region, existing on what they could procure from the country around them supplemented by some income from relief sources.[7] These desert dwellers took up, for "agricultural" purposes, either the normal 160-acre homesteads or 320-acre desert homesteads. Around Twentynine Palms, however, the land was not really suitable for farming and had been filed upon by people, such as returning veterans, who were more interested in the health benefits of the area. For this reason land officials determined that this area was probably better suited for the restoration of mental and physical health than for raising crops.[8] Because larger homesteads were not necessary for this purpose, the federal government ended filing on 160-acre claims. In its place was instituted a radical plan for disposing of public lands, referred to as the Small Tract Act of 1938. Under this act small five-acre "jackrabbit" homesteads on vacant, surveyed public land, which were intended for health and/or recreation, were passed out. Settlers filed in the U.S. District Land Office in Los Angeles and were extended leases for five years at one dollar an acre per year. Deeds were available for a minimal price per acre after a substantial habitable structure, costing $300 or more and conforming to county building laws, had been built.[9] Tracts were carved out of almost every visible acre of land. Most had at least a minimal desert dwelling, a few had outhouses and water tanks, but many were more primitive. In the late 1950s the policy was changed, and the Bureau of Land Management decided to sell the land outright at public auctions. A poorly conceived idea from the start, the Small Tract Act all

---

7. Geo. L. Collins, Actg. Chief, Land Planning Div., Memorandum for the Files, Nov. 21, 1938, Central Files, 1907-49, Record Group 79, National Archives, Washington, D.C.

8. Ed Ainsworth, Five Acres of Heaven (Los Angeles: Homer H. Boelter, Lithography, 1955), pp. 5, 7.

9. Randall Henderson, "Cabin in the Hot Rocks," Desert Magazine (March 1949), p. 10; W. Storrs Lee, The Great California Deserts (New York: G.P. Putnam's Sons, 1963), p. 14; Randall Henderson, On Desert Trails, Today and Yesterday (Los Angeles: Westernlore Press, 1961), p. 32.

too frequently nurtured speculation and the quick erection of flimsy, unsightly structures, many of which were never occupied and fell victim to vandalism and disuse.[10]

Despite the many detrimental effects of this land act, it stimulated growth in the region by opening the public domain to a whole new generation. The first survey of desert watering places in the Mojave Desert was made during 1917-18. At that time detailed logs were made of roads and maps drawn showing the roads and watering places. When it was found that water could be located far beneath the desert's sandy soil, agricultural development began after the First World War. When wells were sunk, water became plentiful for limited irrigation, resulting in a spurt of desert farming and the growth of alfalfa and wheat; in poultry raising; and in the beginnings of small pear, peach, and apple orchards.

4. Military and Recreational Growth

During World War II the military discovered the desert. Its vast expanse of cheap, unoccupied, dry land and its clear sky were ideal for all kinds of land and sky maneuvers to test new planes, guided missiles, and rockets. War games could be staged in almost complete privacy. Varied geographic conditions also made it possible to train troops for desert fighting, mountain climbing, or survival in snow and cold. Additional assets included inexpensive open-air storage of battle paraphernalia and quick delivery of supplies to and from the coast via either rail or plane. Edwards Air Force Base, Fort Irwin, the Naval Ordnance Test Station, and the future Marine Corps Training Center all came into being with great rapidity. The last-mentioned installation was first operated by the U.S. Army for training glider pilots in World War II. It was acquired by the Marines in the mid-1950s. The California aircraft industry, which after the war needed to move some of its operations out of the congested metropolitan areas, also found the desert an ideal spot for relocation.

---

10. Jaeger, California Deserts, p. 191.

Although wartime restrictions on building supplies had prevented many homesteaders from building weekend cabins or homes in the desert, after the war the availability of building materials and of gas for traveling revitalized the growth process. Veterans inflicted with respiratory ailments in search of a healthful atmosphere became a major part of the population. Also after the war a reawakening of interest in the desert for recreational purposes--sightseeing, rockhounding, and dude ranching--stimulated a new pattern of land use. Better transportation facilities and improved highways, the availability of air conditioning, combined with more affluence and leisure time, spurred migration to the desert after World War II. All this activity resulted in a remarkable rate of population growth and a rise in commercial and industrial enterprises to support the growing military and related aircraft industrial installations and recreational development. This last boom in desert growth took place on the "High Desert" (above 2,000 feet elevation) and stretched from the military and industrial complexes near Lancaster and Palmdale east through Hesperia and the Apple and Lucerne valleys into the Morongo Valley and the Twentynine Palms area. While the recreational developments farther south around Palm Springs and Desert Hot Springs were mostly seasonal, in the Morongo and Yucca valleys and over toward Twentynine Palms, people settled in for permanent living.

C. Indian Populations

1. Mojave Desert

The hot, dry, often intimidating Mojave Desert of today has not always been so. The evidence of man's early and continuing presence in the area--in Pinto Basin in Joshua Tree National Monument, for example--would seem to indicate that the Mojave was once an attractive home for primitive people whose seasonal migrations from the hot basin floors enabled them to survive an often harsh and unproductive environment. In early historic times, during the Spanish period, sparse populations of three major Indian groups inhabited this desert: The Serranos and Chemehuevis of the Uto-Aztecan language family, and the Mohave, a Hokan people. Only the first two are closely associated with the Twentynine Palms area, their territories overlapping at the Oasis of

Mara. Although that lush spot was primarily in Serrano territory, a group of Chemehuevis seeking asylum after a war with the Mohaves ended up there in the 1880s.

a) Serranos

The Serranos were named from a Spanish term meaning "mountaineer" or "highlander." The name was originally bestowed by the Spanish on all Indians living in the highlands that were not named for a mission or known under their own name. It later referred only to that group of nomadic people that originally occupied the territory in the San Bernardino Mountains east of Cajon Pass and on the high desert stretching from Victorville eastward to Twentynine Palms and south to the Yucaipa Valley and possibly over to Cottonwood Spring in the monument.

Primarily hunters and gatherers, the Serranos lived in small villages whose location was determined by the availability and accessibility of water. It is not known precisely when contact with Europeans occurred, but it may have been at least as early as 1772 when Pedro Fages entered the area. Between 1819 and 1834 most of the western Serranos were forced to the missions. Only in the region northeast of San Gorgonio Pass did any semblance of Serrano native cultural patterns survive.[11]

b) Chemehuevis

This tribe was first mentioned by the priest Father Garces who describes in some detail his 1776 entrada from the Colorado River to San Gabriel and his experiences with the Chemehuevis in southeastern San Bernardino County.

---

11. Lowell John Bean and Charles R. Smith, "Serrano," in Heizer, Handbook of North American Indians, Vol. 8, pp. 570-71, 573; Francis J. Johnston, The Serrano Indians of Southern California, Malki Museum Brochure No. 2 (Banning, Ca.: Malki Museum Press, 1973), p. 1.

The Chemehuevis were closely related, if not identical, to the Southern Paiutes, but the name is used by anthropologists to distinguish the Southern Paiute of the high desert of California from their brethren in Nevada, Arizona, and Utah, and thus is used basically in a geographical rather than an ethnic sense. Aboriginally the territory covered by their small itinerant groups stretched from south of Death Valley through the Providence Mountains to roughly the present southern San Bernardino County line, thereby covering the eastern half of the Mojave Desert. Some sort of division line apparently existed in the southern Mojave Desert between the Chemehuevis and the Serrano groups to the west. Part of the Chemeheuvi territory also lay west of the lower Colorado River. Sometime after 1776 the Chemehuevis began to settle near the Mohave and Yuma Indians on the Colorado River, at Cottonwood Island, Chemehuevi Valley, and elsewhere on both the east and west sides of the river. About 1867 the Chemehuevis and Mohaves fought, with the former heavily outnumbered. They were forced to flee into the desert toward Twentynine Palms. Although some returned, a small group remained at the oasis.[12] A small tribe, the Chemehuevis were also migratory hunter-gatherers.

2. Colorado Desert

a) Cahuillas

The Colorado Desert also required special techniques on the part of aboriginal peoples to combat the seasonal extremes of heat and lack of rainfall and the scarcity of foodstuffs. The desert Cahuillas, also of Uto-Aztecan stock, resided in south-central California. A nonagricultural food-gathering people, they occupied a wide area including the inland basin between the San Bernardino Mountains and the range extending southward from Mount San Jacinto, with some expansion

---

12. A.L. Kroeber, Handbook of the Indians of California (New York: Dover Publications, Inc., 1976), pp. 593-95. Republication of work originally published by GPO in 1925 as Bulletin 78 of the Bureau of American Ethnology of the Smithsonian Institution.

westward toward Riverside and south from there along the headwaters of the coast drainage. They also occupied the area around the north end of the Salton Sea, extending south as far as Borrego Springs and the Chocolate Mountains. A migratory lifestyle enabled survival when water and food availability were uncertain or insufficient. The Cahuillas interacted regularly with other nearby people by means of the major trade route, the Cocomaricopa Trail, that bisected their territory. They interacted most closely with the Serranos, and in later years some of the Chemehuevis began drifting across the San Bernardino Range into Cahuilla territory.[13]

3. Indians In Joshua Tree National Monument

It is thought that all three of these Indian groups periodically passed through the lands now composing Joshua Tree National Monument. Ethnologists are quick to point out that tribal boundaries are often uncertain, and such would certainly be the case in sparsely settled, vast desert areas. The extent of Chemehuevi use of the monument is not known with any certainty, though they might have wandered through Pinto Basin, the Pinto Mountains, and the Coxcombs in the eastern section of the monument. The Cahuilla may have worked over the west slope of the Little San Bernardino Mountains into the monument during their migratory wanderings for food and water. No ethnographic records of permanent occupation of the area by these groups exist. The Serranos, however, had occupied the village of "Marah" at Twentynine Palms much earlier than their documented presence there. They could easily have drifted down into the present north and western monument areas periodically.[14] Sites found within the monument were used for food collecting, food processing, hunting, and possibly religious activities.

---

13. Lantis et al., Land of Contrast, p. 59; Lowell John Bean, "Cahuilla," in Heizer, Handbook of North American Indians, Vol. 8, pp. 575-76; Kroeber, Indians of California, pp. 693-94.

14. United States, Department of the Interior, National Park Service, Thomas F. King, Fifty Years of Archeology in the California Desert: An Archeological Overview of Joshua Tree National Monument (Tucson, Az.: National Park Service, Western Archeological Center, 1975), pp. 21, 23-24.

D. Beginnings of Twentynine Palms

1. Early Indian Occupation of the Oasis of Mara

The oasis at Twentynine Palms was variously referred to by the Indians as Maru, Mar-rah, Marah, or Mara. A.P. Green, on his survey trip to the oasis in 1856, noted the fine large palm trees in Section 33 from which the springs took their name of "Palm Springs." This makes it unclear whether he named the site or whether the appellation was already in use. This name persisted into the 1880s, although "29th Palms," "Twenty nine Palm(s) Springs," "Twenty nine Palms," and "29 Palm Spring" were frequently used when recording mining or homestead claims in the 1870s. The California fan palm reaches its northernmost natural limit at this oasis. There were originally twenty-nine of these very tall fan palms of the variety known as W. filifera var. robusta. This is thought to have been in prehistoric times a fertile, lush area, rich in vegetation and animal life.

The oasis at Twentynine Palms was first inhabited by clans of the Serrano Indians, who had probably lived here for centuries before white penetration. A good trading spot--the hub of several Indian trails--the small oasis was often visited by the neighboring Mohave, Paiutes, Chemehuevis, and Cahuilla. The presence of fine springs, large palm trees, and mesquite, cane, and greasewood was an added incentive. Apparently the resident Serrano had visited an asistencia--probably the one built by the Spanish near Redlands in 1819--and learned some simple agricultural techniques, for they appeared to be cultivating the land around the oasis when first visited by whites. Colonel Henry Washington, on his Land Office survey in the summer of 1855, did not elaborate on the appearance of the oasis, merely noting that "from this corner an Indian Wigwam (near a spring of good water, supposed to be permanent) bears N 51°W, and a small cluster of Cabbage Palmettos bears N 27°W."[15] Washington did, however, note on his survey map a road

15. Ronald Dean Miller, Mara: The Desert Oasis of Twenty-Nine Palms, Brand Book No. 15 (Los Angeles: Los Angeles Corral, The Westerners, 1978), p. 41.

leading east from the oasis, which he labeled "Old Road to the Providence Mountains." This might have been an early trail used by tribes trading back and forth between the Colorado River and the coast. (It might have been portions of this road that were later used by Pauline Weaver.)

A year later Deputy Surveyor Green reached the oasis while running interior lines for Washington's corners. He left a much more detailed description of the area:

> In Section Thirty-three there are a number of fine springs. There are some large palm trees from which the springs take their name. . . . Near the springs the land has the appearance of having been cultivated by the Indians. There are Indian huts in Section Thirty-three. The Indians use the leaf of the palm trees for making baskets, hats, etc. Around the springs there is a growth of cane of which the Indians make arrows for their bows. There is some mesquite and a considerable quantity of greasewood bush in this township. The mesquite . . . is said by the Indians to be always a good indication of water, which generally can be obtained in a pure state by digging a short distance, say four to twelve feet.[16]

The Indians used the palm fronds for houses, the seed for food, and its fibers for clothing and moccasins.

The Serranos seem to have had sole interest in the oasis until 1867 after a war along the Colorado River between the Chemehuevis and Mohaves. As the former were beaten back, they were forced into remoter desert areas and a small group of them moved as far south as the oasis. Whether this was their first visit there or not is unknown. Here the Shivawach band found a deserted refuge, for the Serranos had left

---

16. Ibid.

the area during a smallpox epidemic. Accepted by the returning Serranos, a group later known as the Twentynine Palms band of Chemehuevis decided to settle at the oasis permanently when most of their tribesmen later returned to the Colorado. Water at the oasis made it possible to farm and the area abounded in food plants and game. These Indians later attained dominance so that by the 1900s all the Serrano family names were thought of as Chemehuevi. These people, because they were more clearly influenced by tribes in this area--the Cahuillas and Serranos--became culturally different from their tribesmen who were influenced by the Mohave. They lived a migratory lifestyle, spending only one-third of the year at the oasis and the rest of the time near Bear Valley in the piñon season and at Banning and Indio during fruit harvests.[17] A desert visitor at the oasis in the early 1900s recalled that during his trip

> . . . we stop for a short time at Captain Jim's kan and chat with the old Indian and his squaw. Here they live a solitary life, contented and happy, for their needs are well provided for by the little garden, the cattle he owns and the natural gifts of the desert, such as the fruit of the prickly pear, pinion nuts, chia seeds, and the like. He was born here and has seen his native place occupied in turn by white men and Mexicans.[18]

2. Establishment of an Indian Reservation

As early as 1856 a tract of 161 acres was set aside for the Serrano Indians. Soon thereafter had ensued considerable controversy with the Southern Pacific Railroad over which section had actually been

---

17. Ronald Dean Miller and Peggy Jeanne Miller, The Chemehuevi Indians of Southern California, Malki Museum Brochure No. 3 (Banning, Ca.: Malki Museum Press, 1967), p. 4.

18. George Wharton James, The Wonders of the Colorado Desert (Southern California), 2 vols. (Boston: Little, Brown, and Company, 1907), II:480.

reserved and who owned the oasis. The land had never, therefore, officially passed into Indian hands, though Serranos were settled on it, pursuing small farming activities, their numbers slowly decreasing through accidents, disease, and old age. Beginning in the 1860s the Chemehuevis, due to their war with the Mohaves and to their gradual displacement by white settlement farther north, began coming to the oasis. Though undergoing acculturation, they still retained many of their old customs. Their stock slowly attained dominance in the village.[19] In 1825 and again in 1862, smallpox hit the Morongo Basin, forcing the Indian residents of the oasis to flee until the scourge passed.[20]

This tract of land was also set aside for a reservation by an Executive Order of December 27, 1875, but for a long time thereafter evidently was still regarded as a holding of the Southern Pacific Railroad Company. During the administration of Ulysses S. Grant, the Department of Indian Affairs was reorganized and in December 1875 Grant began ordering the establishment by executive order of several small Indian reservations throughout southern California. The Mission Agency in San Bernardino was established in 1877, and one of the areas placed under its control was the Twentynine Palms Reservation. According to an early white settler in the area, about forty Chemehuevis lived at the oasis in 1888, though whether all were residents or some visitors is conjectural. Friendly neighbors at that time, they subsisted on mountain sheep, rabbits, mesquite beans, and seeds. On their game hunting trips they reportedly also found several mineral deposits in the area.[21]

This tract was one of several parcels of generally poor land that were set aside for the use of remnant Indian bands under the

---

19. Johnston, Serrano Indians, pp. 2-3.

20. Clark and Couzens, "Yucca Valley," p. 6.

21. Statements made by William H. ("Bill") McHaney in March 1933 about the Twentynine Palms region to W.E. Ketcham and W. Egbert Schenk. Transcribed in March 1952. Denver Service Center history files, p. 1.

authority of the Mission Relief Act of 1891. Under this act the Secretary of the Interior appointed three commissioners to settle the Mission Indians of California on reservations. As far as practicable they were to select reservations for each band that included the villages or lands they already occupied.[22] This action came so late, however, that little land of any real value remained in the public domain to be given to the Indians. The Mission Indian commissioners--Albert K. Smiley, Joseph B. Moore, and Prof. Charles C. Painter--the "Smiley Commission," found that the condition of the southern California Indians was indeed unfortunate. Whites had encroached on many Indian lands and the Southern Pacific also claimed certain sections. The commission's final report was approved on December 29, 1891, and the Twentynine Palms Reservation was established by Executive Order of that same date. The Smiley Commission recommended that this reservation consist of the following lands:

> The South-west quarter of Section thirty-three (33) in Township one (1) North, Range Nine (9) East, S.B.M.; and also the North-west quarter of Section four (4) in Township one (1) South, Range nine (9) East, S.B.M. There are three families here having three houses and some cultivated fields: the head man is Chimehueva [sic] Mike. They have plenty of water and can be very comfortable here. There is sufficient tillable land for their needs; the balance of the land in the proposed reservation is valuable grazing land. The Indians were in possession of these lands as shown by the field notes as long ago as in 1852.[23]

---

22. Jan. 12, 1891, 26 Stat., p. 712 - Chap. 65, An Act for the relief of the Mission Indians in the State of California, in United States, Department of the Interior, Bureau of Indian Affairs, Sixtieth Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior, 1891 (Washington: Government Printing Office, 1891), p. 612.

23. Smiley Commission Report and Executive Order of Dec. 29, 1891, in Bureau of Indian Affairs files, Sacramento Area Office, p. 5.

In this same year Mike Boniface, the tribal leader, filed claim to the oasis water.[24] The twenty-five-year trust patent of November 11, 1895, was issued to the Twenty-nine Palms Band of Mission Indians for only the northwest quarter of Section 4, T1S, R9E, SBM, containing 160.21 acres, more or less.[25] The Indians living there were referred to as the Chemehuevi Indian Band and as the Twenty-nine Palms Band. The earliest census of the group is dated August 1894 and contains thirteen names. A report describes the reservation as containing "very few people. They have reasonably good houses, and are quiet, law-abiding people; their lands are all that they require." This same report mentions two dwellings and states the residents were of the Cahuilla tribe.[26] A report of 1899 lists twenty-seven residents of the "Piute" tribe in six dwellings.[27] During the turn of the century these Indian residents were hunting, collecting food, and perhaps prospecting in the general area of the monument, but how deep or often their penetration of its lands is unknown. Another early settler recalled that the Serranos frequently visited Cottonwood Spring to trade game for flour, coffee, and other staples during the 1880s to 1890s. Bill McHaney stated that the Serranos at the oasis told him about the spring at Pinyon Well sometime prior to 1881, so they apparently had visited that area also.[28]

---

24. Miller, Mara: The Desert Oasis of Twenty-Nine Palms, p. 43.

25. Area Director, BIA, to Regional Solicitor, Sacramento Region, June 2, 1966, BIA files, Sacramento Area Office.

26. "Report of Mission-Tule River Consolidated Agency," August 31, 1894, in Annual Report of the Commissioner of Indian Affairs, 1894 (Washington: GPO, 1895), pp. 119, 123.

27. "Report of Mission-Tule Agent, August 21, 1899," in United States, Department of the Interior, Bureau of Indian Affairs, Annual Reports of the Department of the Interior for the Fiscal Year Ended June 30, 1899 - Report of the Commissioner of Indian Affairs. Part I. (Washington: GPO, 1899), p. 175.

28. Parker, One Hundred Years of History in the California Desert, pp. 31, 34; McHaney interview, March 1933, p. 1.

Due to an error in surveying the land for the Indians, a wrong description had been furnished, the land set aside for them--the southwest quarter of Section 33--being worthless and not actually occupied by the Indians. They lived instead on the northwest quarter of Section 33, which was later patented to the Southern Pacific Railroad Company. To adjust the situation, in 1908 eight sections of land in T2N, R8E, SBM, were withdrawn from entry and settlement, with the intention of patenting them to the Twenty-nine Palms Band. However, the order was revoked in 1911, following an investigation to determine Indian use and occupancy. This study revealed that the few Indians living on the tracts at the time of withdrawal had moved to lands adjacent to the Cabazon Reservation where there was sufficient land and water. In 1908 the Washington office had authorized the transfer of fifteen Chemehuevis from the Twenty-nine Palms Reservation to Section 30, T5S, R8E, SBM. On June 6, 1910, Section 30 was jointly patented in the name of the Cabazon and Twentynine Palms bands. From this time on, census rolls in the Mission Agency files indicate that no separate roll was made of the Twentynine Palms Indians. All who had moved to Cabazon, at least, were included on their rolls.[29]

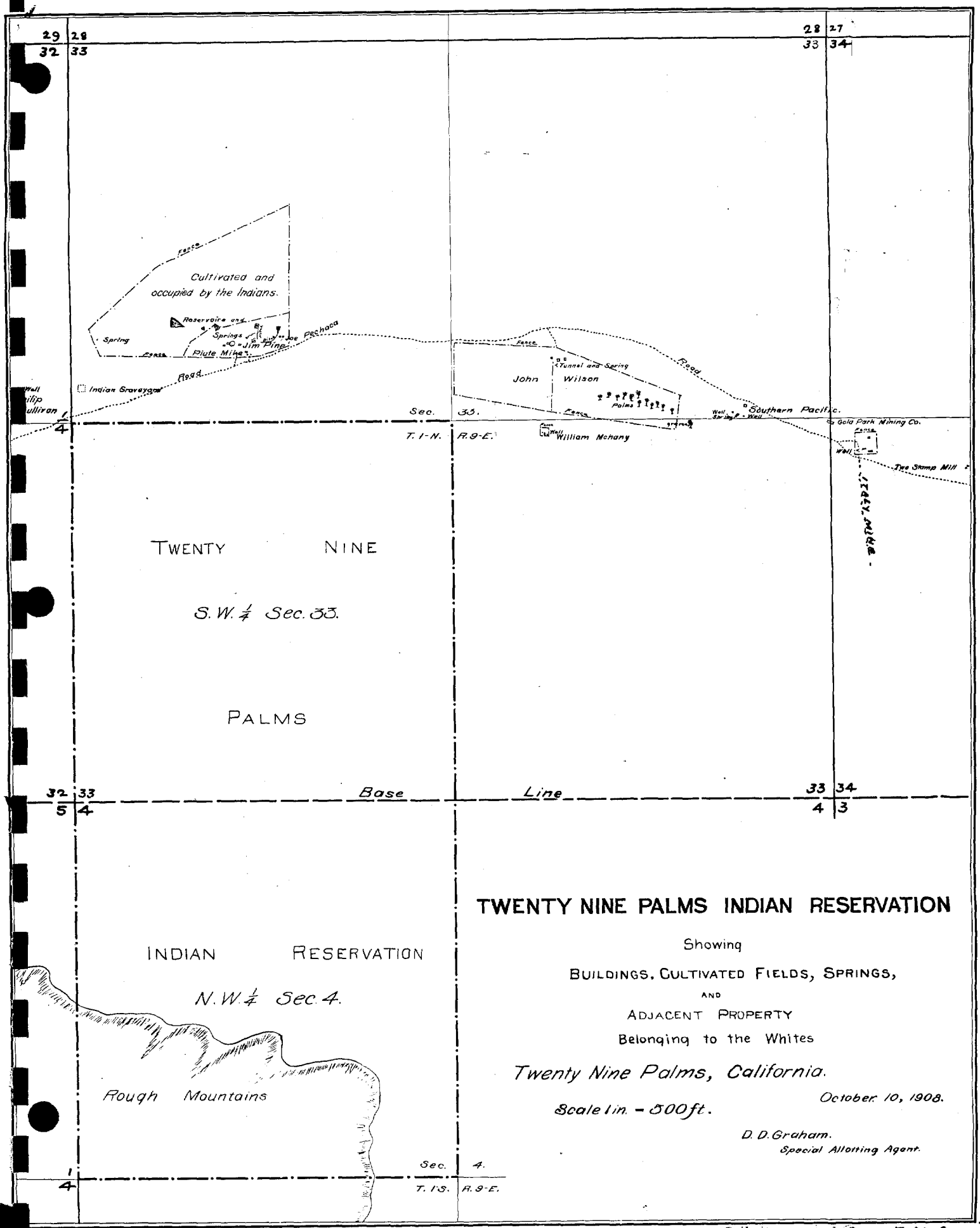
From 1908 to 1910 Clara D. True, headquartered at the Morongo Indian Reservation in Banning, was in charge of the Morongo and several other small reservations in Riverside and San Bernardino counties--among them that at Twentynine Palms. The first Indian Service employee to visit the reservation, she quickly found it to be improperly surveyed. The railroad company was claiming the land on which the water was located and the Indians claimed the water and would not relinquish the land. She tried during her tenure to establish the proper legal boundaries. True kept the first official records of the Indians at the oasis, and her letters are a wealth of information. Unfortunately many of her official reports were loaned by National Archives to the

---

29. James E. Offcia [?], Assoc. Comm., BIA, to Leonard M. Hill, Area Dir., Sacramento, Ca., July 7, 1966, BIA files, Sacramento Area Office, pp. 1-2.

Illustration 1.

Twenty Nine Palms Indian Reservation, Showing Buildings, Cultivated Fields, Springs, and Adjacent Property Belonging to the Whites. October 10, 1908. D. D. Graham, Special Allotting Agent. Map No. 5073, Tube No. 612, Record Group 75 (BIA), Courtesy National Archives, Washington, D.C.



TWENTY NINE PALMS INDIAN RESERVATION

Showing

BUILDINGS, CULTIVATED FIELDS, SPRINGS,

AND

ADJACENT PROPERTY

Belonging to the Whites

Twenty Nine Palms, California.

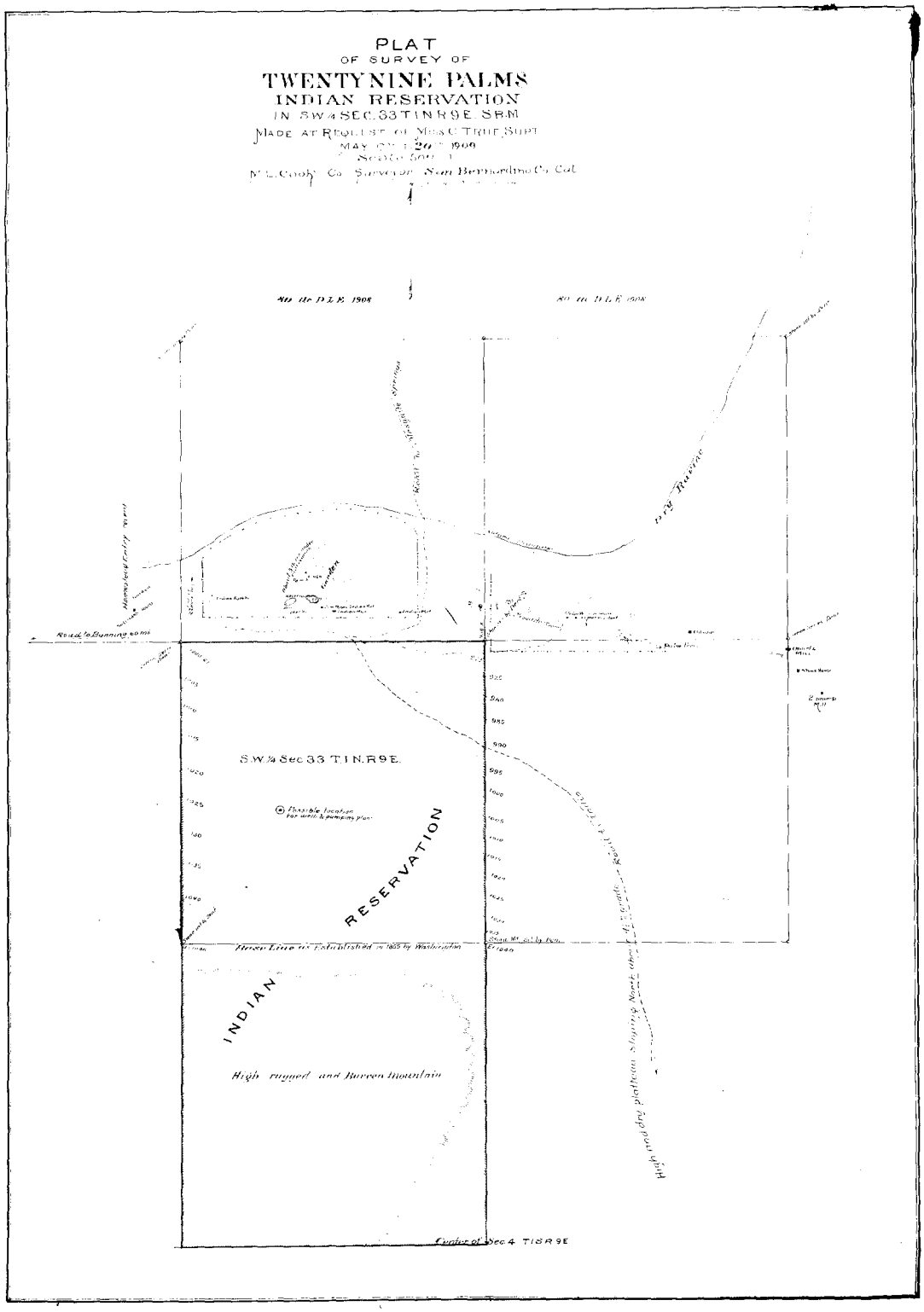
October 10, 1908.

Scale 1 in. - 800 ft.

D. D. Graham.
Special Allotting Agent.

Illustration 2.

Plat of Survey of Twentynine Palms Indian Reservation in S.W. 1/4 Sec. 33 T.1N. R.9E. S.B.M. Made at Request of Miss C. True, Supt. May 17th to 20th 1909. M.L. Cook, Co. Surveyor, San Bernardino Co., Cal. Map No. 6558, Tube No. 686, Record Group 75 (BIA), Courtesy National Archives.


PLAT
OF SURVEY OF
TWENTYNINE PALMS
INDIAN RESERVATION
IN SW¼ SEC. 33 T1N R9E SBM
MADE AT REQUEST OF Miss C. TRUE, SUPT
MAY 20th 1909
Scale 50" = 1
M. L. Cook Co. Surveyor San Bernardino Co. Cal.
Mt. of D.L.E. 1908
Mt. of D.L.E. 1908
Road to Banning 60 mi.
Dry Avenue
S.W.¼ Sec 33 T1N. R9E.
Possible location for wells & pumping plant
RESERVATION
INDIAN
Horse Line as Established in 1905 by Washington
High rugged and Barren Mountain
High rolling plateau Sloping North about 1° to 2° grade
Center of Sec 4 T1S R9E

Bureau of Indian Affairs many years ago and their whereabouts are unknown.

The days of the Serranos and Chemehuevis at the oasis were numbered. After centuries of occupation of the area, they fell victim through the years to decimation through disease, old age, and white encroachment. Their final withdrawal from the oasis was hastened by an event in 1909 that captured headlines across the country. In the fall of that year Captain Mike Boniface led the Twentynine Palms Band to the Gilman Ranch near Banning to harvest fruit. Also at the ranch was a Paiute cowboy named Willie Boy, who several months previously had been rejected in his attentions toward Mike's daughter Isoleta. Ordered by her father to stay away from the girl, Willie Boy nurtured an intense hatred for the old man. One evening during the harvest Willie Boy, having imbibed a large amount of whiskey, decided to kidnap the girl. Creeping up on the Boniface family as they slept together under a tree, Willie Boy shot the father and fled into the desert with Isoleta. Newspapers had a field day, with rumors of a general Indian uprising finding prominent coverage. The life of President William Howard Taft, who was then touring California, was rumored to be threatened. An almost 600-mile chase involving a mounted state posse following an Indian youth on foot ended many days later with Willie first murdering the girl and then taking his own life. The chase had ranged from Banning through the Morongo Valley up north to the Bullion Mountains, back down to Twentynine Palms, northwest to Mesquite and Surprise springs, and finally ended at Saddlerock Spring in the Ruby Mountains.

Clara True was ultimately forced to resign as superintendent of the Banning Agency. Apparently businessmen had long been angered by her defense of Indian land claims, and the negative publicity of the Willie Boy episode provided Indian Bureau officials with an excuse to get rid of her. Old Mike was buried in the oasis tribal cemetery. Disheartened by this episode and believing the oasis to be inhabited by evil spirits, most of the remaining Indians left after burning their huts. Some went to Morongo near Banning, others to Torres-Martinez near the Salton Sea, and some to Mission Creek, west of

the monument. Only Jim and Matilda Pine, who refused to leave the graves of their children, and a few others stayed behind. Pine assumed ceremonial leadership of the remaining Indians and tried to oust the whites who were already settling nearby. True's successor did not continue her efforts to keep the reservation under Bureau control. The Southern Pacific Railroad took over the oasis, but worked out an arrangement by which the Pines could continue to live there. By warranty deed of July 31, 1911, title to the reservation was revested to the United States from the Southern Pacific Railroad Co. This brought the total area of unallotted Indian land to 480 acres--including the southwest quarter of Section 33, the northwest quarter of Section 4, and a quarter section of land about six miles north of the oasis. The reservation as finally set aside comprised 161 acres of rocky, arid land, not including the oasis, plus the cemetery in the southwest quarter of the northwest quarter of Section 33, T1N, R9E.[30]

This cemetery has been designated the Twenty Nine Palms-Chemehuevi Indian Burial Grounds. Although there are few physical indications of burials, such as markers, mounds, or depressions, or any known records of burials here, supposedly the land has contained at least 50 to 60, perhaps as many as 111, Serrano and Chemehuevi Indian graves. As far as this writer knows, only four--those of Jim Boniface, two sons of Jim Pine, and Mrs. Waterman--have ever been identified. There were no burials in the cemetery in later years, and in 1967 the band voted to convey the cemetery to the Twenty-Nine Palms Park and Recreation District, which had been improving the site.[31]

Jim and Matilda Pine finally moved to Mission Creek in 1910 or 1911, and later to Agua Caliente. For a while, despite the legal

---

30. Miller, Mara: The Desert Oasis of Twenty-Nine Palms, pp. 48-49; Harry Lawton, Willie Boy (Balboa Island, Ca.: Paisano Press, 1960), p. 189.

31. Branch of Real Estate Appraisal, Hemet Appraisal Office, to Supt., So. Calif. Agency, Apr. 6, 1973, BIA files, Sacramento Area Office; letter of June 10, 1971, BIA files, Sacramento Area Office; Offcia [?] to Hill, July 7, 1966, BIA files, Sacramento Area Office.

boundaries of the reservation, Indians continued to occupy the oasis, where in 1912 at least five families were still cultivating the land, growing peach trees and vegetables, possibly in the area at the western end of the oasis referred to by the local whites as "Indian Meadows" or "Indian Gardens."[32] According to H.E. Delamare, who visited the area in 1912, about thirty Indians still lived under the palms:

> Most of them are very old and have been at some time renegades or outlaws who have left the Indian reservations and never returned to them. They are nearly all Apaches or Paiutes, cultivating an acre or two of moist soil, but their chief food is the mesquite bean.[33]

Delamare also states that only fifteen palms remained at the oasis. The only water available was acquired from small springs whose seepage was stored in basins. The remaining Indians finally began migrating into the Coachella Valley. The census for 1913 reported only one couple still living at Twentynine Palms.[34] This last family left soon after. Ultimately the Indians' water rights were revoked for nonresidence and the reservation today is deserted. Many of the Twentynine Palms Indians were consistently recognized as members of the Cabazon Band and their names were carried on official Cabazon census records through 1940. They intermarried, participated in tribal affairs, and shared in tribal assets and resources. In 1963 only seven adults and three children constituted the Twentynine Palms Band. Most of them lived in the Indio-Palm Springs area.[35]

---

32. Miller, Mara: The Desert Oasis of Twenty-Nine Palms, p. 49; Parker, One Hundred Years of History in the California Desert, p. 35. (This spot was in the northwest quarter of Section 33) O'Neal, p. 145.

33. H.E. Delamare, "The Desert Lands of California," Travel (October 1912), p. 35.

34. "Indian population of the United States . . . June 30, 1913 (by tribes)," in United States, Department of the Interior, Bureau of Indian Affairs, Report of the Commissioner of Indian Affairs to the Secretary of the Interior for the Fiscal Year Ended June 30, 1913 (Washington: GPO, 1914), Table 3, pp. 48-49.

35. Offcia [?] to Hill, July 7, 1966, p. 4, BIA files, Sacramento Area Office.

3. Whites Find the Oasis

Although a "Jeff Davis" mining claim was recorded in the monument as early as 1865, white habitation of the oasis did not really begin until the 1870s when prospectors became seriously interested in the mineral possibilities of the region. On March 17, 1873, J. Voshay filed a homestead claim there, and a year later a Mr. Hoff claimed another 160 acres "in a square piece of land bounded on the west by the east line of 160 acres claimed by Joseph Voshay or the Blue Jay Co."[36] The presence of water and shade made the oasis a "jumping-off" place into the desert--the natural focal point for activity in the area--and soon it was serving as a base camp for the Palms Mining District, which experienced a short flurry of activity for the next few years. In 1879 the cattleman William (Bill) McHaney arrived at The Palms (Twentynine Palms), to become the first permanent white settler in the region. In his early years there he learned the location of water, trails, and mines from the Indians. He stayed in the area off and on until about 1933.[37]

Increased mining activity during the 1880s at the camps of Gold Park and Dale brought in more miners and teamsters. In 1886 a mud and stone assay office was built east of The Palms, but the first permanent house, of adobe, was not built until 1890 (possibly as early as 1888) by a Mr. Aldridge (sometimes spelled Baldridge) of Santa Ana. It

---

36. Miller, Mara: The Desert Oasis of Twenty-Nine Palms, p. 42.

37. William McHaney was born near Gallatin, Missouri, on March 25, 1859. He was involved in the cattle business when he arrived at Twentynine Palms in 1879. He lived in or near the monument for the next fifty-eight years, supporting himself mainly by prospecting. He divided his time between a camp at Music Valley near Gold Park and the oasis. McHaney became very close to the Keys family, who watched over him as he became older. In 1933 Keys installed him on a homestead near Barker Dam. When he became seriously ill, he was taken to the Keys Ranch where he died on January 5, 1937. He was buried in the Twentynine Palms cemetery. McHaney discovered several of the earliest mines in the area and was a wealth of information on the early history of the monument and its inhabitants.

stood until 1947 when its condition became so hazardous it had to be removed. Because it was the only building in the area for many years, the Old Adobe was occupied for short periods by a great number of people. Aldridge spent time here for health reasons, but the structure also served as a home for itinerant miners, as a base of operations for cattlemen, as a temporary shelter for homesteaders, and around 1898 as a horse-changing station for the stage running from Garnet to Dale. Over many years freighters stopped at the oasis on their way from Amboy, Banning, Garnet, and Indio over roads that converged at or near the Oasis. The Old Adobe was used as a supply store and station for these wagons. As late as 1928 the structure housed the office of the Pinto Basin subdividers. Another adobe was built in 1890 about 150 feet west of Aldridge's by another Santa Ana resident, Mr. Parks. It disappeared at an early date.[38]

Another early resident was Jonathan W. Wilson (often referred to as "Dirty Shirt Wilson" or "Hard-rock Wilson"). He came to the oasis in January 1883 and lived in the area until 1914. By 1884 he had an adobe and dugout under the eastern palms, in an area known as Wilson Cove (present headquarters area of the monument). In 1886 he located the North Star Mine in Gold Park, and was involved in working several other properties.[39] In 1905 he built an arrastra at the oasis to mill ore from nearby mines.

In 1896 Billy Neaves, who had helped build the Old Adobe, aided by John Thurston, built a rock house for use as a mining and assay office near Wilson Cove, which became the first school in the area about 1922-23. In 1897 John Lang ran a saloon near Wilson's house. At

---

38. File on Proposed Interpretive exhibits at Visitor Center: Old Adobe, in Federal Archives and Records Center, Laguna Niguel, California.

39. McHaney interview, March 1933, p. 2. Wilson's 1884 adobe and dugout might have some relation to the assay office mentioned in Miller, Mara: The Desert Oasis of Twenty-Nine Palms, p. 43.

Sneakeye Spring at the west end of Indian Cove was a still run by a John Stull.[40] In 1897 miner Phil Sullivan and his family homesteaded a quarter section just west of the oasis on which they built an adobe house. Mrs. Sullivan, as far as is known, was the first white woman to live at the oasis. In 1910 Sullivan and McHaney built an arrastra in the area to work ore from Sullivan's Contact Mine.[41]

By the early 1900s cattlemen were coming into the area. J.C. Laurence, who worked for the Shay outfit, used the Aldridge adobe as headquarters. From there he ranged his cattle around Stubbe, Quail, Mesquite, and Coyote Hole springs.[42] Another cattleman who came at this time was Bill Keys, who was hired as a cowboy at Surprise Spring in 1910.[43]

George Wharton James visited the oasis in 1906, reporting that

> a number of the palms have been cut down, but the old name still remains. . . . Twenty-Nine Palms is the home of "Charley" Wilson. . . . Mr. Wilson takes us out to show us an old Mexican arrastra, a primitive ore-crushing machine and mineral-separating mill. Only a part of it remains. . . .[44]

J. Smeaton Chase visited Twentynine Palms over the Fourth of July. There he found only two persons--a miner and a tuberculosis sufferer--and the remains of shacks and dugouts. One structure had

---

40. McHaney interview, March 1933, p. 2.

41. Ibid.

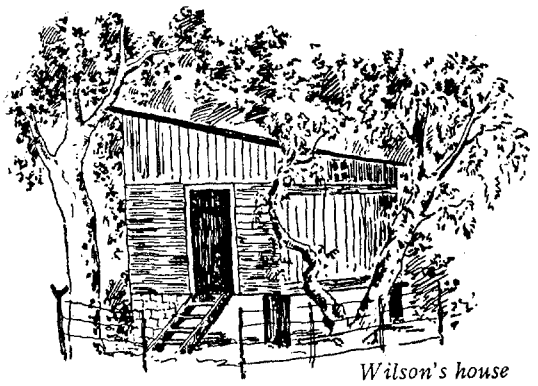
42. Miller, Mara: The Desert Oasis of Twenty-Nine Palms, p. 44.

43. Helen Bagley, Sand in My Shoe (Twentynine Palms, Ca.: Calico Press, 1978), p. 217.

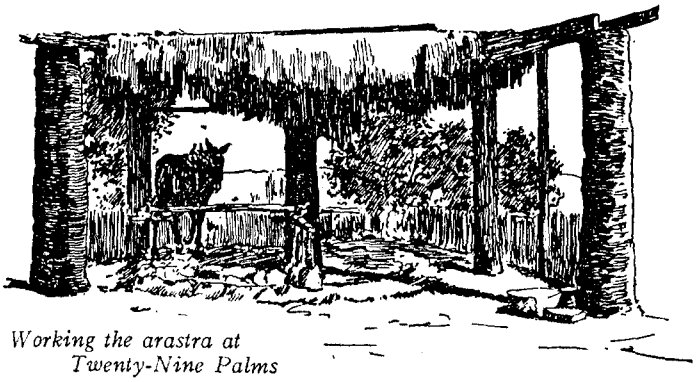
44. James, Wonders of the Colorado Desert, II:480.

Illustration 3.

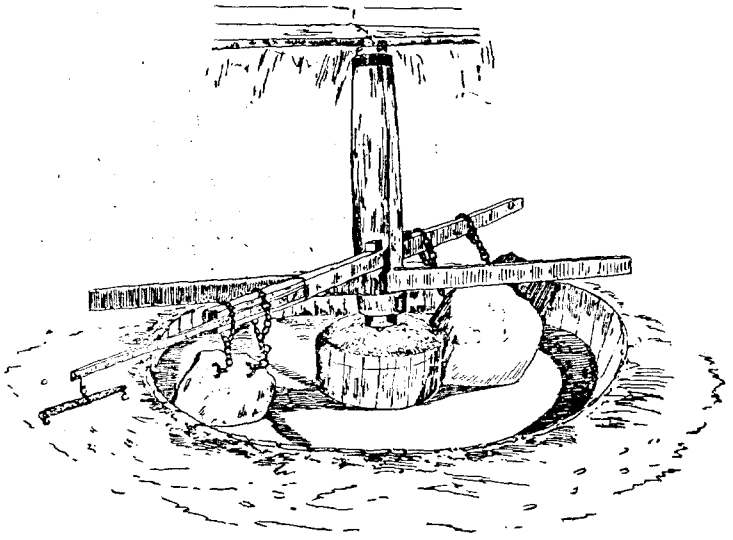
Early scenes at Twentynine Palms. Top: Jonathan W. Wilson's house; Middle: working the arrastra; Bottom: old arrastra at the oasis. From James, Wonders of the Colorado Desert, II:481, 486.



Wilson's house



Working the arastra at Twenty-Nine Palms



Old arastra at Twenty-Nine Palms

been the home of Wilson, who Chase states was forcibly removed by the county authorities. Also visible was the hut of Jim Pine who a few years earlier had been one of the last of the Twentynine Palms Band of Indians to leave. There was still activity at the oasis, however, for Chase stated it was a prospecting base and a water stop on the freight road to Dale.[45] Usually the population of Twentynine Palms was small, with short-lived increases during periods of mining activity in the adjacent desert.

The modern growth of Twentynine Palms did not begin until about 1922, when Dr. James B. Luckie, a Pasadena physician, after scouring the desert country for a favorable climate, began recommending this spot to World War I veterans who had been the victims of poison gas and who had later developed respiratory ailments. Its high elevation of 2,100 feet plus its dryness and lack of fog appealed to the Pasadena American Legion, which erected a campground with facilities for twenty-eight members. When the health of these ex-servicemen began to improve almost miraculously, the federal government allowed veterans, most of them subsisting on disability compensation, to homestead there. An American Legion Post was established in 1929 and functioned as the unofficial Welfare Department, Chamber of Commerce, and community improvement association. It maintained cabins, medical supplies, and other facilities to help incoming homesteaders. In fact, members of the American Legion constituted the bulk of the founders of the present community and played a large part in its development. The health advantages of the area in the treatment of arthritis, rheumatism, tuberculosis, and asthma attracted a multitude of people, many living on small retirement payments or pensions. The period from 1920 to 1941, between the two world wars and dominated by the Great Depression of the 1930s, was a time of great adjustment for many people in the United States. In then-remote desert regions, existence during this time

---

45. J. Smeaton Chase, California Desert Trails (Boston: Houghton Mifflin Company, 1919), p. 152.

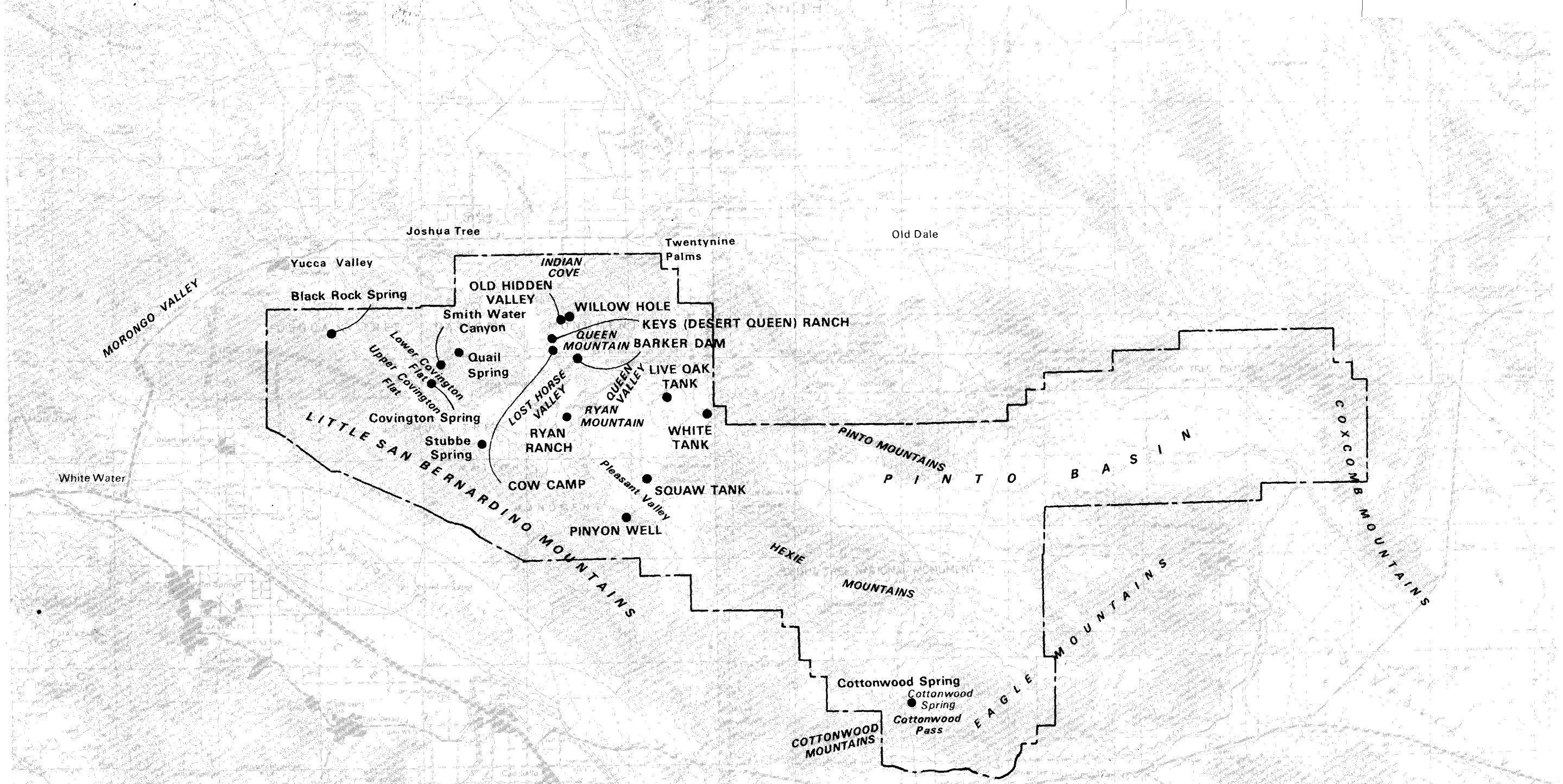
was a throwback to an earlier period.[46] "Roads" were wagon tracks--two ruts with an appallingly high hump between; mail took at least ten days, often longer, to reach the addressee; the area was a den for bootleggers during Prohibition; at other times cowmen, miners, prospectors, and caravans of Indians passed through.[47] There was no refrigeration or electricity, phones were lacking, and adaptation and ingenuity were the only means of survival.

The even climate of Twentynine Palms ultimately led to its large-scale development as a weekend resort area and also to the establishment of many permanent homes. It also encouraged investment in recreational facilities and businesses. The construction nearby of the U.S. Marine Corps Training Center--the largest Marine base in the United States and the largest known training installation in the world--has encouraged an increase in the number of permanent residents and businesses. The only industrial development in the region has been connected with mining, primarily of iron ore deposits. Twentynine Palms, northernmost oasis in the United States, is also enhanced by being the main entranceway to Joshua Tree National Monument.

---

46. Bagley, Sand in My Shoe, p. i.

47. Elizabeth W. Crozer Campbell, The Desert was Home (Los Angeles: Westernlore Press, 1961), pp. 23-27.



ON MICROFILM

SITES ASSOCIATED WITH CATTLE RAISING

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25014

III. Cattle Raising in Joshua Tree National Monument

A. Origins

1. Rustlers

The first major group of Anglo-Americans to settle in the Mojave Desert region were farmers and stockmen rather than miners. The first attempts at stockraising took place on the Mojave in the early 1860s. Several ranches were located there and large numbers of animals grazed in the desert in the winter and fattened on the river bottoms in the summer. The lower desert areas became quite appealing for cattlemen when heavy rains brought forth vast quantities of grass covering the sand. The high desert became recognized for even more reliable grazing land. Here galletta grass and succulent saltbushes provided good browsing in the winter and spring and provided an alternative feeding ground when snow or drought hit the Big Bear or Whitewater country. According to Bill Keys the first stockman to graze his cattle in the monument was Oliver Smith, whose Texas longhorns grazed in the Quail Spring area from about 1870 to 1876.[1]

Beginning in the mid-1870s ranchers in the region discovered good spring grazing as well as winter feed for their sheep and cattle in Lost Horse, Queen, and Pleasant valleys. The higher monument elevations are thought to have then received more than ten inches of rain and snow per year, resulting in a tall, lush grass cover. Water could be found all year at several springs. According to Bill Keys, Bill McHaney started running longhorns in the area of Keys Ranch as early as 1879.[2] By the mid-1880s certain areas of the monument were being utilized by a group known as the "McHaney gang." The extent of Bill McHaney's participation in their illegal activities is unclear, but brother Bill seems

---

1. "Historical notes, Joshua Tree National Monument, As told to Superintendent King by Bill Keys on November 9, 1954," Western Regional Office files, NPS, San Francisco, Ca., p. 1.

2. Ibid.

definitely to have been a leader of this local cattle rustling ring. Headquartered in a section of the monument appropriately referred to as Hidden Valley,

> the operations of these gentry were simple and lucrative. From the ranges of southern Arizona [they] would gather choice cattle and drive them westward into California. Making their way by easy stages through the desert country from spring to spring, their destination was a monoclinal range that appears on the map as the Little San Bernardino Mountains, ascending on a gentle slope from Twentynine Palms Valley southward, and falling away in abrupt barrancas and badlands to the floor of Coachella Valley. Between the desert and the summit was a region where stolen cattle could be concealed, grazing in rock-bound valleys under the watchful eyes of other men whose business was that of directing them from time to time into channels of commerce. Upon their return trip to Arizona, the "rustlers" would drive back a band of horses, recruited in a like manner from the ranges of California, to be sold in the Arizona market.[3]

Hidden Valley, surrounded by perpendicular granite walls and rock piles carved by wind and water erosion into fantastic faces and animals, would have been an ideal place for holding cattle. Corrals could be built across box canyons, and entrances into the fifty-acre valley were hidden from casual view. The chances of being caught were negligible, for the nearest law enforcement officials were at Banning. According to Mr. Seeley, who worked as a cowboy for the Stocker and Shay cattle interests, the cowboys in those early days were held responsible for any

---

3. Philip Johnston, "California's Garden of the Gods," Westways (April 1934), p. 13. According to Bill Keys the original Hidden Valley used by McHaney was in an area called "Seven-Mile Pasture," possibly north of present Keys Ranch. Keys stated that he used the present Hidden Valley to corral his horses. He also claimed to have dynamited the rear opening into the valley in 1921 so that he could run stock there. Keys interview, Dec. 9, 1966, in JTNM Fact File.

cattle that became lost. For that reason they kept an unbranded supply in Hidden Valley to use to replace cattle found missing from their herds.

A couple of routes were used by the cattle thieves to move their stock from the Colorado River into the monument. One trail went via Cibola, another went upriver from Blythe near the site of the old La Paz mining camp. One trail came into the monument at Cottonwood Spring, another followed the old Bradshaw Road west to Cahuilla Spring, skirted the Chocolate Mountains, and entered the monument via Berdoo Canyon, Pinyon Well, and Pleasant Valley.[4] The cattle brands were changed at a spot still referred to as "cow camp," in a valley between rocky hills near the Desert Queen Ranch. The site was chosen because of the presence of a natural pond fed by a spring. Wells were dug to provide water and at least two adobe cabins--a cookhouse and bunkhouse--and a barn were built in 1894. (According to Bill Keys's daughter-in-law, the present Keys ranchhouse was built in 1913 when the two adobe buildings were dismantled.)[5]

By the late 1800s use of the monument in stock rustling activities was on the decline. This might have been due to the formation of Riverside County in 1893 and the resulting presence of lawmen as close as Riverside, but its demise probably resulted mostly from pressures and encroachment by legitimate cattlemen in the area and by prospectors, more of whom were being drawn to the region by the discovery and operation of new mines.

2. Cattle Outfits North of the Monument

The Morongo Valley was the scene of legitimate cattle operations beginning about 1873, when the de Crevecoeur brothers began

---

4. L. Burr Belden, "Cattle Thieves Cause Victim to Find Rich Mine," San Bernardino (Ca.) Sun-Telegram, Apr. 26, 1959.

5. Gwen Keys, "A Brief Sketch of the Life of Wm. 'Bill' Keys," Rockhounds Journal, September 1962, p. 12.

running cattle and sheep. They left the valley in the early 1880s and the de Crevecoeur ranch in Big Morongo Canyon was taken over by Mark Warren in 1884. He ran cattle through Yucca Valley, where in 1881 he had dug Warren's well. The corrals and fenced land around this watering spot were used by cattlemen as a roundup point for cattle drives from the monument area. During the fall roundup, herds were brought in from Barker Tank, Quail Spring, Black Rock, Coyote Hole, and other grazing areas and corralled at Warren's Well for branding. The three-year olds would be driven to the railroad at Victorville for market and the rest retained to replenish next year's herds.[6]

The Talmadge brothers--Will, John, and Frank--purchased Warren's Well in 1909 when the stage service from Garnet to Dale was discontinued and the site was no longer used as a stage stop. They used it as a holding corral for spring roundups. Three years later they bought out the Jim Smart outfit. While the Talmadges owned the well, the bunkhouse burned, and a larger log cabin was built to replace it. The brothers added reservoirs called "the Tanks" to water cattle and further improved the spring at the Tunnel, developed earlier by the Warrens. The Talmadge cattle grazed on the desert in the winter from Yucca Valley up through Mission Creek to Seven Palms (Garnet), five miles north of Agua Caliente, and wherever else the grass was green. The end of May the herd was taken to Big Bear Valley where there was plenty of grass and water for summer grazing.[7]

William V. (Bill) Covington was another cattleman, owning a homestead adjacent to the Warren Ranch and running stock on the open range. Before coming to the Morongo Valley he had been foreman for

---

6. "Cattle Brands Part of Hi-Desert Lore," Roadrunner Magazine, June 1976, p. 10.

7. Clark and Couzens, "Yucca Valley," p. 9; Crotsenburg, M., "Picture Frame for Morongo Valley," Hi-Desert Star, p. ?

Chase and Law, an outfit in Banning whose stock ranged around Covington Flat within the monument. (Bill had lived at the flat for some time--hence the area's name.)[8] Covington acquired the old Warren Ranch in 1917.

B. Activity in the Monument

1. Persons Involved

While the cattle industry centered primarily along the broad mesas from Old Woman Springs through the valleys where numerous high desert towns have now been located to as far west as Whitewater, owners soon began ranging their cattle further and further into the desert. The heavier rains and snows of the late 1870s produced a lush grass covering that attracted cattlemen to the high mountain valleys of the monument. Bill McHaney, who had started his Texas longhorn cattle operations in Queen and Lost Horse valleys in 1879, sold his interests about 1894 to George Meyers.[9] Sometime prior to the turn of the century, C.O. Barker, a prominent Banning resident, entered the region. He was involved in mining to some degree and also had horse and cattle interests in Twentynine Palms.[10] He may have been grazing some of his cattle in the monument's upper valleys in the 1890s. Meyers sold his cattle interests to Barker in 1905, the latter merging soon thereafter with Will Shay, a longtime sheriff of San Bernardino County. The firm of Barker and Shay operated in the monument locality from about 1905 to 1923, running generally from 300 to 800 head of cattle. Probably only

---

8. Carolyn Evans, ed., A Glimpse into the History of Yucca Valley, Morongo Valley, Palm Wells and Yucca Mesa, California (Yucca Valley, Ca.: Artcraft Print Shop, 1965), p. 14.

9. Keys, "Historical notes," Nov. 9, 1954, p. 1.

10. Reino Clark interview with Mrs. W.R. Shay, May 2, 1975, on file in Local History Collection at Twentynine Palms Branch County Library, Twentynine Palms, California.

about 200 to 400 animals actually grazed in the monument.[11] The Whitewater Ranch west of the park, once a stage station on the Bradshaw Road, was a major base of operations for the firm, whose winter range stretched from Whitewater to the Dale Mining District east of Twentynine Palms.[12] According to Bill Keys, the firm of Carpenter and Hamilton ran cattle in the vicinity of Stubbe Spring from 1896 to about 1899, when J.D. Ryan, later a developer of the Lost Horse Mine, bought their interests. A government report of 1938, however, states that the Ryan brothers already had 100 head of cattle in Lost Horse Valley in 1895. Ten years later they sold the herd, amounting then to only 53 animals.[13]

The Swarthout Cattle Company operation started about 1900, with a headquarters at the Twentynine Palms oasis by about 1909. This complex consisted of sheds, corrals, three adobe shacks, and a cookhouse. The Swarthout cattle apparently grazed around the Old Woman Springs and Lucerne Valley areas, but sometimes strayed over onto what is now monument land.[14]

Barker and Shay took over Warren's Well in 1918, and the Talmadge Brothers established their winter headquarters at the old Whitewater Ranch in 1920, about the year cattle raising in the region reached its peak. The Talmadge Brothers also ran cattle in the western

---

11. A.A. Wilhelm, Memorandum concerning the grazing Use of Lands involved in the Joshua Tree National Monument in San Bernardino and Riverside Counties, California, May 6, 1937, RG 79, NA, p. 1.

12. "Cattle Brands Part of Hi-Desert Lore," p. 10.

13. Keys, "Historical notes," Nov. 9, 1954, p. 1; "Report on Field Inspection of Merriam, Apr. 14-15, 1938," Central Files, 1907-49, RG 79, NA, p. 22.

14. Reino Clark interview with Jim Hester, Feb. 8, 1975, on file in Local History Collection at Twentynine Palms Branch County Library, Twentynine Palms, California, pp. 1, 9, 22; Keys, "Historical notes," Nov. 9, 1954, p. 2.

part of the monument through the late 1920s.[15] To continue the history of Warren's Well, Jim Dever and John Berry owned the site in the 1930s and ranged cattle in the area for about three years, possibly running some cattle in the monument. The well then reverted back to the Talmadge Brothers who reportedly still had cattle in the area as late as 1944. Around World War II the cattle and land were purchased by James W. Stocker to be used as headquarters for his winter range near Yucca Valley. In 1950 he sold his cattle business to the Hamilton Brothers and the land to developers.[16]

Down near Cottonwood Spring, in the southeastern section of the monument, James Cram of San Bernardino grazed approximately 250-350 head of cattle from about 1915 to 1930. His general grazing range was from Cottonwood Spring to the Colorado River. Jerry Wolford, Sr., of Blythe also ran cattle there about 1916. John P. Coy utilized part of this area and a John C. Brinton of Banning may also have grazed stock there in the early 1940s. In 1925 the Talmadge Brothers purchased the Shay and Barker interests and grazed about 450 cattle in the monument until 1929 when they sold out to a "Captain" (Katherine?) Barry for $5,000. From 1929 to November 1936, "Captain" Barry ran about 300 head in the monument. Jim Stocker, a San Bernardino County sheriff, and Harry Stacey of Morongo Valley, reportedly later purchased the Barry interests.[17] Some of the details in this account vary from an earlier government investigative report, which states that about 1923 the Talmadge Brothers of San Bernardino purchased the Shay and Barker interests, operating until 1929. Although they claimed to run about 900 cattle altogether, only about one-half that number used monument land for

---

15. Evans, History of Yucca Valley, p. 16; Keys, "Historical notes," Nov. 9, 1954, p. 1.

16. Clark and Couzens, "Yucca Valley," p. 9; Evans, History of Yucca Valley, p. 17.

17. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," p. 21.

grazing. In 1929 a "Katherine" Barry of Los Angeles purchased the Talmadge interests. A consideration of $5,000 was involved for improvements made on the range.

Barry and Harry W. Stacey, the latter either a partner or simply her representative, operated in the same territory with about 500 to 700 cattle until about November 1936. Actually only about 350 head grazed in the monument. In November 1936 the Barry cattle were sold, and although nobody succeeded to the use of this territory, Stacey reported that he purchased the Barry interests and paid $7,000 for improvements, including waterholes and water development on the range, which was estimated to be worth $4,000. Reportedly Stacey had for some time past been grazing cattle on a summer range taking in Quail Spring country, Barker Tanks, and Lost Horse Valley.[18] Further confusing the picture is a statement by Stocker in the 1940s that Shay did not sell to the Talmadge Brothers until about 1928. This might be more accurate, because in 1927 Vera Seely, a cowman's wife, was living in the Old Adobe at Twentynine Palms while her husband oversaw the C.O. Barker cattle herd. In the summer her family moved to the Ryan adobe in Lost Horse Valley to pasture the herd. Stocker may have been in partnership with Will Talmadge for awhile. He said that he purchased all rights from the Talmadges in 1936.[19] He also leased grazing land from the Southern Pacific Railroad Company.

---

18. Wilhelm, Memorandum concerning the grazing Use of Lands, May 6, 1937, pp. 1-2; Sam L. Collins [?] to Arno B. Cammerer, January 27, 1937, Central Classified Files, 1933-49, RG 79, NA; James E. Cole, an early superintendent of Joshua Tree National Monument, stated that Stacey did not buy the Barry interests. Stocker also claimed to have purchased them, but the park was informed he had not. Instead Stocker and the son of Will Shay simply moved in on the range, as did Talmadge. "Report of Pertinent Factors Relative to Grazing in Joshua Tree National Monument, Aug. 22, 1942," Federal Archives and Records Center, San Bruno, California, p. 3.

19. Jas. W. Stocker to Congressman Harry R. Sheppard, Feb. 26, 1943, Central Files, 1907-49, RG 79, NA, p. 1; Lucile Weight, "They shared work, pleasures and dangers," "Women in the Mines" series, Desert Trail, Jan. 19, 1978.

Two people living in Lost Horse Valley tried to run cattle as a sideline to mining. The first was Ryan, mentioned earlier, a former Montana cattleman who claimed to have stocked the valley with 500 cattle early in the century. He finally sold off his herd when he found he was losing cattle. Probably the best known rancher in the monument was William F. Keys who, because of his contributions to the area and the importance of his Desert Queen Ranch in the homesteading history of the region, will be accorded a separate section later in this report. In this chronological overview of early cattle raisers in the area, he will be treated only briefly. According to his wife, Keys filed on a stockraising homestead around 1918 (probably earlier), first having the land designated as stockraising land, and later received a patent on it. Prior to this time he had been raising burros, horses, and goats, but now he turned to cattle.[20] Keys usually ran only a few animals, ranging from twenty to fifty or sixty head. In 1937 he had only about twenty cattle.[21] His herd roamed all through the Queen Valley and Lost Horse Valley and over around Quail Spring. Keys tried for a long time to build up his herd. As long as the big cattle interests controlled the range and the waterholes he fared badly. Because he was primarily a miner and homesteader, friction often developed with the cattlemen. Although Keys was frequently in court, he was never jailed in the early years.

The main source of trouble was a waterhole Barker had improved. In 1912 Barker and Shay had this and several other holes set aside as Public Watering Places or Reserves. Keys and his family started filing additional homesteads in the area until finally they controlled the only entrances to Barker Dam. In retaliation the cattlemen cut his fences.

On August 10, 1936, Joshua Tree National Monument was established by Presidential proclamation. The Barry interests, which had

---

20. Mrs. W.F. Keys to United States Land Office, Sept. 14, 1944, Central Files, 1907-49, RG 79, NA, p. 1.

21. Wilhelm, Memorandum concerning the grazing Use of Lands, May 6, 1937, p. 2.

been using the monument range, sold their cattle. By the late 1930s Keys, Stocker, and Stacey were all still running cattle in the monument: in late 1937 Keys was reported to be running approximately 30 head, while Stacey had about 100 near Barker Dam, with plans to add more young stock.[22] Keys decided that this would be a good time to expand his operations. He tried first to buy 150 more cattle, until informed by the superintendent of the new monument that animals could not run at large. In the fall of 1939 Keys arranged with a Mr. Lawrence to bring in 80 more cattle from Oceanside to Lost Horse Valley, but the partnership soon broke up. Lawrence, whose cattle were denied access to Barker Dam by Keys, kept the cattle in the monument for only a short while. Having no prior grazing rights, he was ordered to remove the herd from government land, and did so.[23]

Keys became bitter enemies with both Shay and Stocker, the Keys family strongly resenting the influence exerted in the area by the Shay family primarily as a result of their control of the sheriff's office in San Bernardino County. Stocker and Keys competed hotly for grazing rights and dominance within the monument area. Most stockraising activities were finally eliminated about 1940. Keys's cattle, however, continued to graze illegally on monument lands, further fueling the controversy between Stocker and Keys. In the fall of 1940 W.L. Lawrence was grazing about eighty head of cattle and a few horses in Lost Horse Valley and a Mr. Hunt had two cows and a horse on his homestead there.

---

22. George W. Borden, Assoc. Engineer, Memorandum to the Superintendent: Subject: Report on Investigation of complaint of William F. Keys, Desert Queen Ranch, Whitewater, Calif. relative to conditions near his ranch in Joshua Tree National Monument, October 25, 1937, Central Files, 1907-49, RG 79, NA, pp. 1, 5. In 1936 about 400 head of cattle were reported to have grazed part of the year in the monument. This was down from counts of the early 1930s showing that about 800 head grazed per year. A few horses, donkeys, and sheep were also in evidence.

23. Cole, "Report of Pertinent Factors Relative to Grazing in Joshua Tree National Monument, Aug. 22, 1942," pp. 3-4.

By Proclamation No. 2487, dated May 27, 1941 (55 Stat. 1647), President Franklin D. Roosevelt proclaimed that an unlimited national emergency existed and called upon all loyal citizens engaged in production for defense to give precedence to the emergency needs of the nation. Both Keys and Stocker became interested in producing more beef to aid in the national defense and applied to the National Park Service for permission to graze cattle on the public lands within Joshua Tree National Monument. The Park Service thereupon sent a grazing expert to the area to ascertain the number of cattle that could feasibly be grazed within the monument. It was determined by this study that because of the limited grazing in the monument only one of the parties could be granted a license, and it was decided Keys should be given the first opportunity. About a year and a half of negotiations ensued with Keys over the matter. Before it was settled, Keys was convicted of manslaughter and sent to San Quentin prison. At that point Stocker received the permit to graze cattle in the monument, beginning in 1943 until the end of the war. His range at this time began nine miles west of Twentynine Palms and bordered the monument all the way to Morongo Canyon, then west as far as Big Bear Lake in some places. The nearest headquarters was at Warren's Well.[24] Stocker later sold out in the 1950s when the heavy population growth of the high desert made widespread grazing infeasible.

2. Extent of Grazing

Large-scale grazing began in the national monument possibly as early as 1895, and it is said that as many as 800 head of cattle might have browsed the upper valleys where water was accessible. For many years cattle used the area during the winter when snow and a lack of feed drove them from the San Bernardino Mountains. With the development of Twentynine Palms and adjacent areas, accompanied by the appropriation by homesteaders of watering places that the cattlemen had always used but to which they had obtained no rights, grazing withdrew

---

24. Duane D. Jacobs, Acting Custodian, Memorandum for the Regional Director, Region Four Office, Mar. 22, 1943, Central Files, 1907-49, RG 79, NA, p. 1.

to two regions west of Twentynine Palms--Coyote and Yucca valleys. In the spring, when the lower desert became too dry and before the mountains were open, cattle were driven into the upper valleys of the present monument. Any cattle missed in the summer roundup might stay in or around Lost Horse Valley until the next summer.[25] Natural feed consisted of galletta and bunch grasses supplemented with cacti and shrubs such as saltbush, cat's claw, scrub oak, mesquite, and sagebrush as grass became scarcer. In 1927 and 1929 Texas longhorn cattle were using the Twentynine Palms area as a winter range, and the annual roundup and branding were taking place in the monument area.

A special report on the grazing situation in the late 1930s found that a few cattle had been grazed in Lost Horse Valley and on adjacent lands and in the vicinity of Cottonwood Spring, but otherwise there were no range animals in the park. It was estimated in this document that only fifty percent of the monument was adapted to livestock grazing--the rest lacking water or forage grasses.[26] Special Agent A.A. Wilhelm concluded that the grazing value of the land in the monument was rather limited. Only the higher and cooler western portion of the monument, and only about fifty percent of it--the rest being rough, mountainous, and almost barren of forage--had been used as a cattle range. There several waterholes had been developed at considerable expense and rights to them established by usage.[27] The number of cattle grazed varied from year to year, depending upon the amount of rainfall. Several people living in the monument when it was established had been residents for many years. Because they owned very little land, they had always used the public domain for grazing. If they were required to keep their cattle and horses on their own property, they would probably

---

25. Cole, "Report of Pertinent Factors Relative to Grazing in Joshua Tree National Monument, Aug. 22, 1942," p. 2.

26. S.E. Guthrey, Special Agent, Div. of Investig., Dept. of Int., to Dir. of Investig., May 6, 1937, Central Files, 1907-49, RG 79, NA, p. 5.

27. Wilhelm, Memorandum concerning the grazing Use of Lands, May 6, 1937, p. 1.

have to sell their animals. Due to the pressure for grazing privileges on NPS land, a study was made of range and forage conditions by Ecologist Harold M. Ratcliff during November 1942. The results of this study showed possible year-round grazing for only 153 head of cattle.[28] In addition to Queen Valley, Lost Horse Valley, and the Quail Spring area, Ratcliff pointed out that on the western end of the monument were two small areas known as Upper and Lower Covington Flats that could be utilized by a few head of cattle. Small seeps in adjoining areas furnished water in wet weather. Probably not over 30 head could be grazed in that section.[29]

3. Watering Places

a) Outside the Monument

The major disadvantage of the high desert for grazing was that it lacked a large number of good waterholes, which are necessary when running large herds of cattle. There were, however, several watering places that were utilized. These included Mesquite Spring, Surprise Spring, and others found up Burns and Pipes canyons and down in Morongo Valley. By digging wells, improving springs, and constructing small dams of rock and cement (tanks) and other types of catch basins in natural drainages in canyons or rock formations in critical areas to supplement natural water sources, cattlemen were usually able to provide enough water for their stock, and the country soon became a regular seasonal range. One early cowman recalled making a reservoir by hooking three horses to a scraper and building a dirt dam across a ravine to catch the rainwater. He also mentioned blister holes--large rocks eroded by sand and wind that would fill with water. Water from behind a dam could be funnelled into these blister holes where it would be held for about two months.[30]

---

28. Custodian's Annual Report for Joshua Tree National Monument, June 30, 1943, Central Files, 1907-49, RG 79, NA, p. 2.

29. Harold M. Ratcliff, Memorandum for the Regional Director, Region Four, Dec. 3, 1942, Central Files, 1907-49, RG 79, NA, p. [3].

30. Hester interview, Feb. 8, 1975, pp. 13-14.

Prior to the mid-1920s when the first homesteaders began entering the area, the entire Twentynine Palms region was open rangeland. Ownership of water was the major consideration in the cattle business. Warren's Well was an important waterhole of the early cattle days; the oasis at Twentynine Palms was another. Between the two were more than twenty miles of sandy, hot desert. Sometime around 1915 Barker and Shay sank Coyote Well near Coyote Holes near the present town of Joshua Tree as an interim watering spot for their cattle. Elizabeth Campbell, an early homesteader of Twentynine Palms, was camped with her husband at the oasis in the early 1920s and recalled that

> every two or three days range cattle, compelled by thirst, came in to the springs to drink. Those days we stayed close to our tent, chasing the white faced cows out of our camp and roping the dog so he couldn't stampede the herd. There were droves of cattle then, for the whole district was open range, with enough water holes to support many of them. When the cattle "came in," they stood around the springs all day and into the next. Then they would be gone to scatter and munch desert growth for a few days.[31]

At the oasis a well was dug, possibly about 1900 by the Barker and Shay outfit, primarily for human consumption. Stock was watered in a sump under the palms several feet to the east. The well was also used by miners and homesteaders.

Farther east, at Old Dale, range cattle could be watered at the Lyon's (Wilson and Lyon's) Well. This was about 2¼ miles northeast of Old Dale. Its windmill supplied water for cattle in 1918.

---

31. Campbell, Desert was Home, p. 21.

b) Inside the Monument

Only about four dependable watering places existed in the higher valleys of the present national monument. These were Pinyon Well at the southern edge of Pleasant Valley, Stubby Spring on the southwest side of Lost Horse Valley about ten miles from Pinyon Well, Barker Dam at the north end of Lost Horse Valley, and Quail Spring, southwest of Keys Ranch. To supplement these sources, several catchment basins or "tanks" were scattered throughout the area, as were several privately owned wells and a few springs.

In an interview in 1933, Bill McHaney mentioned a few of the springs used by cattlemen. One was Stubbe Spring, four miles northwest of present Keys View, which was used by McHaney as early as 1891-92. Keyes Barrel was located one mile north of this spring. Other sources for water were Quail Spring, a natural site; Smith's Water, a half mile west of Quail; another spring (Pine?) 1½ miles north of the Desert Queen (Ranch or Mine?); and Rattlesnake Tank, built by cattlemen.[32] Quail Spring was one of the main waterholes and was utilized by all cowmen in the area, from Barker and Shay up to Jim Stocker, the last one to legally run cattle in the monument and who had a rental lease on land around the spring. During the late 1920s when cattle were driven into the monument in May for the summer grazing, headquarters were set up in Lost Horse Valley. The cows watered at Quail Spring and Barker Dam. The main headquarters in the wintertime, to which the cattle were taken the latter part of October, was at Sunfair, as the area in the Morongo Basin near Coyote Well was known.[33]

---

32. McHaney interview, March 1933, p. 3.

33. Harold Weight and Cheryl Erickson interview with Bill Seely, Feb. 3, 1975, on file in Local History Collection at Twentynine Palms Branch County Library, Twentynine Palms, Ca., n.p.

By 1937 several waterholes were mentioned as serving the cattle interests:

> Barker Tanks--a reservoir in the N½ NE¼, Sec. 4, T2S, R8E. An 80-acre permanent hole protected by withdrawal. A dam was constructed here at considerable expense, probably $1,500. The reservoir ordinarily covered about two acres of land.
>
> Quail Spring--a reservoir had been built here on railroad land in the S½ NE¼, Section 33, T1S, R7E. The water had been used since about 1900. This was a permanent water place. Water was piped from the cement reservoir to watering troughs.
>
> Stubby Spring--this spring was on railroad land in the SW¼ SE¼, Section 27, T2S, R7E. Had been used for fifteen or more years.

Within a fifteen-mile radius of Barker Reservoir were several springs that had been developed and used by cattlemen. These included Covington Spring, Smith's Canyon, Coyote Hole, Dove Springs, Willow Hole, Squaw Tanks, Live Oak Tank, and White Tank. Another waterhole was Cottonwood Spring in Section 14, T5S, R11E, a permanent waterhole also protected as a public waterhole withdrawal.[34]

A government field inspection a year later stated that there was a record of some grazing in Pinto Basin, but decided it was probably confined to the region near Cottonwood Spring. Except for small water tanks at the mouth of Placer Canyon, there was no water available in the basin for stock.[35] In 1942 the superintendent of the monument stated that two springs, four wells, and two reservoirs were then used by cattle. The water from Black Rock Spring and Quail Spring

---

34. Wilhelm, Memorandum concerning the grazing Use of Lands, May 6, 1937, pp. 2-4.

35. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," p. 22.



Illustration 4.

Ivanpah Tank. Water catchment typical of those built by cattlemen in desert areas to capture rainwater for stock. Courtesy JTNM.

was piped to water tanks. Quail Spring was on Southern Pacific Land Company property and was available to stock; Black Rock Spring was on government land and fenced off from cattle. Barker Dam was the principal source of water for livestock and wildlife in the Lost Horse Valley area.[36]

4. Sites Associated with Cattle Raising

Historical remains associated with cattle raising in the national monument consist of numerous tanks, the few building remains at Cow Camp, and the Ryan ranchhouse. Another area associated in legend with cattle-rustling operations is Hidden Valley, although it may not be the one in the NW¼ of Section 8, T2S, R8E, but be another site north of Keys's ranch in the Wonderland of Rocks area.

a) Tanks

None of the tanks are considered significant enough to warrant nomination to the National Register. Barker Dam, an important early waterhole for stock, has already been added. The tanks do not appear to interefere with the natural history of the area and are not detrimental to visitor safety. All those seen by this writer were structurally sound. It is recommended that they be left intact.

b) Cow Camp

Cow Camp was entered on the National Register of Historic Places on October 29, 1975. Located one-half mile south of Keys Ranch, in Section 32, T1S, R8E, the campsite contains today the ruins of one building in the form of a crumbling rubble stone chimney and the stone outline of a house foundation. William F. Keys erected a curved concrete dam 105 feet long and 30 feet high. A rock-lined circular well lies west of the cabin remains. The well was supposedly dug and rock lined in the 1880s by members of the McHaney "gang"--Charlie Martin, Willie and Charlie Button, Diamond George, Ike Chestnut, and

36. Cole, "Report of Pertinent Factors Relative to Grazing in Joshua Tree National Monument, Aug. 22, 1942," p. 6.

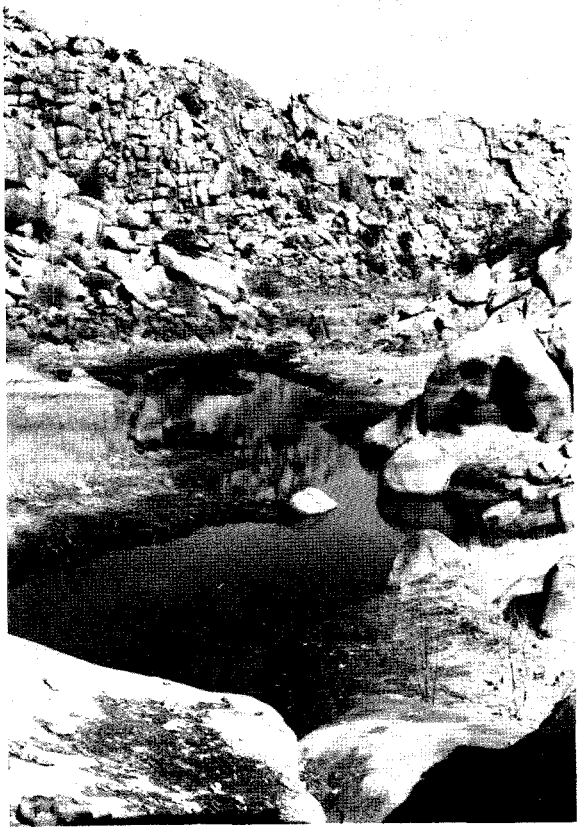


Illustration 5.

Cow Camp lake. Photo by Lynn Loetterle, February 1973. Courtesy JTNM.



Illustration 6.

Chimney and cabin foundation, Cow Camp. Photo by Lynn Loetterle, February 1973. Courtesy JTNM.

George Meyers. Martin reportedly constructed the cabin, troughs, and tanks at the site. The small tank (reservoir) northwest of the cabin tended to back up water to the cabin, so it was partially destroyed by Martin to alleviate the flooding problem.

Cow Camp was determined to be of local historical significance under the category of Agriculture in relation to livestock raising and rustling. It was active as an outlaw headquarters during the late 1880s and early 1890s. Bill Keys probably took over Cow Camp when he filed on the Desert Queen Ranch and used it for stock-raising purposes. Keys built the Cow Camp dam to increase the amount of water available for his stock sometime after his return from prison.

c) Ryan Ranch

The Ryan Ranch at Lost Horse Well was connected with both mining and stockraising efforts within the national monument. The ranch complex was established by Jepp and Tom Ryan. The large adobe home is thought to have been built in 1896 and was lived in into the 1930s and beyond. Mine tailings were said to have been used to make the adobe bricks for the structure. The walls supposedly assayed $8 a ton in gold. Sam Temple was the builder. Later frame additions were made to the main house, enlarging it substantially. It at one time had a wooden kitchen wing attached to the back. The ranch complex included a two-room bunkhouse; one half was built of adobe, the other was wood frame covered with chicken wire and stucco. Off the adobe end of the bunkhouse are the remains of a root cellar, consisting of a hole in the ground filled with brush. Originally the structure is thought to have had timber supports with an infilling of brush and an earth covering.

Around the Ryan home and Lost Horse Well were erected some houses and buildings that developed into a small community sometimes referred to as Langville, which has long since disappeared. It was probably concerned with the assaying of the Lost Horse Mine ore and its final production into gold bricks. A small mill there worked the mine ore before the larger ten-stamp mill was built at the mine. There were said to have been three houses at the well built of Joshua Tree logs.

Illustration 7.

Back of Ryan ranchhouse,
Lost Horse Well, June 21, 1932.
Courtesy JTNM.





Illustration 8.

Front of Ryan ranchhouse, 1983. NPS photo by Linda W. Greene.

Bill Keys mentioned five structures at the ranch site in his December 1966 interview. These included a horse barn, weigh station, an underground cellar and house, the big house, and an assaying cabin. The Calico Print of November 1953 mentioned a large stable and corral, a small adobe brick tool house, and other buildings used by miners. Also according to Keys in 1966, the well where the tank is now was referred to as the Johnny Lang Well. Ryan Well was dug later by the spring where the windmill was placed (now fallen over). Keys states that pumping here dried up the spring.[37] The Ryan adobe was used as a summer headquarters for cattle grazing in Lost Horse Valley well into the 1920s. Members of the Ryan family (Addie and Jeptha DeGarret) lived there for various periods, even while in their seventies. District Ranger Matt Ryan lived at the Ryan home for a short time in the late 1930s and early 1940s.

On June 5, 1975, the Ryan House and Lost Horse Well or Spring, a small one-room adobe structure, and the two-room bunkhouse were entered on the National Register at the local level of significance. They were thought to exhibit desert life as well as being associated with a famous mine of the area. At that time the smaller building, in front of the main house and off to the west near the entrance road, had two standing walls and portions of the other two. This building is now gone, as are the wooden kitchen of the main house and its roof, and major portions of the bunkhouse. The Ryan ranchhouse burned during the night of August 12, 1978. Arson was suspected. The main house was destroyed completely, except for the adobe walls. Just east of the house is a stone-enclosed reservoir. Further southeast on the hillside are the collapsed windmill, some stone-ringed foundation levels, and a large stone well covering. Vandalism in the form of initials carved in the adobe and the recent fire are manifestations of the ongoing denigration of the site. Its proximity to the Ryan Campground and its visibility from a main monument road assure it of steady visitation by park visitors. The lack of roofing over the adobe walls makes it

37. JTNM Fact File.

impossible to retard erosion. Because it no longer exists, it is recommended that the one-room adobe be removed from the LCS. Due to their present lack of integrity, it is also suggested that the opinion of the National Register be obtained as to whether the ranch and bunkhouse still meet the criteria of the National Register. Although the ranch complex and its occupants were important in the local history of the area, the site has disintegrated to such a degree that its integrity of ten years ago has been lost. The main house is not considered eligible for the National Register for this reason. It is recommended, however, that the site be allowed to naturally decay and serve as a reminder of the early cattle and mining days and of personages important in the monument's history.



Illustration 9.

Front of Ryan ranchhouse, Lost Horse Well, July 1935.
Courtesy JTNM.

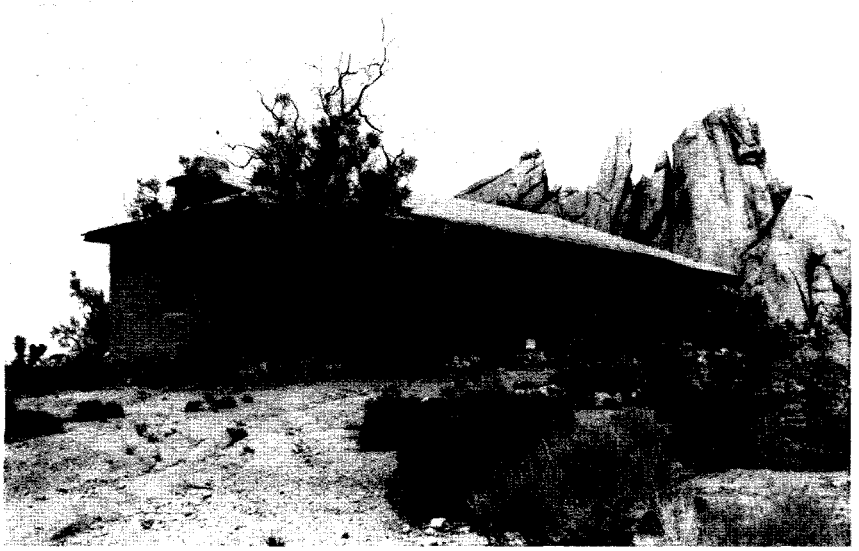


Illustration 10.

Front of Ryan ranchhouse, ca. 1975, structure no longer occupied.
NPS photo.



Illustration 11.

Small, one-room adobe structure at Ryan Ranch that has since fallen down, ca. 1975. NPS photo.

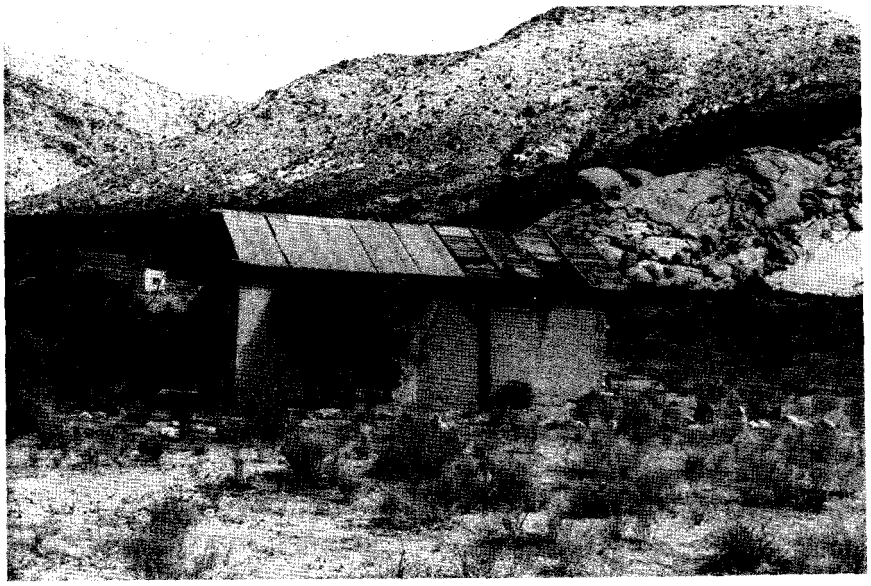


Illustration 12.

Bunkhouse, Ryan Ranch, ca. 1975. NPS photo.



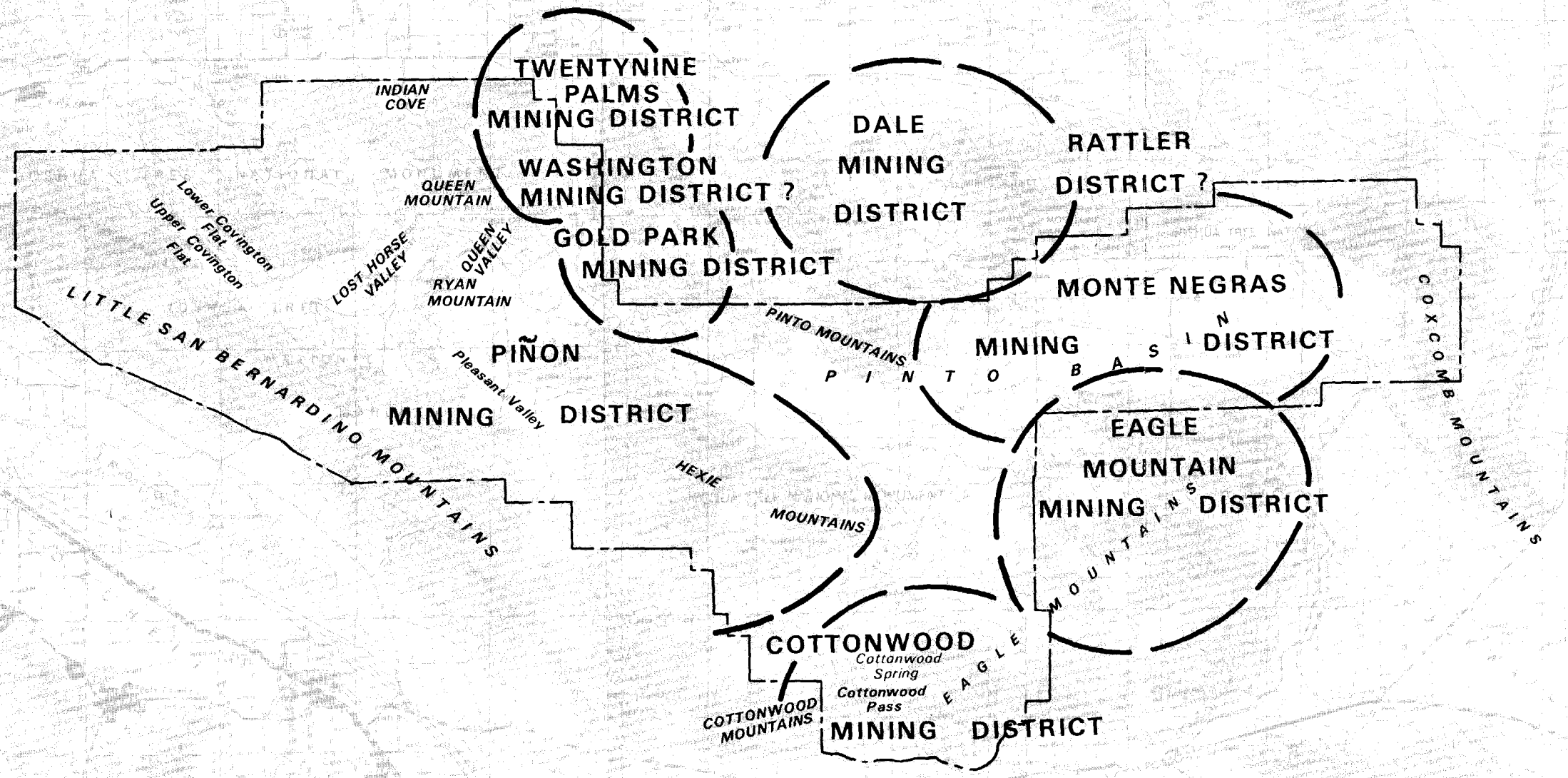
Illustration 13.

Bunkhouse, Ryan ranch, 1983. Main house in background. NPS photo by Linda W. Greene.



Illustration 14.

Interior of bunkhouse, 1983.
NPS photo by Linda W. Greene.



ON MICROFILM

MINING DISTRICTS

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25012

IV. Mining in Joshua Tree National Monument

A. Twentynine Palms Mining District

1. History

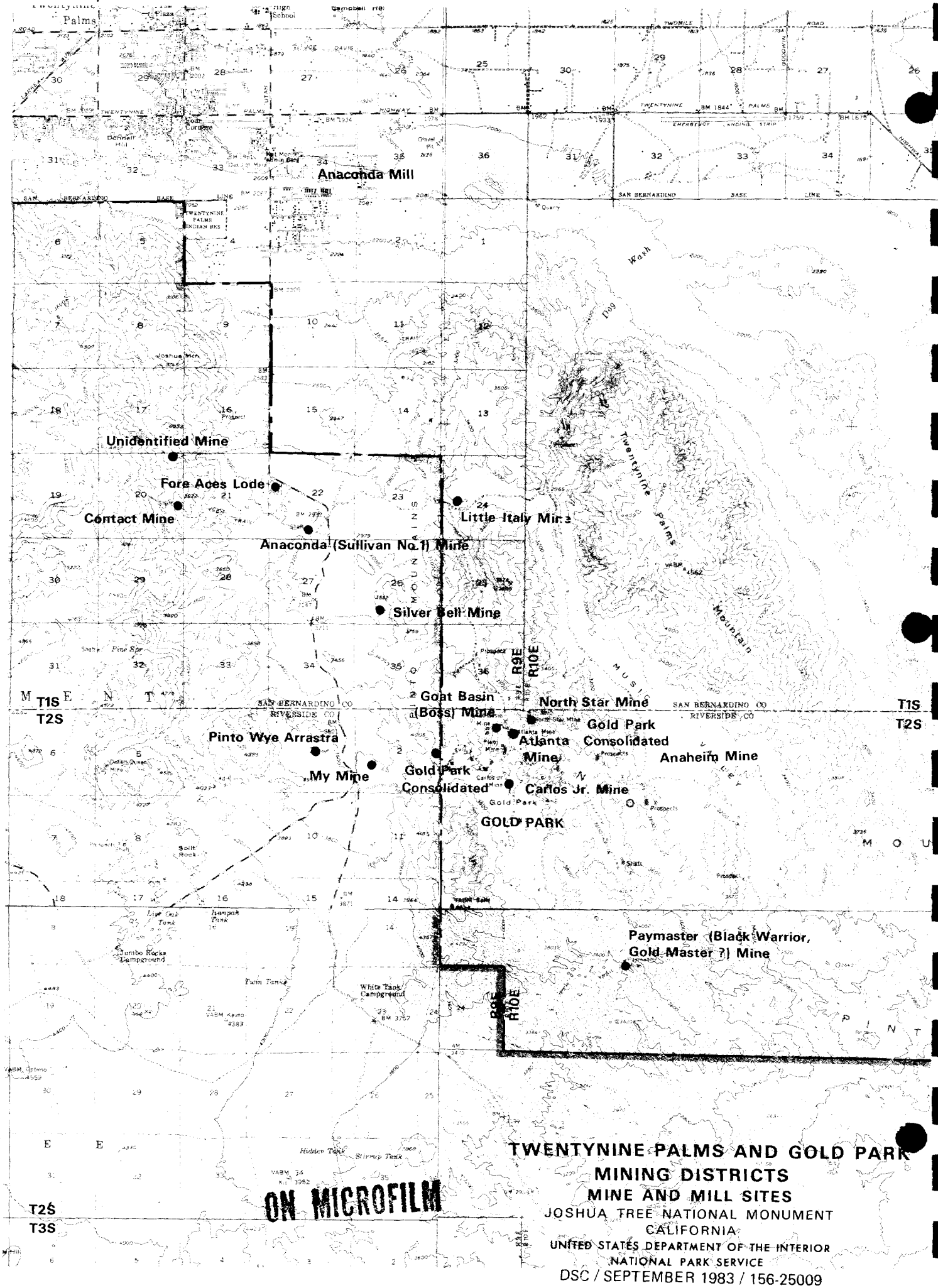
About the time cattlemen were moving into the monument, prospectors also entered. Bypassed by the Forty-Niners heading for the Mother Lode country, the desert regions of southern California offered a rich new field to later arrivals. In 1865 the first claim within the monument was filed--the Jeff Davis in Rattlesnake Canyon, then referred to as Lone Valley. The first known discoveries near Twentynine Palms were made by Dave Gowen and Joseph Voshay in early 1873. The Gowen Mine was south of Twentynine Palms and the Blue Jay north of town, supposedly in T2N, R9E. Several other mines were located south of the Gowen Mine in an area that later developed into the Gold Park mining camp. By October 1873 two arrastras were operating near the oasis. A stamp mill was installed a year later. Because of its water supply, the oasis at Twentynine Palms served as the base camp for the Palms Mining District. Other claims in the district were the Valentine, Hornet, Peru, Eagle, Cora, California, Frying Pan, and the Poor Man.[1] By 1883 activity at the oasis had waned as miners moved on to other locations. Abandoned mills and equipment remained in the area for several years afterward as evidence of its brief mining flurry.

The California state mineralogist in 1890 described the Twentynine Palms Mining District, adjoining the Morongo District on the east, as including

> the greater portion of T 1,2, and 3N., R.8,9, and 10 E. . . . There are many metalliferous lodes in this district, the most of them gold-bearing. They are rather narrow, ranging from one

---

1. Larry M. Vredenburgh, Gary L. Shumway, and Russell D. Hartill, Desert Fever: An Overview of Mining in the California Desert (Canoga Park, Ca.: Living West Press, 1981), pp. 138-40; Ronald Dean Miller, Mines of the High Desert (Glendale, Ca.: La Siesta Press, 1968), p. 9.



TWENTYNINE PALMS AND GOLD PARK MINING DISTRICTS

MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25009

ON MICROFILM

> to three feet in thickness. While a good many of these lodes have been somewhat prospected, but little deep work has been done. Some of the ore worked by arrastras yielded as high as $100 per ton, and nearly all of that worked by the two small mills in the district has been of high grade.
>
> This district being well out in the desert, neither wood nor water is in large supply. There are, however, several large springs in the vicinity. . . .
>
> Although mineral-bearing lodes are known to exist east of this locality, no mining districts have as yet been organized in that direction.[2]

By this time gold production had started in the Dale Mining District farther east, but owners of claims near Twentynine Palms were also still at work developing their properties.[3] In 1895 mention was made of the Pinther, Price & Burnap Mining and Milling Company, which, with a paid-up capital of two million dollars, owned the San Bernardino, Two Gilberts, Ellery, Sophia Pinther, Going, Price, and other mines near Twentynine Palms within ten miles of the Desert Queen Mine. "Arrangements are being made to bring water on the properties when the mills purchased will be erected and work commenced. There are several

---

2. California State Mining Bureau, Tenth Annual Report of the State Mineralogist, for the year ending December 1, 1890 (Sacramento: State Office, 1890), p. 526. The Ninth Annual Report of the State Mineralogist, for the year ending December 1, 1889 (Sacramento: State Office, 1890) states that the district comprised T1N, R8E; T1N, R9E; T1N, R10E; T1N, R11E; T2N, R9E; T2N, R10E; T2N, R11E; T3N, R8E; T3N, R9E. (Sacramento: State Office, 1890), p. 222. Probably T2N, R8E should have been included in this description.

3. Engineering and Mining Journal 49, no. 14 (Apr. 5, 1890): 390.

hundred tons of rich ore now on the dump."[4] The oasis area continued to support low-scale mining activity through the 1890s. The Sam Temple Mine, 2½ miles from the mill at Twentynine Palms, was said to be a rich find with a three-foot-wide vein and high-grade ore. Other prospects in the vicinity also appeared promising.[5]

The most productive period for this district was during the 1890s and early 1900s, though it would again show activity in the 1930s. In many of the reports of the California State Mining Bureau and in the mining journals, the Twentynine Palms Mining District often encompassed the gold mines just south of town that were also often included in the Gold Park and Piñon districts. In this report the later mining activities at Gold Park camp, situated about eight miles south of the oasis, will be described in a separate section on the Gold Park Mining District. Despite promising locations found in this area south of the oasis as early as the 1870s, prospecting first moved farther east, to the barren hills flanking Pinto Basin on the north, as activity around The Palms lessened.

The following are mining properties in the Twentynine Palms District whose location is known and which have been examined and/or evaluated for historical significance.

2. Mine Sites

a) Anaconda Mine (Sullivan No. 1)

According to Bill McHaney, a member of the Washington survey party, Drinkwater by name, first worked the Anaconda

---

4. Ibid. 60, no. 11 (Sept. 14, 1895): 256.

5. Ibid. 64, no. 20 (Nov. 13, 1897), p. 585: Ibid. 65, no. 4 (Jan. 22, 1898): 110.

Mine. McHaney states it was later owned and worked by Mr. Parks.[6] In the spring of 1907 the Anaconda Mine was owned by the Taylor-Sullivan Mining Company, which was negotiating a lease for the claim, on which considerable work had already been done, with Edward M. MacDermott, a Los Angeles mining promoter and stockbroker. The five-year lease was for three claims, three mill sites, and a well.[7] MacDermott and associates evidently comprised the Mohawk-Herald Mining Company. C.W. Roach would be superintendent of operations at the Anaconda, where in the past a small two-stamp mill on the site had been used to process its ore.[8]

A newer mill was deemed necessary, however. By the end of 1908 there was a quartz mill at Twentynine Palms (see Illus. 15), but how complex an operation it was is uncertain. By the fall of 1910 the Anaconda had been developed by a 100-foot-deep shaft. Ore recovered was being sent to the small mill at Twentynine Palms, where about $1,000 per week was being obtained by milling. The mill was being managed by the Mohawk-Herald Company and was a Bryan roller mill capable of treating around twenty tons of ore per day. Plans were being made to add a cyanide capability.[9]

Chase visited the mine camp there around 1919 on his way to Twentynine Palms. Late in the day he describes coming upon

> the grouped shanties of a small mine. . . . I was welcomed heartily by the three men on the place. . . . their supply [of water] must be replenished at Twenty-nine Palms, four miles away. . . .

---

6. McHaney interview, 1933, p. 2. Whether this is the same mine is unknown. Interview with E.J. Hunt, Mar. 24, 1981, in JTNM Fact File.

7. San Bernardino (Ca.) Daily Sun, Apr. 6, 1907.

8. Ibid., July 12, 1907.

9. Engineering and Mining Journal 90, no. 13 (Sept. 24, 1910): 600. See picture of Anaconda mill in 1916 in Miller, Mines of the High Desert, p. 28.

> The six men who were concerned in developing the mine had formed themselves into two shifts of three a side, taking alternate spells at the works and "inside" (the term used by desert men to signify the cities and the coast country). . . .
>
> Evening was coming on, so I soon took the road. Tracks led off to other small mines, reminders of the lively days of the seventies, when this Twenty-nine Palms district was a "camp" of renown. . . .[10]

By 1922 the Anaconda Gold Mining Company had been issued a permit by the Corporation Commission to sell 24,995 shares of stock at 50¢ per share. The company held six unpatented claims in the "29 Palms Mining District." Principal workings consisted of an old shaft 185 feet deep, and 185 feet of tunnel on the Anaconda claim. Ore was found in small lenses. The company hoped to open up enough commercial-grade ore to justify erection of a (larger?) milling plant.[11]

In 1930 P.T. Sullivan of Twentynine Palms was listed as owner of the Anaconda Mine. Sullivan owned four claims on which were two shafts, one 100 feet deep and the other 185 feet. Although idle at that time, the mine had produced $10,000 worth of ore.[12] Harry Boling may have worked with Sullivan on this property.

---

10. Chase, California Desert Trails, p. 149.

11. California State Mining Bureau, Report XVIII of the State Mineralogist covering Mining in California and the Activities of the State Mining Bureau During 1922 (Sacramento: State Printing Office, 1923), p. 265.

12. State of California, Department of Natural Resources, Division of Mines, Report XXVI of the State Mineralogist Covering Activities of the Division of Mines Including the Geologic Branch (Sacramento: State Printing Office, 1930), p. 222. Phil T. Sullivan homesteaded in the Twentynine Palms region, arriving about 1897 or 1898.

A 1953 report mentioned the Sullivan No. 1 (Anaconda) Mine in Sections 22 and 27, T1S, R9E, SBM, owned by E.M. Reimiller of Twentynine Palms. The two shafts on the idle property were 100 and 212 feet deep.[13]

b) Contact Mine

Bill McHaney stated that in 1910 he and Phil Sullivan built an arrastra near The Palms to work ore from Sullivan's Contact Mine. A June 25, 1941, report of the Division of Investigations stated that the Contact and Contact No. 2 lode mining claims had been located July 1, 1923, that the property had been active for several years, and that gold and silver ore was being mined, shipped, and milled at a substantial profit.[14] In 1953 the Contact Mine, in Section 20, T1S, R9E, SBM, was owned by E.M. Reimiller of Twentynine Palms. It had been explored by a 50-foot open cut and a 150-foot shaft, with a drift on the 50-foot level. Selected ore was treated by amalgamation and reportedly yielded seventy dollars per ton. Idle then, it had been operated from 1933 to 1935 and in 1940.[15]

c) Fore Aces Lode

Nothing is known about the early history of this apparently minor operation.

d) Silver Bell Mine

Phil Sullivan was also involved with this mine, whose legal history and descriptions are confusing and full of discrepancies, due primarily to the fact that this township was not surveyed until 1933. On

---

13. State of California, Department of Natural Resources, Division of Mines, California Journal of Mines and Geology 49, nos. 1 and 2 (Jan.-Apr. 1953): 58.

14. McHaney interview, March 1933, p. 2; JTNM Fact File.

15. California Journal of Mines and Geology, Jan.-Apr. 1953, p. 30.

July 1, 1923, Sullivan and Albert Vivian filed on the Silver Bell, "1½ miles South Easterly from Anaconda Mine," in Sections 27 and 34. This location was later declared null and void. Then on September 20, 1930, Sullivan and H.Y. Boling located a Silver Bell Mine (or Lode) in Section 34. According to the owners there was only one Silver Bell with several relocations. This mine was located as a quartz claim and operated in hopes of finding gold. It was leased from Sullivan and Boling about 1933-34 by a man named Rowland. In the 1940s it was operated as a lead mine. The Silver Bell Mine was found not to be in either Section 27 or 34, but in the SW¼ of Section 26, T1S, R9E, SBB&M. A Silver Bell Mine, in Section 21, was first filed on on July 10, 1913, by F.W. Fox. A last location notice, for both the Phyllis Lode and Silver Bell Lode, both in Section 34, was filed on March 7, 1932, by P.A. Kennedy, C.H. Shepard, and Earl Forrey.[16]

e) Mymine (My Mine)

This mine, in the NW¼, Section 2, T2S, R9E, was filed on on May 9, 1936, by Dr. John J. Smith of Santa Monica, California. The claim is a few hundred yards east of and overlooking the main Twentynine Palms entrance road and one-half mile northwest of the Pinto Wye utility area. Development at the gold mine consisted of little beyond an eleven-foot shaft.[17] It was still being worked in December 1950.

3. Mill Sites

a) Pinto Wye Arrastra

Construction history of this millsite in Section 3, T2S, R9E, is unknown. Willis Keys, when asked if he knew the arrastra's origin, declared his unfamiliarity with it, but stated that

16. Frank R. Givens, Custodian, JTNM, Memorandum for the Regional Director, Region Four, Dec. 3, 1947, WRO files, NPS, San Francisco, Ca.

17. Frank R. Givens, Custodian, JTNM, Memorandum for the Regional Director, Region Four, June 9, 1948, Central Files, 1907-49, RG 79, NA.

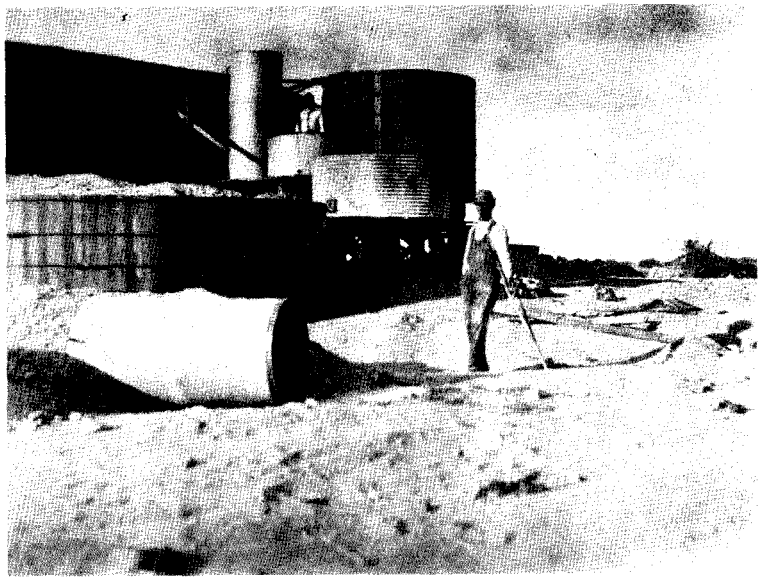
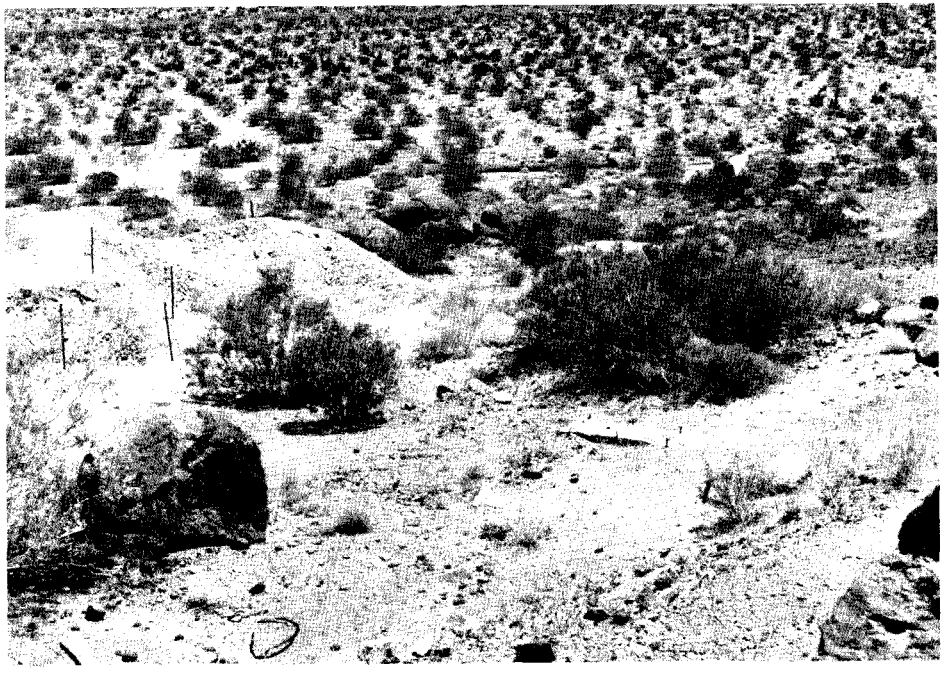


Illustration 15 (left).
Anaconda mill at Twentynine Palms, 1916. Courtesy JTNM.

Illustration 16 (bottom left).
Anaconda (Sullivan No. 1) Mine. Note road leading to workings from Utah Trail.

Illustration 17 (bottom right).
Anaconda Mine. Shaft on ridge northeast of main working that has been sealed with a metal grate. NPS photos by Linda W. Greene





"Big Johnny Wilson" had an arrastra back in that area somewhere "years ago."[18] The arrastra is possibly associated with a nearby prospect hole, located on the hillside above. A claim marker on the site identifies this as the AED lode mining claim, located May 16, 1954, and filed on by Arnold M., Edna (Ed?), and Don M. Benito of Twentynine Palms.

4. Evaluation of Resources and Recommendations

a) Mine Sites

(1) Anaconda Mine (Sullivan No. 1)

This mine area is about 1½ miles south of the monument boundary and about ¼ mile west of the monument road that leads south from Twentynine Palms. Visible from Utah Trail Highway are dumps associated with several filled and roped-off shafts on the east side of a small ridge. Above these shafts are some concrete machinery pilings. It appears as if this entire area, including the ridge and a small knoll about 1/8 mile northeast have been prospected, although whether all this work was done at the same time is not known. An ore shaft on the knoll was grated during mine safing operations. In addition to shafts and prospect holes, an archeologist investigating the site found a semi-dugout habitation or office ruin near the main mining area. The structure had apparently burned.

Although the archeologist investigating this site felt it was eligible for nomination to the National Register, this writer disagrees.[19] There are not enough significant artifacts, structures, or other features on site to warrant detailed or extensive physical analysis. While it is true that any mining site has the potential to yield some interesting information on lifestyles or technology, some discrimination has

---

18. Reino Clark and Don Black interview with Willis Keys, while touring Keys Ranch, March 1975, transcript on file at JTNM, p. 25.

19. United States, Department of the Interior, National Park Service, Kay Simpson, The Joshua Tree Road Improvements Project (Tucson: Western Archeological Center, 1981), p. 44.

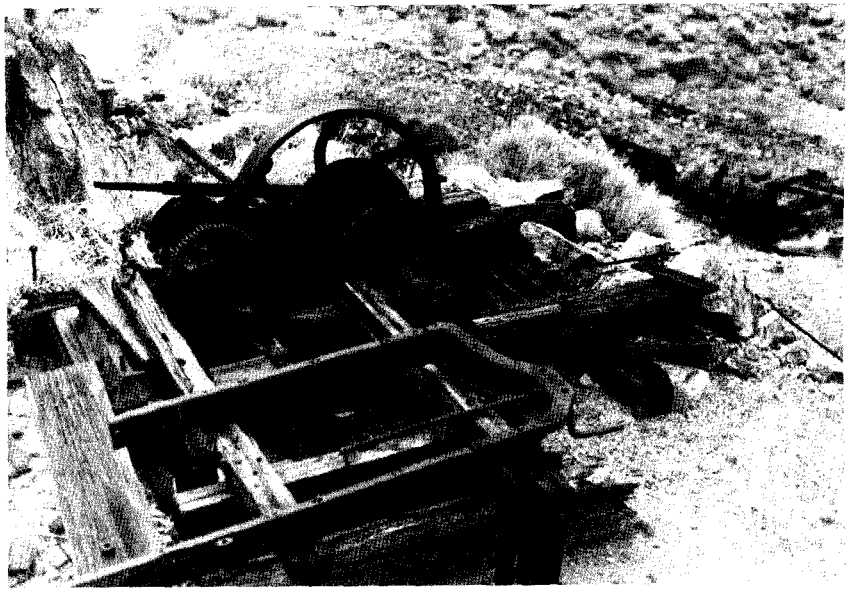
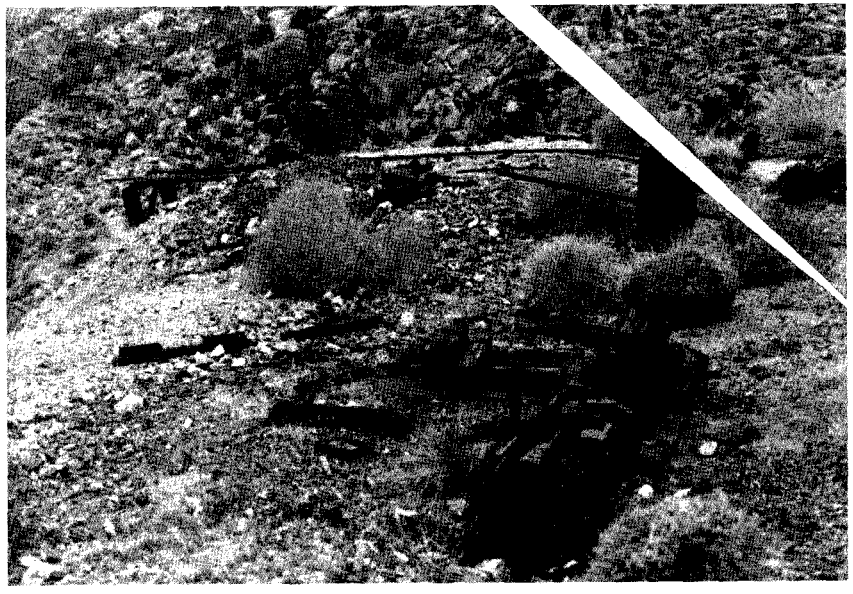
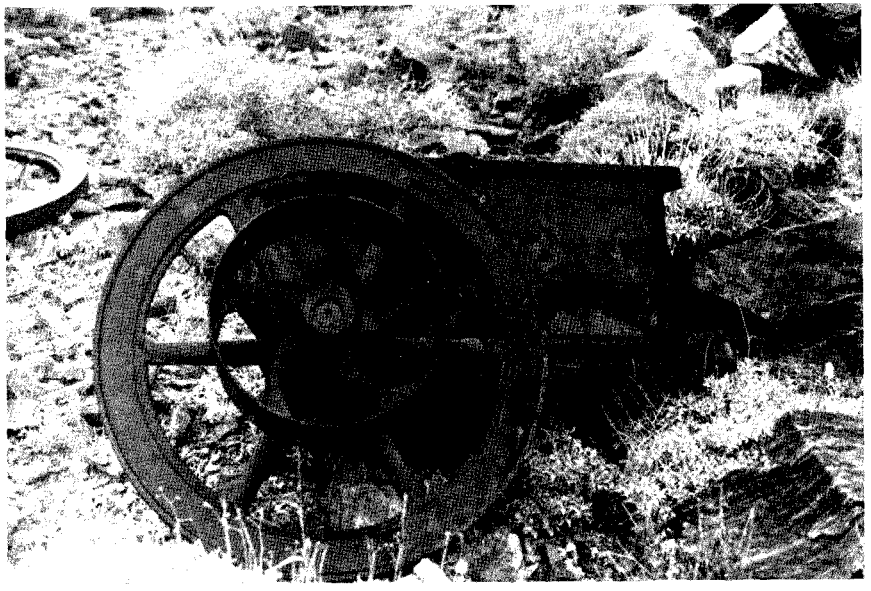


Illustration 18 (left).
Winch at Contact Mine, 1983.

Illustration 19 (bottom left).
Site of generator, Contact Mine.

Illustration 20 (bottom right).
Pulley and flywheel; generator cover that has fallen down hill at Contact Mine. NPS photos by Linda W. Greene.





to be made in selecting sites for investigation, especially in an area that offers several such opportunities. This mine does not have historical integrity or significance. Any machinery that might have been left on site when operations ceased has since been carted off. The mill associated with this operation was not located at this site. Documentation on the mine's operation is also sketchy, with no indication that varied technological processes were ever introduced here. The property was only an intermittent producer. It is recommended the site be left to benign neglect.

(2) Contact Mine

The Contact Mine was visited during inspections of hazardous mines in the monument made in the early 1970s. Found at the site were old mining and hoisting equipment and sloping shafts in excess of twenty-five feet dug along the ore vein. Another survey trip was made by this writer in February 1983. The road to the mine area takes off to the west about ½ mile south of the Twentynine Palms entrance. A jeep trail that is barely discernible in its early stages through the flats, the access road is shored with rock walls as it curves for about 1¼ miles along the east-facing slope of the ridges. Little is left from the mining operations, although there is some machinery on site, consisting of a winch above one vertical shaft, and a generator. Vestiges of a tram track remain in place on the tailings dump. Located just below the workings, the wooden mine cabin has collapsed.

The Contact Mine is not considered to be of historical significance. Although hoisting equipment is still in place, it is not considered to be of particular techological importance or interpretive value. The machinery left on site has been photographed and recorded. The one open shaft and the exploratory cuts made along the vein pose a potential safety hazard. The main shaft is timbered, which might aid escape if a careless visitor fell in. It is doubtful that visitation is frequent, because the unimproved dirt track leading from the main monument road is very difficult to find and the better road through the mountains is hidden from view from the paved road unless one knows



Illustration 21.

My Mine. Tunnel and covered shaft in background, stone-walled shelter with collapsing roof to right, 1983. NPS photo by Linda W. Greene.

exactly where to look. It is recommended the site be left to natural decay.

(3) Fore Aces Lode

This open shaft near the Anaconda Mine is in the northeast quarter of Section 21, T1S, R9E.

(4) Silver Bell Mine

This mine was not visited by the writer. Faint traces of a trail can be seen leading east into the mountains from the main monument road although no access is shown on the U.S.G.S. Twentynine Palms quad map.

(5) Mymine (My Mine)

Mymine is located at the top of the north-facing slope of the small knoll about one-eighth of a mile northeast of the Pinto Wye intersection. When it was visited in connection with mine safing operations in 1967, several pieces of mining equipment that were thought to be of historical interest were found. Miscellaneous tools and supplies were stored in the small shack near the main shaft and an ore cart was still in place on the tram track system. The cabin, used for living and storage, was in reasonable shape. Another survey of the mine area was made in February 1983. The main tunnel was closed with a wooden door while an iron drop door covered the shaft. Tram tracks leading from the shaft or tunnel to the tailings dump were still in place. The ore cart was gone. North-northeast of the main shaft about fifty feet is a smaller one that has been filled in. The cabin outside the tunnel entrance on the north is rapidly falling apart. Its walls are composed of rock, wood, and chickenwire; its roof was covered with a layer of dirt and stone several inches thick, but is now falling through. No tools or artifacts of any significance were found.

This site appears to have no historical significance. Its proximity to the Pinto Wye arrastra poses some question as to whether ore from this site might have been processed there, but no data has been found to substantiate such a theory. No mining artifacts



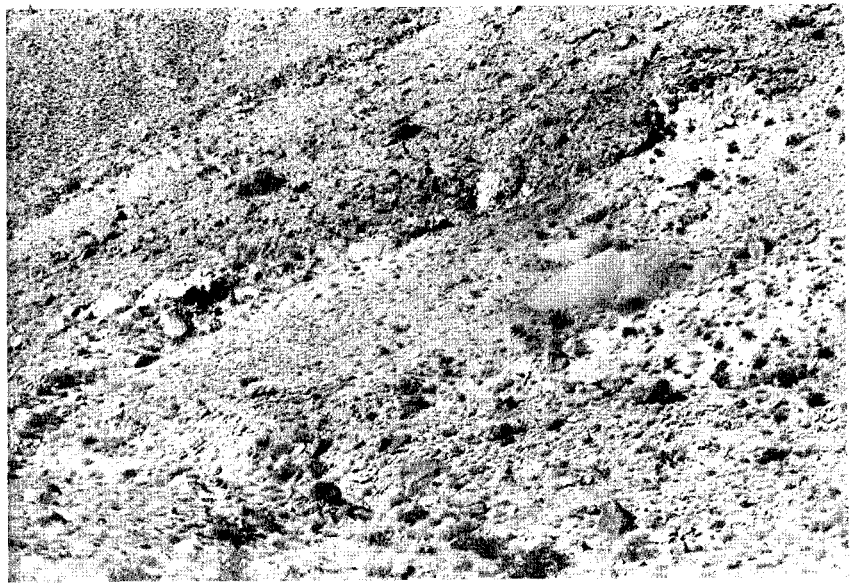




Illustration 22 (top left).
Shored rubble road leading from Utah Trail to unidentified mine in Section 17, T1S, R9E, 1982.

Illustration 23 (top right).
Adits on hillside to right, building ruins lower down.

Illustration 24 (left).
Rock wall foundations for cabins, two levels. NPS photos by Linda W. Greene.

of interpretive significance were found. The site's proximity to the road and the fact that one cut associated with the mine is visible to passers-by has undoubtedly led to exploration of the area and probably some removal of items. No danger exists at the site due to mine safetying operations. It is recommended the site be left to natural deterioration.

(6) Unidentified Mine in SE¼, Section 17, T1S, R9E

This site is located at the end of a 1½-mile-long road taking off west into the mountains from Utah Trail Highway about 1/8 mile north of the Twentynine Palms entrance to the monument. It would appear the mine was worked seriously for some period of time because of the physical efforts exerted in building the road and shoring it up in many places. (This road is not passable by vehicle.) The wagon road ultimately turns into a trail following along the side of a wash. Up in the hills at the end of the wash is a two-level cabin or tent site. The amount of wood lying around strongly indicates there were wooden structures there. Much tin can and metal refuse lies strewn around, as well as thick purple glass fragments and remains of pottery dishes. Above the habitation site are large dumps and two adits, one caved in and the other going back about 300 feet into the hillside. Outside the latter tunnel a platform area has been cleared and outlined with rocks. It is bare and measures about twenty-six feet across. Neither the name of this mine operation nor its ownership record or dates of operation are known. A general guess as to the time period involved would be 1890 to 1917.

Because no historical information has been found relevant to this mine, the writer can only say it has no known historical significance. No artifactual material was seen of scientific or historical worth. The site does not appear to warrant investigation by historical archeologists due to the small size of the site and lack of complexity of its mining operation. It is recommended the site be left to natural deterioration.

b) Mill Sites

(1) Pinto Wye Arrastra

The arrastra structure near Pinto Wye is in excellent physical condition. The center wagon wheel--the main pivot mechanism for the operation--shows little deterioration from weather or vandals. Contributing to the site's lack of visitation is the fact that no visible trail exists to the site and its existence is known by very few people. The mill's one-foot-high rock walls, chinked with a crude cement mortar, are intact. Some floor stones appear to be missing or covered with sand. The drag channel is about 2½ feet across. In the edge facing the wash on the west is the exit hole where the gold-carrying slush was conveyed through a square wooden drain pipe (still in place) into what appears to be a concrete basin settling pond, measuring about twelve by four feet. Four dragstones are present that hung from the four wooden timbers that rotated on the pivot. It is probable the arrastra was mule or horse operated, there being no evidence of mechanization.

Only one other "wagon wheel" arrastra is known to have been found on a National Park Service property, and that was at Arrastra Spring in Lake Mead National Recreation Area. The use of arrastras in the nineteenth-century West is well documented, the Western Regional Office possessing a good compilation of materials from mining journals and other historical sources on the subject to which NPS examples may be compared as they are found and recorded. Several arrastras were used in the Joshua Tree National Monument area, but this is the only one of this type found. Several arrastras are known now to exist in parks in this region, ranging from small, crude mills in which the ore was crushed by dragstones probably pushed around by human labor, to larger ones such as that at Pinto Wye probably run by animal power, a mechanized one at the site of the Desert Queen Mill at Keys Ranch, and a 1930s example run by steam power in Warm Spring Canyon, Death Valley National Monument.

This arrastra is considered to be regionally significant as the only wagon wheel arrastra yet found possessing



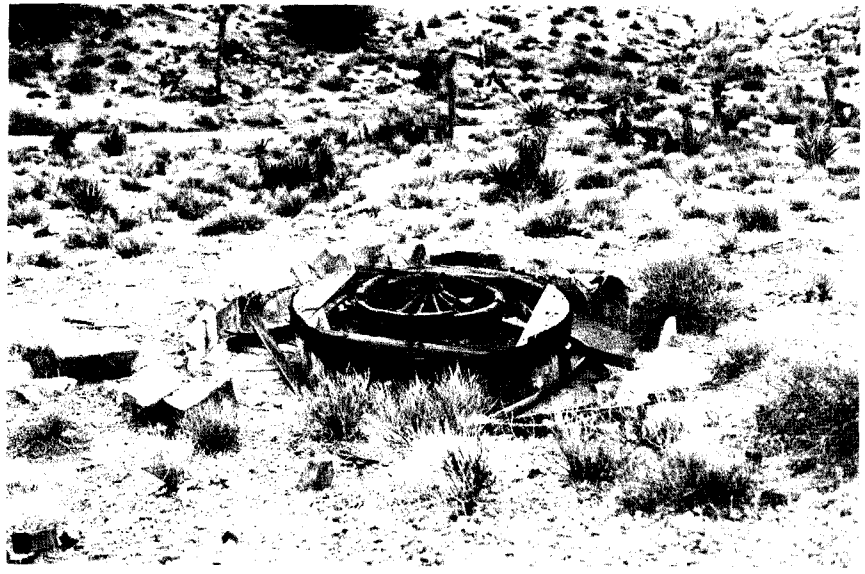


Illustration 25 (left).
Pinto Wye arrastra is in center of picture, mine and waste dump on hillside above, 1976, view to northeast.

Illustration 26 (above).
Pinto Wye arrastra, looking down toward wash, 1976. NPS photos by Gordon S. Chappell.

integrity of location and construction. The wheel arrastra at Lake Mead was not as elaborate a design and was badly eroded in its original location, similar to this one, on the side of a wash. That mill, however, was later dug up and ultimately reconstructed at the visitor center. This is an important example of a nineteenth- and early twentieth-century milling technique and would be a valid subject for both historical and industrial archeology. Several questions relevant to the site still need to be answered. The only nearby water source to supply the arrastra is the wash at the bottom of the hill, which is now dry. Was water transported in? What was the source of ore treated here? Little mining appears to have been carried on in the adit on the hillside above. Was this a custom mill operation, serving perhaps Mymine, the Anaconda, or the Silver Bell claims? Data was found that C.A. Benito of Twentynine Palms leased (or owned) the Golden Bell (Blue Bell) Mine farther south off the Pinto Basin Road from 1954 to 1957 and evidently performed some cleanup work. Assuming he was related to the AED claim locators, possibly he brought ore up to this arrastra to be worked during those years. The excellent condition of the mill might suggest the builder had high hopes for rich discoveries but ultimately barely used the arrastra. Archeologists should be able to determine if other structures existed in the area, making this a more complex operation than it now appears.

Preservation of the wheel requires treatment of wood and metal parts with preservative. The site should be protected by monument staff and checked periodically for signs of vandalism or severe weathering. An interpretive sign could be placed near the tunnel uphill from the arrastra. The site will be nominated to the National Register of Historic Places.

B. Dale Mining District

1. History

Around 1883 Lew Curtis discovered placer gold east of Twentynine Palms and started a rush that for a while drew attention from the Twentynine Palms oasis. The deposit he found lay near the south

boundary of San Bernardino County within the canyons that drained into the northern end of Pinto Basin. At Burt's Dry Lake (later Dale Dry Lake), about fifteen miles east of Twentynine Palms, John Burt dug a well and built an arrastra to mill the cemented gravel. Placer operations proved profitable, and soon the town of Virginia Dale, later abbreviated to Dale, grew up at this spot, near the present intersection of Highway 62 and the Gold Crown Road. Its population reportedly reached close to one thousand people, most living in tents that could be easily moved. As placering gave out and lode deposits were discovered in the Pinto Mountains, the miners moved closer to them, and another town called Dale the Second, about 4½ miles farther south on the Gold Crown Road, replaced the earlier community. By 1915 Old Dale had almost disappeared.

The first major quartz mine in the new district was the Virginia Dale, discovered in 1885 by Tom B. Lyons and John (Chuckwalla) Wilson. The Virginia Dale Mining Company began operating in 1886. Water was piped to the mine from the well at Old Dale and both mining and milling operations were established. A five-stamp mill was erected on the property in 1887, but due to the high costs of mining and milling, operations were suspended in 1889. By 1894 the mine was idle. The first five-stamp mill at the mine was buried in a sandstorm in 1896;[20] that summer another five-stamp mill was moved there from the oasis and work actively commenced on six claims.

The Supply Mine, richest and most extensive in the district, was located about two miles farther south along the Gold Crown Road. Its discovery around the turn of the century caused the area's population center to move even farther southeast, off the Gold Crown

---

20. Engineering and Mining Journal 61, no. 13 (Mar. 28, 1896): 308.

Road about one-half mile from the Supply Mine side road, and then east one mile. This spot became Dale the Third (New Dale). This town probably had the largest population of the three, for the Supply Mine was a big producer, operating until about 1915. Extensive mining facilities were set up on the mountain overlooking the town. The most profitable operations took place during 1914, when the mine was operated by the United Greenwater Copper Company, headed by financier Charles Schwab. In 1931 the Supply had a 100-ton-capacity mill including a crusher and cyanide plant. Both the Supply and Virginia Dale were worked intermittently until shortly before World War II. By 1942 the Supply Group had produced about one million dollars in gold.

The Brooklyn Mine, on the border between San Bernardino and Riverside counties, and the O.K. Mine were discovered in the early 1890s by John Burt, who, along with F. Botsford, worked them until 1899. In 1896 the O.K. (McKinley Bill) quartz mine had been developed by two shafts sunk on the vein. By 1898 the operators had a two-stamp mill at Dale and were erecting a cyanide plant.[21] (The mill was moved in 1900 to the mine to decrease expenses of hauling ore.) In the early 1900s the O.K. was taken over by the Seal of Gold Mining Company. The Brooklyn Mining Company was formed in 1901 and was active until 1916. Water for milling purposes was hauled to the mine from Cottonwood Spring until a pipeline was finally laid from Dale Lake. In 1905 the Brooklyn had two three-stamp mills. In 1912 the United Greenwater Copper Company took out a forty-nine-year lease with an attached option price of two million dollars for the O.K. and Supply groups of mining claims.[22]

---

21. Ibid. 66, no. 21 (Nov. 19, 1898), p. 615; California State Mining Bureau, Thirteenth Report (Third Biennial) of the State Mineralogist for the two years ending September 15, 1896 (Sacramento: State Office, 1896), p. 313.

22. "Landwehr Figures in $2,000,000 Deal," Riverside (Ca.) Daily Press, Oct. 28, 1912.

Schwab hired large crews with the full intent of spending several hundred thousand dollars opening up his properties, and it was planned that Dale would become a substantial mining town. By 1914 considerable progress in mining activity had been made in the district as a direct result of Schwab's interest in the area. The Brooklyn was operated intermittently into the 1930s. In 1931 it had a three-stamp mill; by 1934 its operations were confined to treating tailings.

The Virginia Dale District, centered in T1S, R12E, although discovered in the 1880s, was not very productive until the 1890s. In 1894 the Engineering and Mining Journal reported that

> there are a number of mining districts in that region lying between the Atlantic & Pacific and the Southern Pacific roads, which require capital and energy, with experienced management. The mines are there, but wood and water are absent. Water can usually be obtained by sinking in the dry washes, and petroleum is looked to for fuel. . . . All of the mines will be worked in the future and a large amount of gold produced. The districts are Twenty-nine Palms, Virginia Dale, Monte Negras and Eagle Mountain. The veins are from one to four feet wide and the ore is high grade. . . .[23]

In 1899 the Dale District was described as producing over six thousand dollars a month despite the current high cost of operating. A milling center, ore was hauled there from a number of mines within a few miles radius.[24] By 1902 the miners of the area had abandoned the name Virginia Dale Mining District and formed the Dale District, with the same boundaries. The town and post office of Dale were moved to near

---

23. 57, no. 19 (May 12, 1894): 445.

24. Ekman et al., Old Mines and Ghost Camps of California, p. 141.

the O.K. Mine. Stages ran from Palm Springs once a week. The district saw moderate activity in the early 1900s and 1920s. In early 1910 there were four producing mines in the district and thirty-five stamps at work.[25] Roads were a major impediment to progress in this mining district. In the early days four- and six-horse teams and mule outfits hauled lumber, machinery, and supplies to the mines, a long and arduous trip. Even when trucks were being used later, the roads were primitive and often caused breakdowns. A major part of this problem was that at first the roads were not maintained by the county and depended for repair on those who used them.

The state mining report for 1915-16 stated that during the previous five or six years more active and systematic mining work had been carried on. Several properties were operating, extending over eight or ten square miles. The main properties being worked, however, were confined to an area of about four square miles. Principal mines were the Supply Group, O.K. Group, Brooklyn, Virginia Dale, Ivanhoe, Carlisle, Leota(i), and Bon Ton. Since cessation of work by the United Greenwater Copper Company in 1915, very little actual mining had been done in the district other than assessment.[26] A visitor to the Twentynine Palms area in 1926 was told that the old ghost town of Dale was again being populated, "that the Aladdin mine in a nearby canyon has been reopened, and the old buildings at Dale are being moved to this new location."[27] In 1927 it was reported that satisfactory progress was being made in the development and operation of the Supply Mine of the

---

25. Engineering and Mining Journal 89, no. 9 (Feb. 26, 1910): 485.

26. California State Mining Bureau, Report XV of the State Mineralogist, Mines and Mineral Resources of Portions of California, Chapters of State Mineralogist's Report, Biennial Period 1915-16 (Sacramento: State Printing Office, 1919), pp. 801-3.

27. Fred R. Archer, "Monuments of the Gods," Touring Topics (December 1926), p. 20.

Arrowhead Development Company in the Dale District. Drifting in the Jean shaft was opening up quantities of gold ore.[28] Most properties in the Dale District fared badly during World War II. Few watchmen remained on duty, leaving valuable mill properties vulnerable to scavenging by scrap metal collectors.

2. Mine Sites

Mining activity increased in the 1930s when the Great Depression hit. When Joshua Tree National Monument was established on August 10, 1936, it was noted that this newest national monument included within its boundaries the principal mineral sections of Riverside County. At the time of the park's establishment, the Virginia Dale Mining District was very active. A number of properties were being developed because of the fifty-ton cyanide plant of the Gold Crown Mining Company, on the boundary line of San Bernardino and Riverside counties, that was then operating at full capacity. In the latter part of the 1930s (ca. 1938), after the monument had been established, several properties were still operating. A synopsis of these sites and their status at that time is presented below. Although most of them are north of the monument boundary, many of their owners and their milling facilities were involved with mining operations farther south.

a) Gold Crown Mine

Situated in Sections 15 and 16, T2S, R12E, this group included twenty-five claim locations. It is in Riverside County, about nine miles south of New Dale and twenty-seven road miles from Twentynine Palms. This property was equipped with a sixty-ton ball mill in 1937 and thirty tons of ore per day were being mined and milled from the Lureman (Lorman) Mine in T1S, R12E. Ores from other adjacent mines were also being treated on a custom basis at the Gold Crown mill.[29] In the 1930s the owner of the property was the Gold Crown Mining Company, based in Los Angeles. The same company had a lease and

---

28. Engineering and Mining Journal 124, no. 5 (July 30, 1927): 186.

29. Guthrey to Dir. of Investig., May 6, 1937, p. 11.

bond on the Nightingale Group of six claims and on the Supply Mine, comprising nine patented claims in Section 35, T1N, R11E. This mining company had been operating this particular property since 1929. The Gold Crown Group of claims had been developed by four shafts from 100 to 600 feet in depth. The Supply Mine had been developed by a shaft 1,100 feet deep with 10,000 feet of underground workings. Its production record so far was $500,000. The Nightingale Group had a shaft 250 feet deep. About 20,000 tons of ore had been developed carrying an average value of $18 per ton in gold.

The Gold Crown Mining Company had installed a fifty-ton modern cyanide plant by 1936. Water was brought in a four-inch pipeline from the company's well at New Dale to the mill. Total investment by the company in machinery and development work was more than $150,000. The mill was also operating on a custom basis, which increased mining activity in the district. The property was described at this time as a steady producer of gold bullion that was shipped to the U.S. Mint in San Francisco. Thirty men were employed. The Gold Crown mill was still operating in 1940 (though at a different location, evidently) and employing thirty-five men. By 1943 the mine, which had been operated by the Gold Crown Mining Company from about January 1930 to December 1942, was idle and the fifty-ton cyanide plant had been dismantled. In 1946 a report on the Gold Crown Mine stated that it was operated intermittently from 1926 to 1938 by the Gold Crown Mining Company. The fifty-ton plant had been installed on the property in early 1935 and treated ore from the Gold Crown and Nightingale mines until 1938, when the mill was moved to the Supply and Nightingale mines, the Gold Crown ore bodies having been depleted. The claims held by the Gold Crown Mining Company were abandoned in 1938 and all equipment moved to the Supply Mine.

In 1953 a further report on the Supply (Gold Crown, Jean, Luhrman, Nightingale, and Supply claims) Mine Group appeared. These properties were located in Sections 21, 22, 27, and 28, T1S, R12E, SBM. This report confirmed that the Supply Group, in the course of its operations, had yielded gold ore valued at about one million dollars,

becoming the largest producer in the Dale District. Nearly half this amount came from the Supply Mine when it was operated by the Seal of Gold Mining Company and later the United Greenwater Copper Company, both prior to 1915. The mine was then idle until 1928. The Nightingale became active when its properties were leased by the Gold Crown Mining Company in 1930. Operating until 1942, this mine reportedly yielded over $500,000. Except for minor leasing operations, all these properties had since been idle.[30]

b) Heely & Cross Mine

This property was described as located two miles north of the Gold Crown Mine, and comprised five claims. Development work consisted of an adit 700 feet long. Its ore was being milled at the Gold Crown plant.[31]

c) Star Mine

This group of four claims was situated 3½ miles west of the Gold Crown Mine in T1S, R12E. (The location references for several of these mines are inaccurate). A shaft 100 feet deep had produced ore that was processed in a small mill and crusher.[32]

---

30. "Notes on Mining Activity in Dale Mining District which is Located Partly in San Bernardino and in Riverside Counties, in the Joshua Tree National Monument," no date (probably late 1936 or early 1937), Central Classified Files, 1933-49, RG 79, NA, p. 2; State of California, Dept. of Natural Resources, Division of Mines, California Journal of Mines and Geology (Quarterly Chapter of State Mineralogist's Report XXXVI) (Sacramento: State Printing Office, 1940), p. 63; State of California, Dept. of Natural Resources, Division of Mines, California Journal of Mines and Geology (Quarterly Chapter of State Mineralogist's Report XXXIX) (Sacramento: State Printing Office, 1943), pp. 449-51; State of California, Dept. of Natural Resources, Division of Mines, California Journal of Mines and Geology 41, no. 3 (July 1945) (Quarterly Chapter of State Mineralogist's Report XLI) (Sacramento: State Office, 1946?), p. 130; California Journal of Mines and Geology, Jan.-Apr. 1953, p. 81. According to Lester Spell, the Nightingale and Luhrman mines were the same property. "History of Dale Mining District, California," as told to Susan Moore by Lester Spell, no date, typescript in JTNM files, p. 1.

31. Guthrey to Dir. of Investig., May 6, 1937, p. 18.

32. Ibid.

d) Big Bozo Claim

This location was made March 9, 1937, by Florence Hall Ebert and was situated about one mile south of the Star Mine, in T1S, R12E. A 200-foot-long adit was producing ore averaging $15 per ton in gold.[33]

e) Meek Group

One mile east of the Gold Crown property in T2S, R13E, this mine was developed by an 80-foot-deep shaft.[34]

f) Frank Hill Group

The location of this mine is given as three miles west of the Gold Crown Mine, in T1S, R12E (?). The claims in this group were located April 1, 1933, by Frank Hill. A 130-foot-deep shaft was developed on one of the claims.[35]

g) McKeith Mine

These eight claims, located in 1932 by Roger Dalton and A.V. Zamorano, are described as three miles west of the Gold Crown Mine in T1S, R12E.[36]

h) Lena Mine

This property, one mile south of the McKeith claim, in T1S, R12E, was also located by Dalton and Zamorano in 1932. Development consisted of a 210-foot-deep shaft and two 100-foot-long drifts.[37]

---

33. Ibid.

34. Ibid., p. 17.

35. Ibid., p. 19.

36. Ibid.

37. Ibid.

i) Ivanhoe Mine

Comprising thirteen claims twelve miles east of New Dale, this property was owned by Denny B. Pardo of San Bernardino, California, and under lease and bond to the Sunbeam Mining Company of the same city. The company was installing a twenty-five-ton cyanide plant at New Dale to treat the Ivanhoe ore. The finished plant would employ twenty men. The mine had been developed by a 215-foot-deep shaft with 1,000 feet of lateral development. The average grade of ore was reported to be $15 per ton in gold.[38]

j) Carlyle Mine

These eight claims were located seven miles northeast of New Dale, in Section 11, T1S, R12E, and were owned by the Carlyle Mining Corporation of Beverly Hills, California. Development at the mine consisted of two tunnels--the upper following 1,200 feet along the vein, the lower 1,500 feet long--with 5,000 feet of crosscuts, drifts, and raises. The average grade of ore was $15 per ton in gold and silver. The company had invested about $150,000 in mining and a milling plant. A 2,680-foot-long aerial tram connected the mine and mill. A pumping plant was built on the southwest shore of Dale Dry Lake with a three-inch pipeline to the mill--a modern flotation plant with a capacity of sixty tons every twenty-four hours. Concentrates were produced with a value of $800 to $1,000 per ton. Thirty men were employed. The mine's most active period was between June 1936 and March 1939. It was last operated by a lessee in 1941.[39]

k) Jupiter Mine

These five claims were located seven miles northeast of New Dale, adjoining the Carlyle Mining Company's property. Development consisted of a 200-foot-long tunnel on the vein, with 500 feet

---

38. "Notes on Mining Activity in Dale Mining District," p. 1.

39. Ibid.; California Journal of Mines and Geology, Jan.-Apr. 1953, pp. 73-74.

of drifts, crosscuts, and raises. Some of its ore had been milled by the Carlyle Mining Company and showed a value of $20 per ton. The lessees were planning to ship twenty tons of ore per day to the Gold Crown Mining Company's mill. Ten men were working the mine.[40]

l) O.K. Mine

These five patented claims adjoined the Supply Mine. It had been developed by an 800-foot-deep shaft, with 5,000 feet of underground workings. Six men were employed in extracting the ore, which was shipped to the Gold Crown mill for treatment. Past production from the property amounted to $200,000.[41]

m) Los Angeles-Brooklyn Mines

This group of fifteen claims was owned by the Campbell Gold Lease Company of San Bernardino, and was under lease. The Los Angeles was developed by a 750-foot-deep shaft, with 2,500 feet of underground workings. The Brooklyn group was developed by a 550-foot-long tunnel and 200-foot winze. The two properties had a production record of over $200,000. Ore was hauled to the Gold Crown mill for treatment. Six men were employed.[42]

n) Sunrise Mines (for more detail, see Monte Negras Mining District, Section D)

These forty-four claims were owned by Sunrise Mines, Inc., of San Diego, California. The Sunrise Group was developed by a

---

40. "Notes on Mining Activity in Dale Mining District," p. 1.

41. Ibid., p. 2. This O.K. Mine was patented on Aug. 1, 1936, as the Storm King Group. L.E. Graner to Harold Ickes, Sec. of the Interior, Apr. 11, 1938, Central Classified Files, 1933-49, RG 79, NA. According to Lester Spell, there were two O.K. mines in the Dale Mining District, one about three miles south of the Supply Mine, the other on the north side of Pinto Basin, also referred to as the Goldenrod. "History of Dale Mining District, California," p. 11.

42. "Notes on Mining Activity in Dale Mining District," pp. 2-3.

300-foot-deep shaft. The Zulu Queen Group was developed by a 100-foot-deep shaft with 500 feet of drifts. A twenty-five-ton mill had been built on the Sunrise property. The company drilled a well to a depth of 600 feet, equipped with a pump and 1½-inch (later 4-inch) pipeline running one mile to the mill and camp. The company had invested $50,000 to $75,000 on the property. Ten men were employed on development work.[43]

o) Goldenrod (Golden Rod) Group

This property comprised two lode claims and a mill site and was under lease and bond to the O.K. Mining Company. Development consisted of a 200-foot-deep shaft with 500 feet of drifts. Ore was treated in a mill with a capacity of ten tons per twenty-four-hour period. The company planned installation of a twenty-five-ton cyanide plant. Three men were employed. By 1940 the O.K. Mining Company owned the property and was leasing it to the Pinto Basin Mining Company. Ore was shipped to the Gold Crown Mining Company's mill for treatment. The ten-ton mill on the property consisted of a six-inch by eight-inch jaw crusher, a three-foot by nine-foot Straub ball mill, and two three-foot by five-foot amalgamation plates. Water was hauled from the Lane (Mission) Well in Pinto Basin.[44] The mine was idle in 1945.

p) Mission Gold Mine (Huff and Lane) (for more detail, see Monte Negras Mining District, Section D)

These twenty-one claims in T2S, R12E, were owned by E.C. Huff of Los Angeles. The mine had been developed by shafts,

---

43. Ibid., p. 3. Guthrey also reported on the Sunrise Mine, situated in T3S, R13E. He reported that sixteen claims were being developed. The Sunrise property had a Chilean mill with a capacity of twenty-five tons of ore per day. Guthrey to Dir. of Investig., May 6, 1937, p. 12.

44. "Notes on Mining Activity in Dale Mining District," p. 4; California Journal of Mines and Geology, 1940, pp. 49-50. Guthrey noted that the claims in this group were located July 1, 1931, by E.M. Campbell, Adele Campbell, and John L. Campbell. Guthrey to Dir. of Investig., May 6, 1937, p. 17.

the deepest being 570 feet, with 600 feet of drifts. Mill equipment consisted of a ten-foot arrastra. Three men were employed.[45]

q) Virginia Dale Mine

This property consisted of one mining location and one mill site. The mine had been developed to a depth of 300 feet and operated intermittently since about 1896. A small mill and cyanide plant had been built. The property was reported to have produced more than $200,000.[46] The Virginia Dale was also reported on in the 1950s. At this time seven claims in Section 20, T1S, R11E, SBM, were owned by Harry Hess of Morongo Valley, California. The mine's principal periods of activity had been 1908, 1928-29, and 1934-37. Development consisted at this time of a shaft and drifts. A forty-ton mill on the property treated the ore by amalgamation and cyanidation. Water was pumped five miles from an Old Dale well.[47]

r) Other Mines

Slight information has been found on the

Sunset Group--seven claims one mile west (actually southeast) of Gold Crown Mine. Elevation 2,000 feet. Owned by Jack Meek of Twentynine Palms. Several shallow shafts sunk. Idle in 1929.[48]

---

45. "Notes on Mining Activity in Dale Mining District," p. 4.

46. Guthrey to Dir. of Investig., May 6, 1937, pp. 11-12.

47. California Journal of Mines and Geology, Jan.-Apr. 1953, pp. 83-86.

48. State of California, Dept. of Natural Resources, Division of Mines and Mining, Report XXV of the State Mineralogist Covering Mining in California and the Activities of the Division of Mines and Mining (Sacramento: State Printing Office, 1929), p. 488.

Gypsy Mine--quartz claim four miles west of Virginia Dale. Elevation 1,800 feet. Shaft sunk 115 feet. Drifts. One-stamp mill built on dry lake. Owners in San Bernardino.[49]

Gold Standard Mine (Standard-Duplex)--four claims on south slope of Dale Hills. Tunnels and shafts. Installing two-stamp mill in 1940.[50]

Gold Rose Mine--six claims adjoining Los Angeles Group on southwest. On south slope of Dale Mountains. Elevation 1,700 feet. Mine equipment consists of twenty-five-ton ore bin, Blake crusher, Wheeler ball mill, amalgamating jig and plates, cone tank, and two settling tanks. Six men.[51] Idle in 1943.

Top Nest Mine--Section 7, T1S, R13E. Six claims on east slope of Dale Mountains, three miles northeast of New Dale. Elevation 3,000 feet. Owner, Hayward Lumber Co., Palm Springs, Ca. Adjoins Ivanhoe Group on northwest. Ore loaded into trucks and hauled to Sunrise mill in Pinto Basin for treatment.[52] Idle in 1943.

Additional mines in the area were the Exchequer, Jim Boy Group, June Group, Star King, Iron Age, Capital, Pardo, and North Star Group.

3. Evaluation of Resources and Recommendations

No recommendations are made because all sites are outside the boundaries of Joshua Tree National Monument.

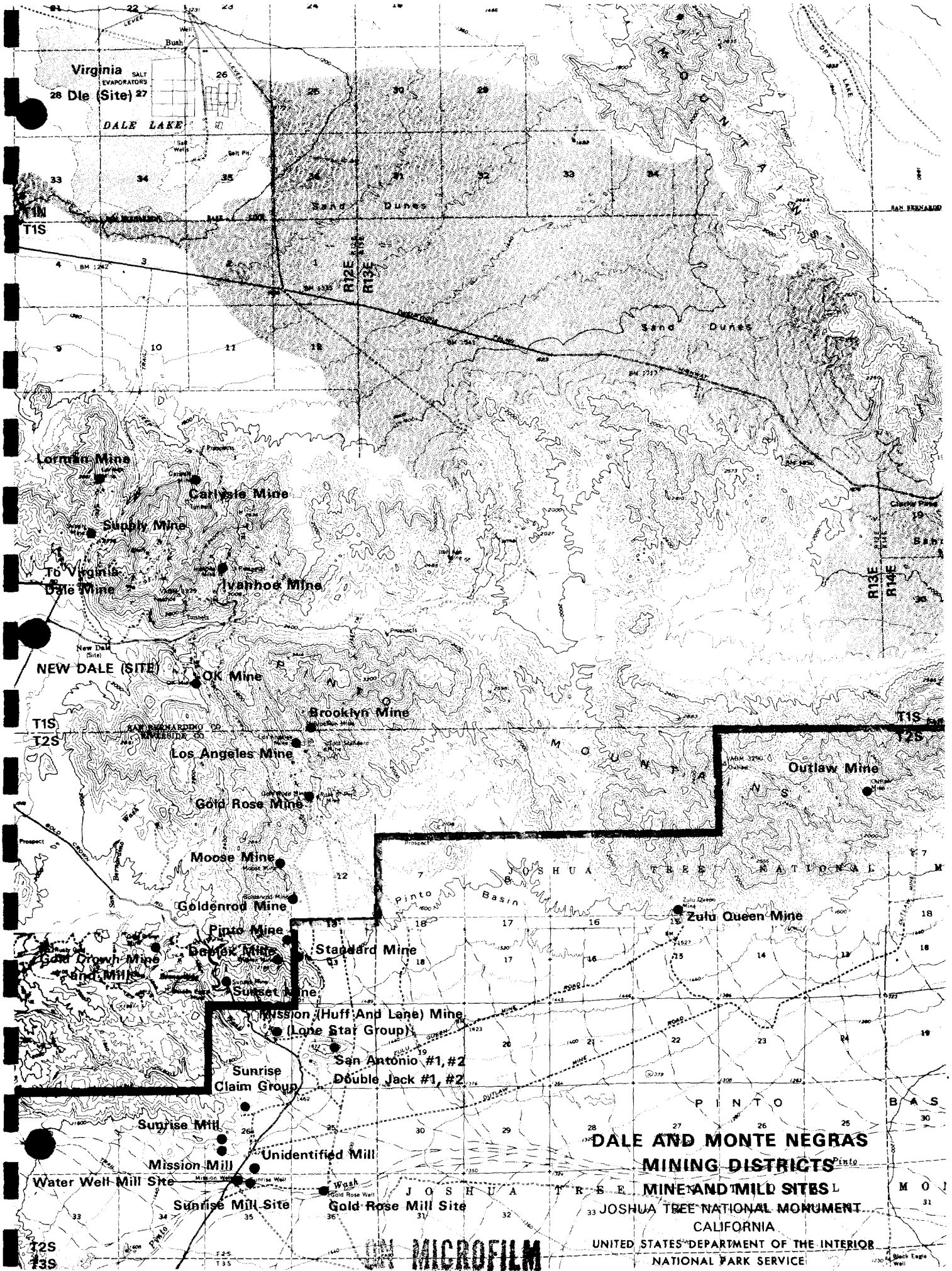
---

49. Thirteenth Report of the State Mineralogist, 1896, p. 311.

50. California Journal of Mines and Geology, 1940, p. 50.

51. Ibid., p. 67.

52. Ibid., p. 79.



DALE AND MONTE NEGRAS MINING DISTRICTS

MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT

CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

DSC / SEPTEMBER 1983 / 156-25008

MICROFILM

C. Rattler Mining District

1. History

The exact boundaries of the early Rattler Mining District were not found by this writer, although it would appear from the few times the name was used that it either included or once designated both the Twentynine Palms and Dale mining districts. An area by this name was referenced in the 1880s:

> Lying off in the desert that occupies the southeastern angle of San Diego County are a number of mining districts, of which the following are the most notable: the Rattler, situated twenty miles east from the locality, on the Southern Pacific Railroad, known as the "Twenty-nine Palms" . . . the Ogilby . . . and the Poorman. . . . These districts contain numerous auriferous veins, some of which have, under extensive working, shown large values. The most of the ore here is, in fact, high grade and easy of reduction. . . .

Further confusing the location of this district, the writer continues:

> Along several of the arroyos here tributary to the Colorado, placers have been worked for many years past. In some of these diggings, dry washing is still practised by the Mexicans. . . . In this part of San Diego County, probably in the Rattler District and near, if not on the very site of, what is now the Cargo Muchacho Mine, was obtained the first gold ever found in California. . . .[53]

The above descriptions suggest that the Rattler District started east of the oasis and stretched east and south along the Colorado River.

---

53. Henry De Groot, "The Mining Resources of Southern California," Overland Monthly IX (Second Series), no. 53 (May 1887): 457-58.

2. Mine Sites

Mine sites possibly once referred to as being in the Rattler District have been discussed here under their later district designations.

3. Mill Sites

On January 15, 1886, a Rattler Mill Site, said to be connected with the Rattler Mine situated in the Rattler District of San Bernardino County, California, was located. It was described as adjoining the Virginia Dale Mill Site and about three miles north of the Virginia Dale Mine and about twenty miles east of Twentynine Palms.[54]

The California state mineralogist, in discussing the mill erected by the Virginia Dale Mining Company in 1887, described the property as located in the Rattler District.[55]

D. Monte Negras Mining District

1. History

The Monte Negras District, in the eastern portion of Joshua Tree National Monument, was organized between 1890 and 1892. It was described as being

> 22 miles northeast of Cottonwood Springs, 16 miles north of Eagle Mountain, and about 6 miles south from Virginia Dale. The belt is about 1½ miles in width and 5 miles in length. The veins trend north and south.
>
> This new district, which has been named the Monte Negras, or Black Mountain District, has attracted considerable attention by

---

54. Book B, Mining Records, San Bernardino County, Hall of Records, San Bernardino, Ca., p. 403.

55. Ninth Annual Report of the State Mineralogist, 1890, p. 238.

the discovery in one of the claims of nuggets of gold and quartz of extreme richness.[56]

The state mineralogist visited the new district in May 1892 and carefully examined the claims and adjacent country. He described the camp as being at an elevation of 1,520 feet on the south side of a range of hills forty-five miles northeast of Walters Station, a stop on the Southern Pacific Railroad. A "fair" desert road led from there to the camp. The report pointed out that wood was not obtainable near the mines and water very scarce, although a well had been sunk in a basin at Virginia Dale, a few miles north.

Principal mines of the district were listed as the Great Eastern, Venus, Columbus, Summit, Porcupine, Schiller, Hillerman, Annie Rooney, Ethel, Republican, Ramona, McKinley Bill, and Revenue. Their ores ranged in value from $20 to over $100 per ton.[57]

Work in the district progressed slowly. By 1894 little had been accomplished. A few tons of ore had been processed in a small stamp mill at Virginia Dale, with unknown results. Assessment work was delinquent in most cases and several claims had been relocated.[58]

---

56. California State Mining Bureau, Eleventh Report of the State Mineralogist, (First Biennial,) Two Years ending September 15, 1892 (Sacramento: State Office, 1893), p. 368.

57. Ibid., p. 369.

58. California State Mining Bureau, Twelfth Report of the State Mineralogist, (Second Biennial,) Two Years Ending September 15, 1894 (Sacramento: State Office, 1894), p. 224.

Within the next couple of years two mills were built in the Virginia Dale area that presumably were used to process some of the Monte Negras District ores. Claims on the south side of the district--the Columbus, Porcupine, Republican, Summit, and Venus--which had been developed by shallow shafts and short tunnels, were hauling their ore to an arrastra at Cottonwood Spring for treatment.[59]

By 1915-16 what were described as the principal mines of the district were idle: The Ramona (Ingersoll) Mine, developed by shafts of forty and eighty feet; the O.K., mined through shafts of thirty and forty feet; and the S.S., four miles south of Virginia Dale and discovered by T.B. Lyon in 1894. The O.K. Mine, owned by Esler and Ingersoll of San Bernardino, hauled its ore to the mill at Virginia Dale. (Strangely, the O.K. was described as an old forgotten property in 1929.) Two of these mines, at least, were actually in the Dale District. Also listed as being in the Monte Negras District were nine claims in Sections 4, 8, and 9, T3S, R9E, owned by the Gold Galena Mining Company (Gold Coin Mine), and a property in Section 17, T3S, R10E, being operated by a relatively new Los Angeles-based firm--the New El Dorado Consolidated Mining Company.[60] These, however, will be treated in more detail in the Piñon Mining District section.

2. Mine Sites

a) Ingersoll (Ramona) Mine

Few details were found regarding this mine site. In 1896 it was reported as having two shafts, forty and eighty feet deep, on the property. Because this was the same condition reported in 1915-16, it is reasonable to assume little development ever took place there. In

---

59. Thirteenth Report of the State Mineralogist, 1896, p. 312.

60. Report XV of the State Mineralogist, 1919, p. 538. The Thirteenth Report of the State Mineralogist, 1896, mentioned an O.K. quartz mine eighteen miles northeast of Indio, at 3,000 feet elevation, with a thirty-foot shaft, owned by Tingman and Holland, p. 313.

Illustration 27.

Mineral Survey No. 6295 A & B, Claim of E.H. McHann, Known as the Sunrise Claim Number One, Sunrise Number Two, Sunrise Number Three Amended and Sunrise Southern Extension Lodes, and Sunrise Mill Site Number One, Surveyed May 28 to June 3, 1942. From Western Regional Office, NPS.

MINERAL SURVEY No. 6295 A & B

CLAIM OF

E. H. McHANN

KNOWN AS THE

SUNRISE CLAIM NUMBER ONE, SUNRISE NUMBER TWO, SUNRISE NUMBER THREE AMENDED AND SUNRISE SOUTHERN EXTENSION LODES, AND SUNRISE MILL SITE NUMBER ONE

SITUATE IN

Secs. 26 and 35., T. 2 S., R. 12 E., S.B.M.
RIVERSIDE COUNTY, CALIFORNIA
Monte Negro Mining District
Los Angeles Land District

0 50 100 200 300 400 500 600 700 800 900 1000

Scale: 1 inch = 300 feet
Magnetic Declination 15° East

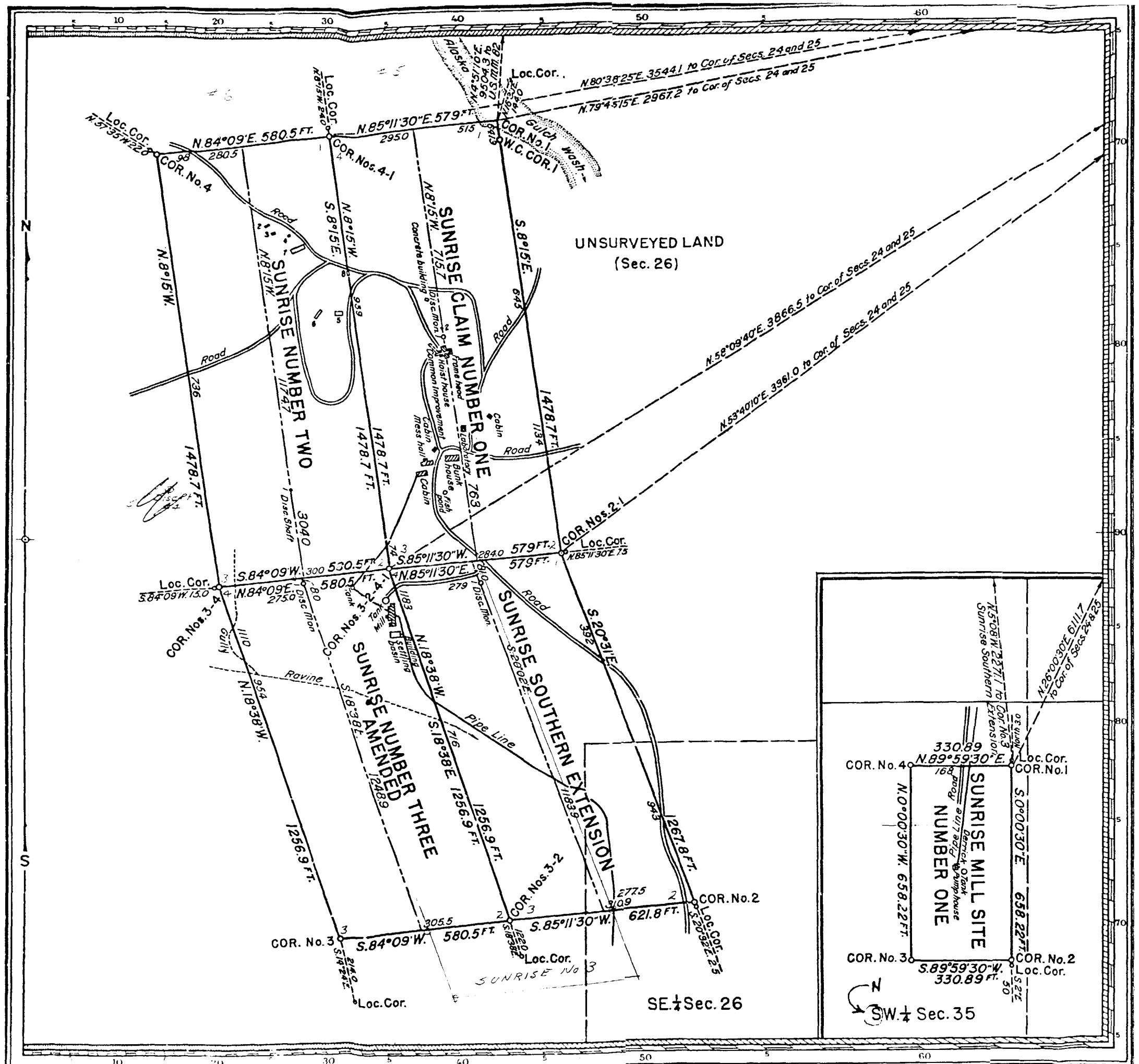
Surveyed May 28 to June 3, 1942
by Frederic Thomasson, Mineral Surveyor

UNITED STATES DEPARTMENT OF THE INTERIOR
GENERAL LAND OFFICE

Public Survey Office
Glendale, California, September 9, 1944

I hereby certify that this plat of Mineral Survey No. 6295 A&B, California, is strictly conformable to the field notes of said survey which have been examined and approved.

B. W. B. Peatman
Acting Office Cadastral Engineer.



1929 Elser, Ingersoll, and others of San Bernardino were listed as former owners, with the present ones unknown.

b) S.S. Mine

This property south of Virginia Dale was said to have produced some very high-grade ore in the late 1890s. In 1896 its location was described as near Lyon's Well. By 1929 it was forgotten.

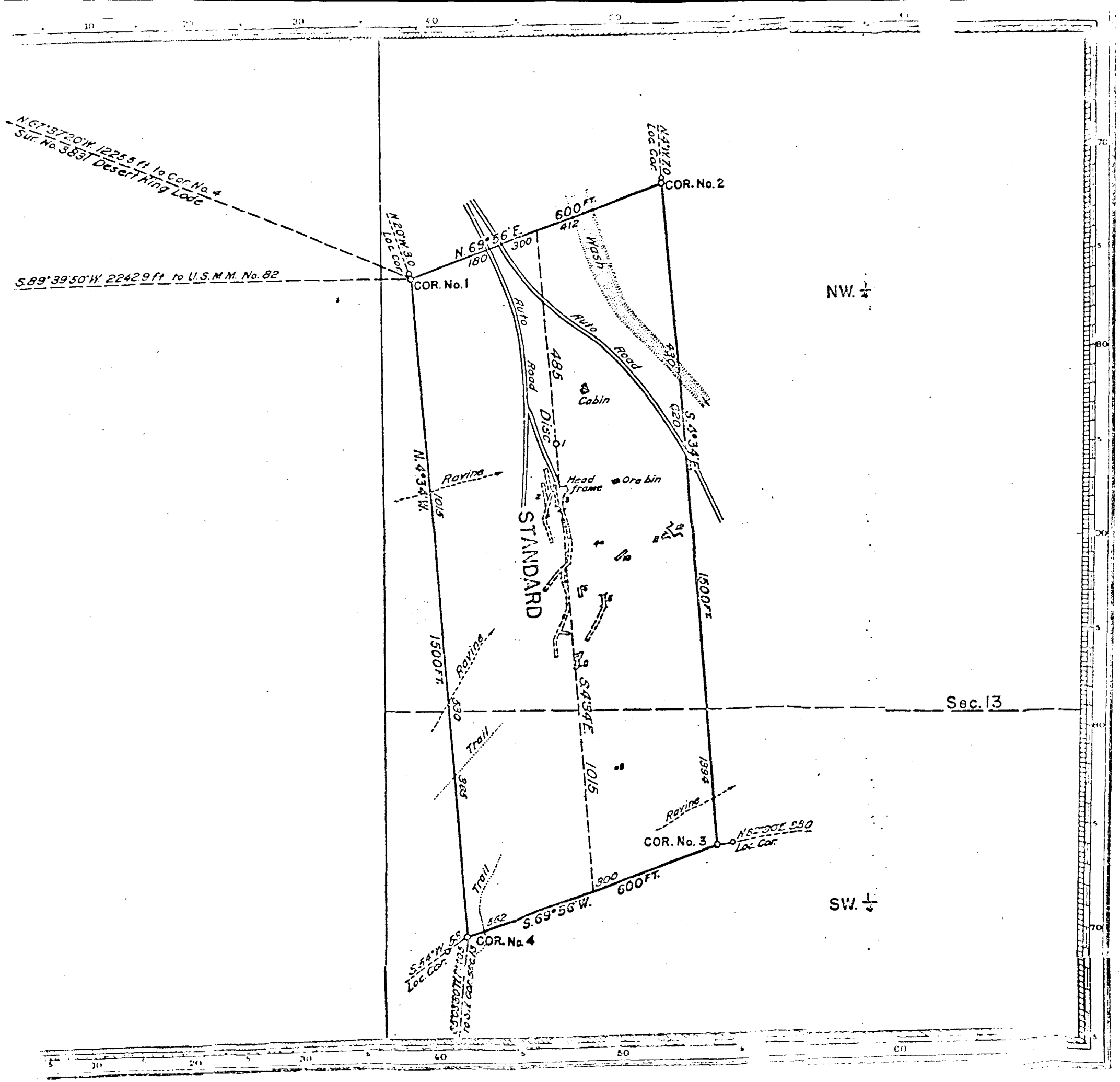
c) Sunrise Mine

The Sunrise Mine has been variously listed in mining records as being in the Dale, an Unorganized, the Pinto Basin, and the Monte Negro mining districts. When Monte Negras became Monte Negro (or Montenegro) is not known. A brief summary of the status of this mine group at the time the national monument was established is found in the section on the Dale Mining District. A fuller discussion of the mine's history will be presented here, where the writer feels it more appropriately belongs.

The Sunrise Mine lode might have been discovered as early as 1900, but the earliest location notices date from 1927. It was intermittently active until the mid-1930s. Around 1929 it was acquired by Sunrise Mines, Inc., of San Diego. In 1933 the Sunrise Group consisted of fifteen claims and was being operated by Sunrise Mines along with the Zulu, Moose, and Cortez groups. The main camp was located just south of the Sunrise shaft in Section 26, T2S, R12E, and included an office, mess hall, assay office, bunkhouses, and mill. Sixty-five gallons of water per minute were pumped to the camp and mill from Sunrise Well, one mile to the south in Section 35. In 1939 the Sunrise Mine was under lease to the Pinto Basin Mining and Milling Company of Pasadena, California, which was remodeling the mill for custom work. Four men were employed. The lessee treated custom ore until closed by War Production Board Order L-208 in 1942. The mine was idle in 1945 and by 1958 all buildings and equipment had been removed from the campsite vicinity. In the 1970s the Sunrise Group of nineteen unpatented claims and a millsite, located between 1927 and 1932, in the Montenegro Mining District, covered approximately 285 acres in unsurveyed Sections 23, 26, and 35, T2S, R12E, SBM, of Riverside County.

Illustration 28.

Mineral Survey No. 6294, Claim of E.H. McHann, Known as the Standard Lode, Surveyed June 3 to June 6, 1942. From Western Regional Office, NPS.



MINERAL SURVEY No. 6294

CLAIM OF
E. H. McHANN

KNOWN AS THE
STANDARD LODE

SITUATE IN
Sec. 13, T. 2 S., R. 12 E., S.B.M.
RIVERSIDE COUNTY, CALIFORNIA
Monte Negro Mining District
Los Angeles Land District

0 50 100 200 300 400 500 600 700

Scale: 1 inch = 200 feet
Magnetic Declination 15° East

Surveyed June 3 to June 6, 1942
by Frederic Thomasson, Mineral Surveyor

UNITED STATES DEPARTMENT OF THE INTERIOR
GENERAL LAND OFFICE
Public Survey Office
Glendale, California, October 30, 1942

I hereby certify that this plat of Mineral Survey No. 6294, California, is strictly conformable to the field notes of said survey which have been examined and approved.

John A. Carleton
Chief Cadastral Engineer

The U.S. Bureau of Mines credits Sunrise Mines, Inc., with 67.51 ounces of gold and 28 ounces of silver from 218 tons of ore in 1933, and 71 tons in 1941 yielding 15 ounces of gold. Which specific orebody yielded this ore is not known. The only surface evidence of facilities visible now are a few dirt access roads and remains of concrete foundations at the millsite, shaft, and campsite. No buildings remain. In the 1970s workings consisted of an adit and two shafts, both of which were partially boarded over. Several open cuts were noted.[61]

d) Standard Mine

The Standard Mine property is located in Section 13, T2S, R12E, SBM, about 2-3/4 miles north-northeast of the Mission and Sunrise wells. Little is known about the mine's earliest ownership. It was reputedly owned and operated by Willard Allen and Joe Geiger of Twentynine Palms from 1938 to 1941. By 1942 it was owned by Emilus H. McHann and was in his possession until 1950. After that time it went through at least three more owners: William C. O'Connor (Pinto Basin Mining and Milling Company), Frank D. Bronson, and Howard and Rose Fox (Sunrise Group).

e) Zulu Queen Mine

This property, near the northern boundary of the monument, in Sections 10 and 15, T2S R13E, SBM (proj.) was one of three mines owned by Sunrise Mines, Inc., in the 1930s. In 1933 the property consisted of the Zulu Group of eleven unpatented claims. The mine was worked intermittently from 1933 to 1938. Water was obtained from Sunrise Well, about six miles southwest.

f) Outlaw Mine

This property, in Section 1, T2S R13E, SBM (proj.), is about 2½ miles northeast of the Zulu Queen Mine. Ownership

---

61. Paul H. Knowles, "Report on the Validity of the Sunrise Group of Claims, Joshua Tree National Monument, Riverside County, California," Jan. 18, 1974, file L3023, Office of Mining and Minerals, WRO, NPS, San Francisco, Ca., pp. 1, 7-10, 18.

of the property has not been determined. It may have been another holding of Sunrise Mines, Inc., though no mention of it has been found in records so far examined. In 1949 on the Outlaw Group, owned by W.P. O'Connor and J.P. Hayes, only assessment and road work were done.[62]

g) Mission Mine (Huff and Lane, Lone Star Group)

Some discrepancy exists as to the exact location of this mine. In the late 1920s it was reported that the Huff and Lane or Lone Star Group consisted of twenty-one claims in the Pinto District in T2S, R12E, at an elevation of 1,200 feet. Its owners were E.C. Huff of Los Angeles and George Lane of Mecca. The mine had been discovered by Lane in 1887. A sixty-foot shaft with drifts had been sunk on the ore vein. A twenty-ton ball mill and amalgamation plates had been set up on the property. Water came from a 600-foot-deep well lined with seven-inch casing. Six men were employed.[63]

In the 1930s the Mission (Huff-Lane) gold mine of twenty-one claims in T2S, R12E, was described as developed by shafts, the deepest being 570 feet, with 600 feet of drifts. Mill equipment consisted of a ten-foot arrastra. Three men were employed, the property being under lease to Messrs. Henderson, Foulkes, and Ake.[64] In 1940 the Lone Star Group comprising seven claims and two millsites was described in this same location. The owner, E.C. Huff, had the property under lease and bond to Mission Gold Mines, Inc. Development consisted of a 600-foot shaft, drifts, and a raise. Ore from one stope was reported to average $25 a ton in gold. Other ore sent to the Gold Crown Mining

---

62. State of California, Dept. of Natural Resources, Div. of Mines, California Journal of Mines and Geology 47, no. 2 (April 1951) (Sacramento: State Printing Office, 1951), p. 352.

63. Report XXV of the State Mineralogist, 1929, pp. 481-82.

64. "Notes on Mining Activity in Dale Mining District," p. 4.

Company's mill averaged $43 a ton.[65] In 1945, however, the Mission Gold Mine (Huff and Lane, Lone Star Group) was reported as being located in Section 5, T3S, R12E. It was idle at this time. During 1949 development work carried out included a two-compartment shaft 600 feet deep, drifting on the 100-, 300-, 400-, and 600-foot levels, and a raise to the surface. Five to ten thousand tons of ore had been blocked out.[66]

h) San Antonio #1 and #2; Double Jack #1 and #2

These properties are located in Section 24, T2S, R12E, on a rise (Mint Hill) about 1½ miles north-northeast of the Mission Well. Shredded documents found by mine safety investigators in one of the corner markers indicated the claim was located in 1934. Notices of Intention to Hold were found for 1936 through 1938.

3. Mill Sites

a) Mission Mill

Little is known about this mill other than its location. On a claim map of the Sunrise Group of mining claims compiled from available data and field work, Mining Engineer Paul H. Knowles in 1973 designated a mill site about one-quarter mile north-northwest of the Mission Well as the old Mission Mill. At the site of the Mission Well itself he located an arrastra just south of the well and pump building. This might be the ten-foot arrastra associated with the Mission (Huff and Lane) gold mine. The exact location of the ball mill and amalgamation plates "on the property" of the Huff and Lane (Lone Star Group) claims is uncertain, but possibly they were on this site in the southwest quarter of Section 26, T2S, R12E. The mineral survey for the Sunrise Group of claims, conducted in 1942, stated that the Sunrise Number Three Amended

---

65. California Journal of Mines and Geology, 1940, p. 51.

66. California Journal of Mines and Geology, 1945, p. 139; Ibid., 1951, p. 352.

Mine was "directly North of what is known as the Huff Lane Mill which is located on the North edge of the Pinto Basin about 18 miles from Cottonwood Spring."[67]

This same document refers to the Sunrise Southern Extension Mine as being about 3/8 mile from the Huff Lane water well in Pinto Basin.[68]

b) Sunrise Mill

The quartz mill owned by Sunrise Mines, Inc., was located on the Sunrise No. 3 claim. By late January 1939 the Sunrise Mill was bankrupt and newly leased to a three-man partnership (Swartout, Soske, and Swartzwalder). Because the Gold Crown had ceased custom ore milling, the success of the Sunrise Mill venture was critical to other small mines still operating in the area. The new partners were converting the mill to a cyanide operation and had bought some of the Gold Crown's old equipment.[69] By 1940 then, while the Sunrise properties were under lease and bond to the Pinto Basin Mining and Milling Company, the mill had been remodeled for custom work. The twenty-five-ton plant operation consisted of: an eight-inch by ten-inch Blake crusher elevated to a fine-ore bin; a belt-type feeder from the bin to a ten-foot Lane mill, then to a Wilfley concentrator; pulp went from concentrator to sump; then pumped to two twelve-foot by twelve-foot

---

67. Notice of Location, Sunrise Number Three Amended Mine, in "Mineral Survey No. 6295 A and B . . . Field Notes of the Survey of the Mining Claim of E.H. McHann . . . Surveyed under instructions dated May 8, 1942, by Federic Thomasson," file L3023, Office of Mining and Minerals, WRO, NPS, San Francisco, CA.

68. Notice of Location--Quartz, Sunrise Southern Extension Mine, in ibid.

69. Hugh d'Autremont, West of Dawn (New York: Exposition Press, 1971), pp. 157-58. According to the author the mill was later robbed (probably in the 1940s). Big moving vans took the power plant, pumps, motors, rod mill, classifier, and loose steel, leaving only the race mill and conveyors. P. 184.

Deveraux agitators; then to two ten-foot by twelve-foot Dorr thickeners; then to an eight-foot by ten-foot solution tank.[70]

A mining report in 1951 stated that during 1949 the Pinto Basin area enjoyed considerable gold mining activity. W.C. O'Connor, owner of the Sunrise, Mission, and Standard mines, was engaged in building a 100-ton custom cyanide mill to serve his three properties.[71] (See section below on "Unidentified Mills.")

An unpublished ca. 1959 study by Clifton H. Gray, Jr., James R. Evans, and Richard Saul of the California State Division of Mines stated that the main Sunrise camp included two Straub ten-stamp mills.[72] Water was pumped from Sunrise Well, one mile southeast.

c) Gold Rose Mill

Little information was found on this mill, located near the Gold Rose Well in the northwest quarter of Section 36, T2S, R12E, about one mile east of Sunrise Well. It served the Gold Rose Mine in the southwest quarter of Section 1, T2S, R12E, in the Dale Mining District, south of the Los Angeles Mine. The California Mining Journal of July 1949 mentioned that Dale Holmes had a crew of five men installing a mill for his Gold Rose Mine in Pinto Basin. (See below under "Unidentified Mills.") The Gold Rose Mill Site consisted of forty acres on two patented claims owned by Oehls and Holmes. Buildings and a mill on the property were removed by early 1973.

d) Unidentified Mills

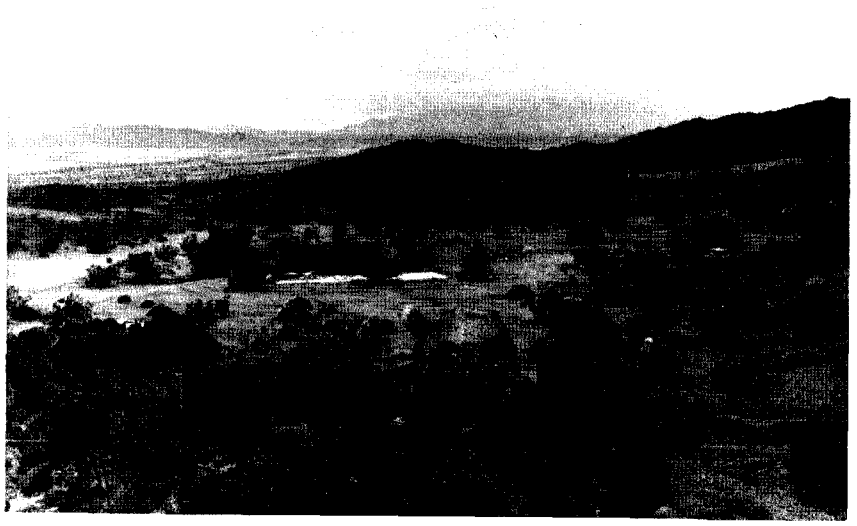
By the end of 1946 a 150-ton mill was being constructed in Pinto Basin for the treatment of gold ore in that vicinity. No further information was found as to its location. In December 1950

---

70. California Journal of Mines and Geology, 1940, p. 53.

71. California Journal of Mines and Geology, 1951, p. 352.

72. Knowles, "Report on Validity of Sunrise Group," p. 9.





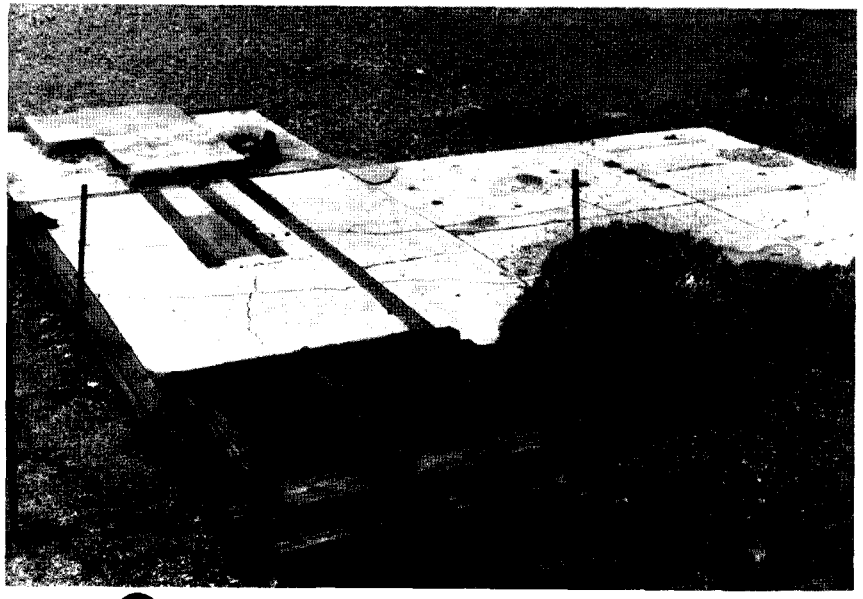


Illustration 29 (top left).
Sunrise Mine camp, looking south. Cement floors visible in cleared area. Mill is on cleared slope to the right beyond camp, 1983.

Illustration 30 (top right).
Fish pond at camp.

Illustration 31 (left).
Sunrise Mine shaft north of camp site.
NPS photos by Linda W. Greene.

two concentrating plants about one mile apart were noted inside the monument, but their exact locations were not given. One, a cyanide mill, was under construction but would be able to treat about sixty tons of ore per day. The other plant, a flotation process, could treat twenty-five tons a day. Ore for both plants came from mines outside the boundaries. Both plants were probably in the Pinto Basin area near the Dale District.[73]

4. Evaluation of Resources and Recommendations

a) Mine Sites

(1) Sunrise Mine

The claims are reached by driving south for thirty-two miles from Twentynine Palms via the main monument road and the Pinto Basin Road to its intersection with the Old Dale Road. From there one proceeds northeasterly for twelve miles on the Old Dale Road to Mission Well. The Sunrise millsite is 900 feet east of the Mission Well, in Section 35, and the Sunrise Group extends northerly from there through Sections 26 and 23. The Sunrise shaft, by 1933, was 300 feet deep with levels at 100, 200, and 300 feet. By 1961 the shaft was boarded over and timbered. All surface equipment had been removed.

In 1942 the Sunrise Claim Number One, Sunrise Number Two, Sunrise Number Three Amended, and Sunrise Southern Extension Lodes, and the Sunrise Mill Site Number One, owned by E.H. McHann, were surveyed. According to this lengthy document, the Sunrise mine camp was erected on the Sunrise Number One lode claim. A well (Sunrise Well) to be used by the mine operation was being drilled in the center of the Sunrise Mill Site Number One claim in 1932. The purpose of claiming the mill site was to obtain water for working the

---

73. "150-Ton Mill Being Built In Pinto Basin," Desert Views (Joshua Tree, Ca.), Nov. 27, 1946; Edward N. MacKenett and Edward J. Matson, "Mineral Production and Mining Activities" (portion of mineral report), in United States, Department of the Interior, National Park Service, Samuel A. King, "History of Joshua Tree National Monument," 1955, pp. 23-24.

Sunrise Nos. 1-12 and 14-15, the Joyce Nos. 1-3, and the Green Parrot claims, and for milling purposes.[74]

Improvements listed in the Sunrise mine camp complex consisted of, on the Sunrise Claim Number One, a small concrete building, a frame hoist house, a wooden headframe, three frame cabins, a frame laboratory building, a frame bunkhouse, a frame messhall, and a concrete fish pond; on the Sunrise Number Three Amended, a seven-foot-diameter water tank, a twenty-foot-diameter water tank, a frame mill building, a twenty-by-thirty-two-foot concrete settling basin, a frame building, and a two-inch steel water pipeline intersecting the Sunrise Southern Extension lode; on the Sunrise Mill Site Number One, a twelve-foot-diameter water tank, a frame pumphouse building, a frame pump derrick, and a four-inch steel water pipeline.[75]

The mine and camp site were visited by this writer in February 1983. The mine camp is over a small ridge northwest of the Old Dale Road, nestled along the base of a north-south-trending ridge. All that remains today of the little settlement are concrete floor slabs, the concrete fish pond with a fountain in the middle, and what appear to be caved-in root cellars. All the streets and some of the shrubs are lined and encircled by decorative rockwork. On a bench above the camp to the north is the timbered vertical shaft and concrete floor of the hoist house. A little to the west of that building is a small concrete structure that might have been connected with the dispensing of fuel. A metal gasoline drum was found buried in the ground just east of it with a pipe leading toward the hoist house.

---

74. Notice of Mill Site Location, Sunrise Mill Site Number One, in Mineral Survey No. 6295 A and B.

75. Other Improvements, in Ibid. pp. 9-10.

This mine's greatest productivity occurred in the 1930s and early 1940s. Although the mine itself was not a particularly rich proposition, the site should be of interest to the monument's interpretive division because of the extent of remains--including a cyanide mill and campsite--and because its operators were heavily involved in mining activities in the Pinto Basin area. The Sunrise Mine functioned for only a brief period and did not have any significant impact on the economic life of the area. The site does not warrant nomination to the National Register due to lack of integrity and significance. The camp poses no safety hazards and might be of interest to park visitors. It is recommended it be left to natural deterioration.

(2) Standard Mine

According to the 1942 mineral survey of this property, the lode claim was cut by two auto roads and contained a cabin, headframe, and an ore bin. In the 1960s a drift adit about 300 feet long comprised the main workings. Other development was of relatively minor extent and consisted mainly of shallow shafts and prospects. The mine was then idle.

The mine site was not visited by this writer. On reviewing the scanty data available on the property, the writer does not believe it possesses historical significance, and it is not deemed eligible for nomination to the National Register. It is recommended the site be left to benign neglect. If any work is projected by the monument that will impact this area, the site should be visited and its current condition assessed by a qualified historian. The presence of any important technological or other interpretive artifacts should also be noted.

(3) Zulu Queen Mine

On this property a vertical two-compartment shaft was sunk 100 feet, with drifts on the 50- and 100-foot levels. Directly south of the headframe of the shaft a 110-foot adit with winzes was driven. The mine is at an elevation of 1,700 feet and low on the northeast slope of a small hill near the mouth of a wash that drains the

Pinto Mountains from the north. A visitor to the park in 1968 noted that there was little left at the site to make the trip worthwhile, although the headframe over a vertical shaft was intact. He also mentions that the mine had an elevator to haul up loaded ore cars.[76] All that remained on the property in 1976 were a rock powder house, an ore tipple, some concrete slab foundations, an adit, and a couple of vertical shafts, one with a headframe.

The site was not visited by this writer but was inspected and evaluated by the LCS crew in 1976. This regional team determined that the site was not eligible for the National Register. Because additional information was found indicating the possible existence of an elevator in the Zulu Queen shaft, the site should be inspected by a historian for possible significance as a site "representative of a type." It is recommended the site be left to natural deterioration.

(4) Outlaw Mine

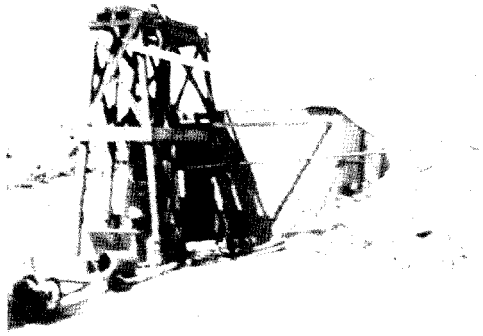
This property is on top of a small, outlying hill on the northeast side of a southeast-trending wash draining the Pinto Mountains from the north. A 100-foot shaft was sunk in the ore zone. Water was obtained from Sunrise Well. In 1968 it was reported that two shacks and a variety of disintegrating machinery were found at the mine. The headframe had fallen into the shaft.[77] In 1976 investigators found at the mine camp a parking site lined with stones, two pit toilet sites, a dump containing 1930s-period garbage, and a masonry shell surrounding a concrete slab.

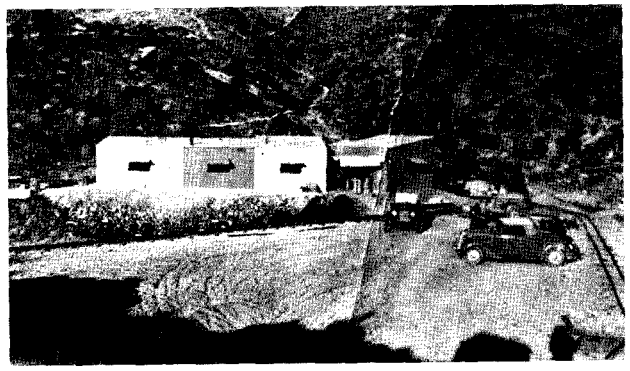
The LCS crew that visited the site in 1976 determined it not to be eligible for the National Register. No significant remains were found on site. An archival search turned up no historical

---

76. George Service and Kent Werges, "Exploring Dale Mine District," Desert Magazine, March 1968, p. 23.

77. Ibid.





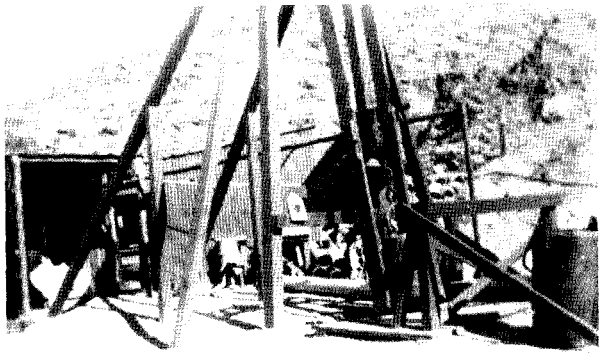


Illustration 32 (top left).
Mission Mine, 1933.

Illustration 33 (top right).
Mission Mine, 1934.

Illustration 34 (left).
Mission Mine, 1937-38. Photos from Tom Ake, Jr., Collection. Courtesy JTNM.

significance for the mine. The state of potential safety hazards there, such as the shaft, is not known, but visitation is probably extremely infrequent. It is recommended the site be left to natural deterioration.

(5) Mission Mine

Mine equipment at this operation consisted of a six-horsepower gasoline hoist and a compressor driven by an automobile engine. During mine inspections in the early 1970s, investigators tentatively identified the Mission Mine as being in Section 23, T2S, R12E, about one-fourth to one-half mile north of the Old Dale Road. Four mine shafts were found there. Ownership of the property was uncertain, although a Palm Springs man claimed part ownership in a "Mission Mine" just outside the monument at the end of the road along which these shafts were located.

The site was not visited during this writer's field trips. The mine is not considered historically significant and because no structures other than shafts exist within the monument it was not deemed necessary to personally inspect it. The section of the Mission Mine just outside the north monument boundary is being worked occasionally. Three trailer homes and a tall metal headframe are visible there. The site in the monument is recommended for natural deterioration.

(6) San Antonio #1 and #2; Double Jack #1 and #2

Workings here consist of two mine shafts. The site is not historically significant and should be left to natural deterioration.

b) Mill Sites

(1) Mission Mill

The old Mission Mill ruin comprises the remains of a cyanide operation. Two large metal vats, several levels still supporting concrete machinery pillars, and a large dump site visible off the point of the ridge southwest of the mill attest to its having been a good-sized operation. No description of the mill setup has been found by the writer. In 1941 T.J. Ake, operator of the Mission Mine, was in the







Illustration 35 (top left).
First mill for Mission Mine, 1932. Difficult to tell if this is the present mill ruin or not. Note circular stone structure in background, however. Tom Ake, Jr., Collection. Courtesy JTNM.

Illustration 36 (top right).
Remains of what is known today as old Mission mill.

Illustration 37 (left).
Another view of Mission mill ruins, 1983. NPS photos by Linda W. Greene.

process of rebuilding a mill on the Lone Star Mill Site, located about 1927. He planned to pipe water from the Huff and Lane Well. The precise location of this mill is unknown.

Because of the lack of any mill machinery onsite, the dearth of information on the mill operation here, including the processes used, builders, and the mines it served, the Mission Mill is not deemed eligible for nomination to the National Register. It is recommended for natural deterioration.

(2) Sunrise Mill

The ruins of the Sunrise Mill are about five-eighths of a mile northwest of Sunrise Well. The concrete foundations of a medium-sized cyanide mill are hidden behind a small ridge just west of the Old Dale Road. It is assumed the mill performed custom work for several other mines. One customer was the Top Nest Mine in the Dale District adjoining the Ivanhoe Group of claims on the northwest. In 1940 its ore was being trucked to the Sunrise mill for treatment.[78]

North of the Sunrise Well about one hundred yards are what appear to be the remains of yet another small mill operation, consisting of concrete foundations and what might be a heavy metal crusher or roller. A road leads from the structure north toward the Mission Mill. There is some evidence of burning here. No information on this mill has been found. The possibility exists that it is one of those referred to earlier under "Unidentified Mills." The ruin should be left as is.

(3) Gold Rose Mill

The Gold Rose Mill is reached via the Old Dale Road, turning east on Gold Rose Mill Road and continuing past the

78. California Journal of Mines and Geology, 1940, p. 79.

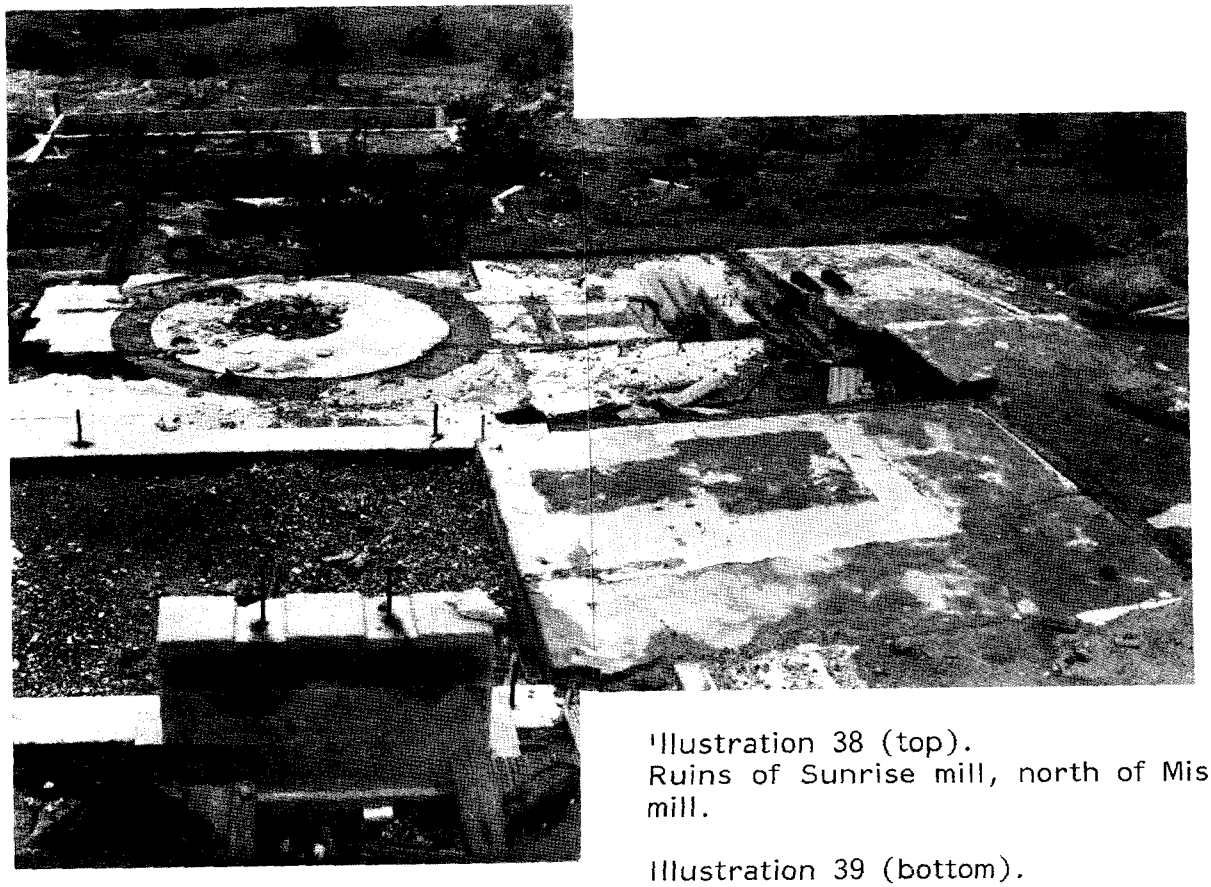
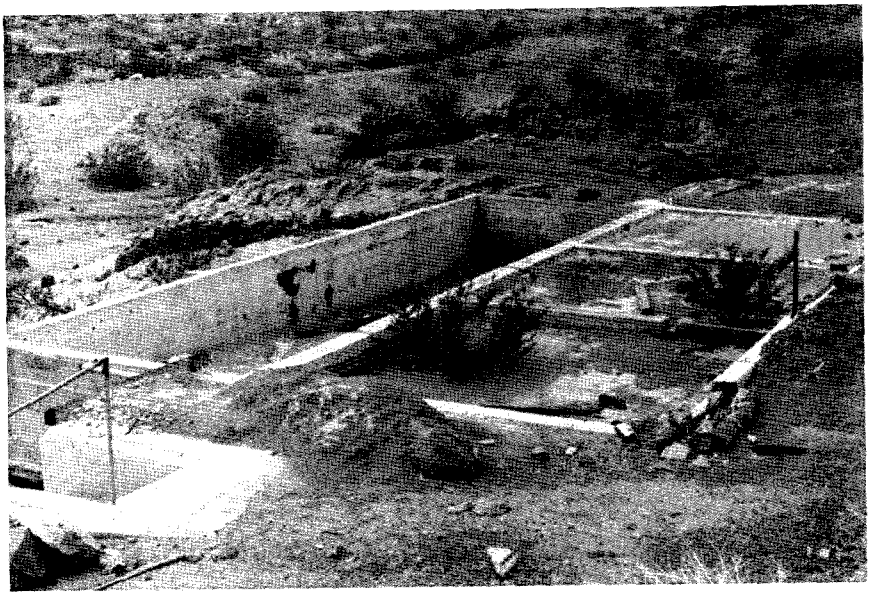


Illustration 38 (top).
Ruins of Sunrise mill, north of Mission mill.

Illustration 39 (bottom).
Close-up view of settling basin, Sunrise mill. NPS photos by Linda W. Greene.



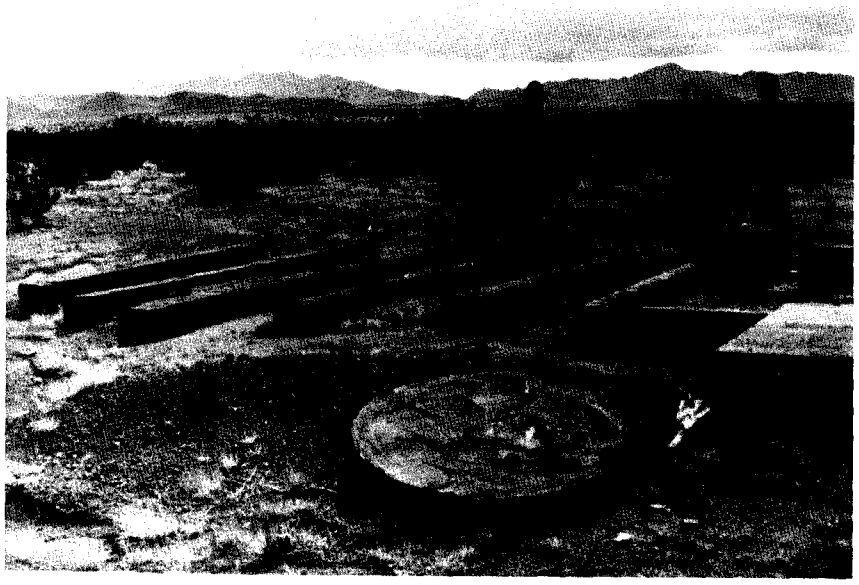




Illustration 40. Unidentified mill ruin north of Sunrise Well. NPS photos by Linda W. Greene.





Mission and Sunrise wells. The mill was torn down in the early 1960s.[79] Lester Spell, in his history of the Dale Mining District, mentioned that the locator and first owner of the Gold Rose Mine was a Tom Holmes. After he passed away, his heirs were Dale Holmes, his son, and Herbert Oehls. "While they knew the mine could not work at a profit because of the inflation," Spell noted, "they did build a flotation concentration mill in Pinto Basin." No date was given. This is probably the flotation mill mentioned under "Unidentified Mills," because Dale Holmes was reportedly erecting a mill in Pinto Basin in 1949. Because these two men owned the Gold Rose mill site, that is the probable location of their mill. In 1940 the Gold Rose Mine milling operation consisted of a Blake crusher, Wheeler ball mill, amalgamating jig, amalagamation plates, a cone tank, and two settling tanks.[80] Nothing is known of this mill's production record or its exact location, although what appears to be the remains of a cone tank were found at the Gold Rose mill site in 1983.

The present structure at the mill site is not considered to be eligible for the National Register, but should be left in its present condition. On site are a truck ramp and three relatively shallow metal vats--the largest with a fifteen-foot diameter and three-foot-high walls, the two smaller ones of five-foot diameter with two-foot-high walls. The campsite is about one-eighth mile southwest of the mill, and contains a well and a profusion of miscellaneous plumbing fixtures, appliances, utensils, and machinery parts. In the camp, behind it, and strung along a wash are almost two dozen 1950s-era junked cars, most of them buried in silt or turned upside down. This site could be cleaned up under a monitoring process so that only the well site and pump remain. The place is an eyesore in its present condition. The writer did not find any items of historical or technological interest in making a cursory inspection of the area, but if such a cleanup effort is undertaken, it should proceed carefully and with discrimination so that no important artifacts are lost.

---

79. Observation card on Gold Rose Well; Observer, Alsen Inman, Park Ranger, Dec. 18, 1965, in JTNM Fact File.

80. Spell, "History of Dale Mining District, California," p. 12; California Journal of Mines and Geology, 1940, p. 67.

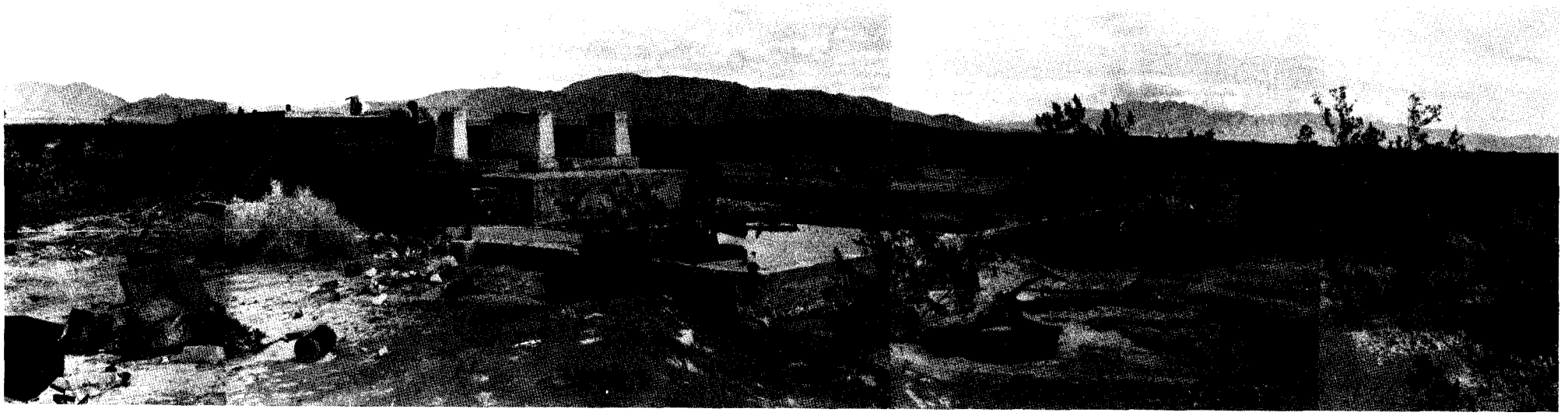


Illustration 41.

Gold Rose Mine mill ruin, 1983. NPS photos by Linda W. Greene.

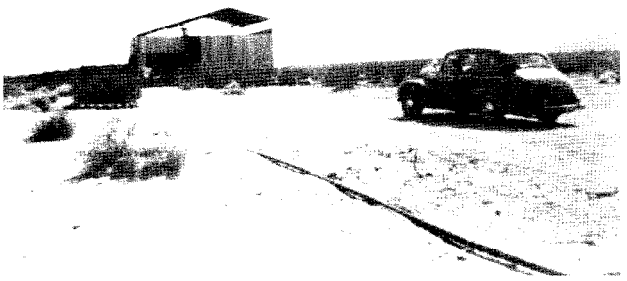


Illustration 42.

Mill for Gold Rose Mine, located in Pinto Basin, 1948-49. Tom Ake, Jr., Collection. Courtesy JTNM.



Illustration 43.

Gold rose mill camp site, 1983. NPS photo by Linda W. Greene.

E. Eagle Mountains Mining District

1. History

The Eagles are one of several bare ranges of rocky mountains in the Mohave and Colorado deserts. Its highest peaks rise between three and four thousand feet above sea level. Gold prospectors probably entered the area from the Colorado River in the 1860s. Lead, zinc, and silver were found along the iron belt. As railroading became more important in the southwest, the value of iron deposits grew. The first official account of activity in the Eagle Mountain area appeared in 1892 when it was reported that rich placers had been found in the dry gulches of the Eagle Mountains and that more diligent searching had led to the discovery of rich gold-bearing quartz deposits. Because of the scarcity of water in the area, a cement basin had been built with the proceeds of dry washing to catch the winter rains so that the placer mines could be worked more easily and profitably.[81] To what extent properties had been staked in the area earlier is not known, although as early as 1890 a sales transaction was reported involving the Iron Chief Mine in San Bernardino County.[82] One assumes from the name that the existence of iron in the area had already been established, but the first operations in the range centered around gold extraction.

2. Mine Sites

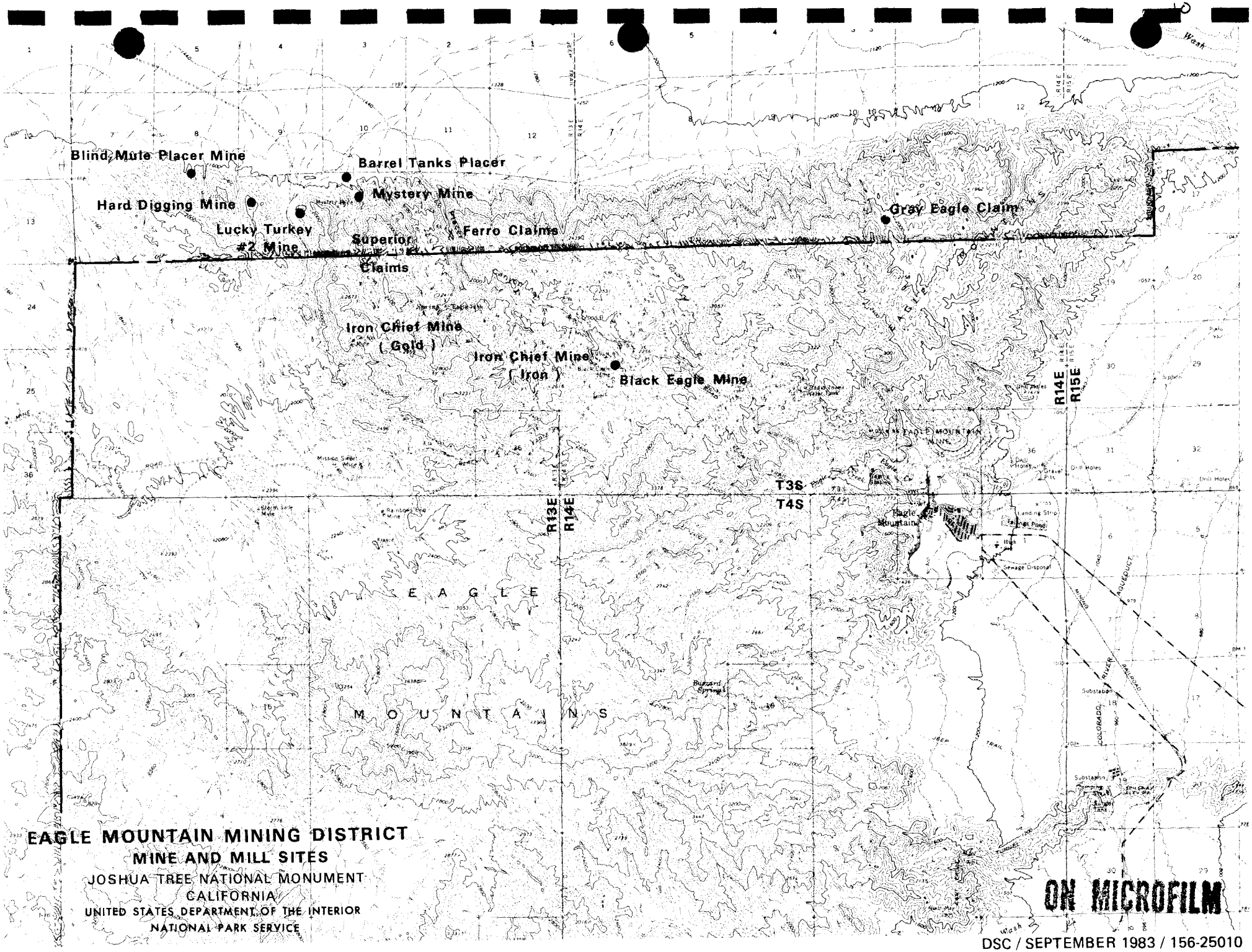
a) Iron Chief Mine

Initially a producer of copper and gold ores, this property in T3S, R13E and R14 E, quickly became the principal source of gold in the Eagle Mountains. Located in the northern part of the Eagle Range at an elevation of about 2,500 feet, this deposit was originally discovered by William Stevens and Thomas Dofflemeyer of San Bernardino. In 1897 Charles Lane of San Francisco bought the mine and installed and

---

81. Eleventh Report of the State Mineralogist, 1893, p. 386.

82. Engineering and Mining Journal 49, no. 6 (Feb. 8, 1890): 182. It is assumed that the journal was referring to the mine in the Eagle Mountains even though the county designation is misleading. This would still have been San Diego County.



EAGLE MOUNTAIN MINING DISTRICT

MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT

CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

ON MICROFILM

DSC / SEPTEMBER 1983 / 156-25010

operated a small mill, producing about $50,000 worth of gold. Lane became delinquent on his payments and the original owners regained the property, installing a fifty-ton cyanide plant. In 1898 it was reported that the Iron Chief was being successfully developed. Ore was assaying from $10 to $100 per ton. A twenty-five-horsepower gasoline engine was used for hoisting and another twenty-five-horsepower engine drove the mill plant--a dry roller and cyanide process. A pipeline was supplying the camp and plant with water from Cottonwood Spring. About sixty tons of ore were reduced each day.[83] The mine and mill were run until 1902, reaping a reported $150,000 profit. In 1902 the property was sold to J.F. Collins of Pittsburgh, Pennsylvania.

A popular story is that a miner named Joe Torres first found iron ore in the Eagle Range. Not recognizing this type of ore he left some samples at a store in Mecca that were eventually seen and identified by a mining engineer named L.S. Barnes. However he found out about them, Barnes secured an option on nineteen claims of the Iron Chief Mine in 1909. In 1912 he offered E.H. Harriman, president of the Southern Pacific Railroad, these same claims, convincing him that the railroad should not be totally dependent on the East for steel for its rails. Because Harriman did feel that the steel trust was overcharging the railroad for rails, the sale was made. Harriman then bought a steel mill site near San Pedro, and proceeded to survey for a spur railroad route to the mine. But then the price of rails dropped, and Harriman died before a mill could be erected. Without Harriman's energy backing its development, the mine lay idle.

In 1924 the state mineralogist reported on the status of six patented claims of the Iron Chief known as the Gray Eagle Group (Section 15, T3S, R14E). Development consisted of a 140-foot-deep vertical shaft cut from the west by a tunnel. Mill

---

83. Engineering and Mining Journal 66, no. 24 (Dec. 10, 1898,): 705.

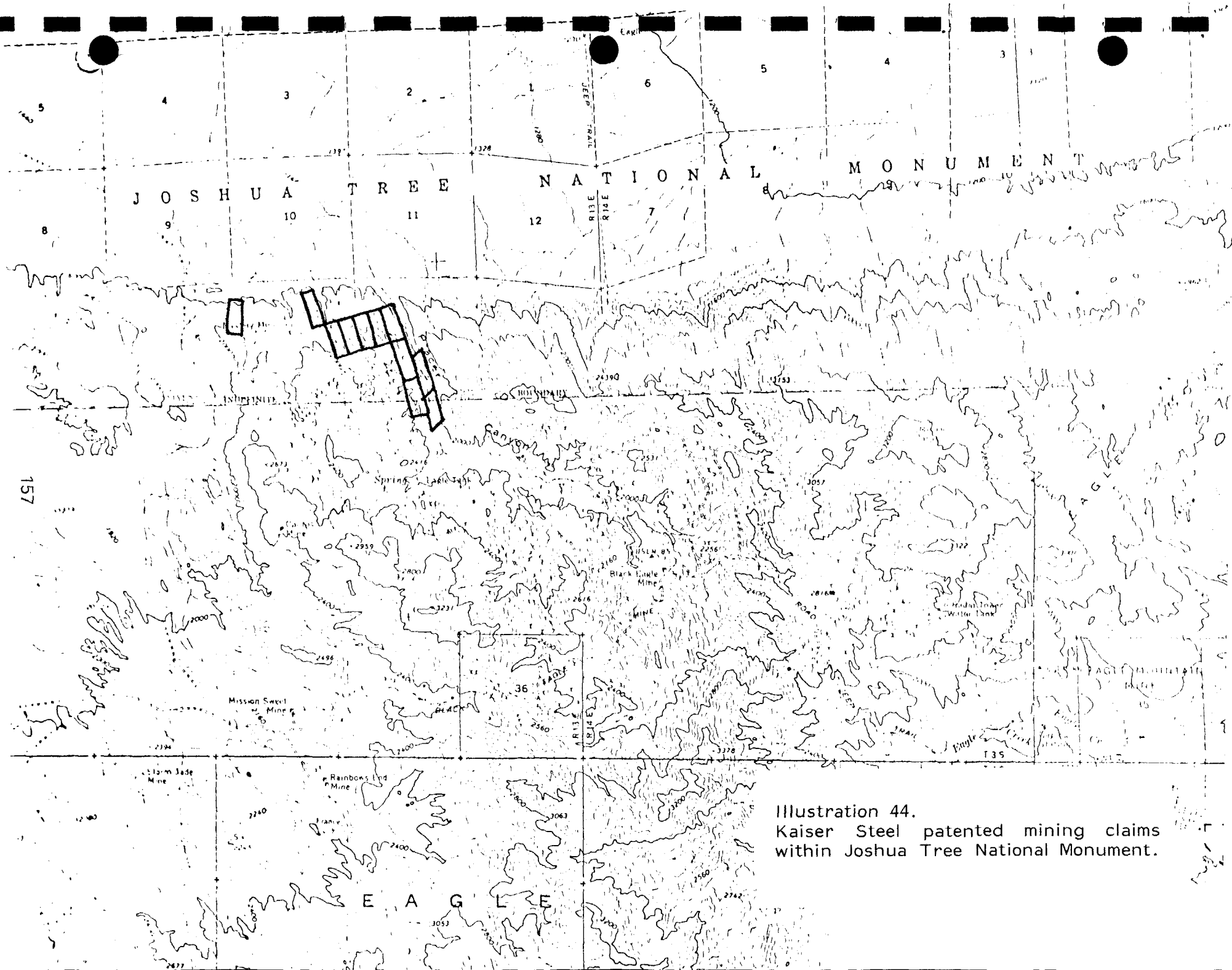


Illustration 44.
Kaiser Steel patented mining claims within Joshua Tree National Monument.

equipment consisted of two Blake crushers, Gates rolls, and eight four-by-eighteen-foot steel cyanide tanks. Water was secured from Cottonwood Spring, eighteen miles to the south. The mine operation was then idle. The same publication described the Eagle Mountain iron ore deposits as extending over an area about eight miles long and from one-quarter mile to two miles wide, running generally east-west across the summit of the mountains. Total holdings of the Iron Chief Mining Company, controlled by the Southern Pacific Railroad, were 187 patented claims. Development work was minimal, characterized by several shallow shafts and tunnels on the different claims.[84]

In 1929 the Iron Chief Mine (Gray Eagle Group, probably) was still idle. A few more details on the extent of development and on mine structures appear. The 140-foot vertical shaft was intersected at the 100-foot level by a 500-foot crosscut tunnel. There 500 feet of drifting had been accomplished. The ore-shoot was stoped to the surface over a length of 300 feet. On site were a twenty-five-horsepower gasoline hoist, a headframe, a blacksmith shop, an assay office, a twenty-five-ton ore bin, two jaw crushers, one set of rolls, and eight cyanide vats, 18 by 4½ feet. Another section of the Iron Chief Group mentioned at this time was the Messenger Mine, also idle.[85]

The Henry J. Kaiser Corporation bought the Iron Chief property (more than 2,000 acres) from the Southern Pacific Land Company in 1944 for a reported one million dollars. A year later it was under option to the Riverside Iron and Steel Company of St. Paul, Minnesota, and under lease to Mineral Metals Company of Alhambra, California. During this time some of the ore was shipped to the Los

---

84. California State Mining Bureau, Chapter of Report XX of the State Mineralogist Covering Mining in California and the Activities of the State Mining Bureau (Sacramento: State Printing Office, 1924), pp. 191-92, 196.

85. Report XXV of the State Mineralogist, 1929, pp. 482, 484.

Angeles area for ship ballast during World War II. Forty thousand tons of ore had been shipped by 1945.[86] Kaiser built a steel mill at Fontana, California, and in 1947 started construction on a fifty-one-mile railroad to tie in with the Southern Pacific at Ferrum Junction adjacent to the Salton Sea. By 1959 the Eagle Mountain site held more than 1,000 people. The plant was producing six to seven million tons of ore a year, and underwent a major expansion in 1964. By the 1960s there were 3,000 employees with their families at the site.[87] The operation has since closed down.

b) Black Eagle Mine

This mine was being actively worked by 1924. A producer of lead, silver, copper, and gold, the property was situated at an elevation of 2,100 feet. It was owned by Edward Harmon of San Bernardino and under option to A.W. Scott and George Hayden of Los Angeles. The property comprised three unpatented claims known as Maleta No. 1, No. 2, and No. 3. Development at that time consisted of adits, winzes, drifts, and stopes. Equipment included two gas engines driving a compressor and a blower, plus one hoist. Water was hauled from Cottonwood Spring in a 450-gallon tank. Six men were employed.[88] Five years later the total production of the mine was said to have been $30,000. The property was equipped with a six- by eight-inch compressor driven by a semi-diesel engine that furnished air for drills and for running an air hoist at the shaft. The property also held a twenty-ton dry concentration plant with a Blake crusher, bucket elevators, trommel screen, rolls, and two Cottrell tables. The property was said to have been under operation from 1923 until the end of 1928. It was idle in 1929.[89]

---

86. Vredenburgh et al., Desert Fever, p. 30.

87. Russ Leadabrand, A Guidebook to the Mojave Desert of California (Los Angeles: The Ward Ritchie Press, 1966), p. 167.

88. Report XX of the State Mineralogist, 1924, pp. 193-96.

89. Report XXV of the State Mineralogist, 1929, p. 476.

By about 1937 total production was stated to be $50,000. Operations were being carried on by the Imperial Smelting & Refining Co. of Los Angeles, which requested permission to dig a well in T3S, R13E, Section 11 or 12, in the northeast part of the monument. If an immediate supply of water could be acquired, the company anticipated employing forty to fifty men at their mine and 150-ton concentration plant. Operating from 1939 to 1940 the plant yielded more than $53,000 worth of lead-copper concentrates that were shipped to Midvale, Utah. During this time the mine was getting its water from Black Eagle Well in Pinto Basin, five miles away.[90] In November 1940, however, the mine ceased operating. The claims were not abandoned and a watchman was left to protect the machinery and buildings. Although the mine had produced $250,000 during the previous three years, the company had expended $750,000 to obtain that gold.[91]

c) Blackbird Group

This group of five claims in the Eagle District was operated in 1907 by the Crescent Company.[92]

d) Eagle Mountain Placer

This property was located in a gulch by John McGrath, probably in the late 1880s.[93]

e) Grassy Hill Lode

This claim was eighteen miles easterly from Cottonwood Wash and about four miles south of the Iron Chief Mine, in

---

90. "Notes on Mining Activity in Dale Mining District," p. 3; S.B. Mosher, president, Imperial Smelting & Refining Co., to Sec. of the Int., Sept. 15, 1938, Letters Received by the Office of the Secretary of the Interior, RG 79, NA; Vredenburgh et al., Desert Fever, pp. 30-31; California Journal of Mines and Geology, 1940, p. 47.

91. Superintendent, JTNM, Memorandum for the Director, Aug. 12, 1941, FARC, San Bruno, Ca.

92. Engineering and Mining Journal 84, no. 18 (Nov. 2, 1907): 843.

93. Ibid. 57, n. 10 (Mar. 10, 1894): 229.

T4S, R13E. The property was located for semi-precious minerals (vesuvianite and marble) on December 17, 1934, by Chester Morten and Edith Hopper.[94]

f) Rainbow Lode

This property was located in 1935 by Chester Morten and Edith Hopper and was situated about two miles south of the Iron Chief Mine, in T4S, R13E. Development consisted of one shaft on the quartz vein. Ore recovered was milled at the Hopper (Moorten) mill in Cottonwood Wash.[95]

g) Mule Shoe Lode

This property is about sixteen miles east of Cottonwood Wash in T4S, R14E. Two claims on a quartz vein were located in 1935.[96]

h) Diane Lode

Located about 1934 by R.A. Theobold, this mine is in T4S, R14E. Sixty tons of ore from the quartz vein were milled at the Hulsey mill at Cottonwood.[97]

i) Desert Star Lode

At this site a quartz vein containing gold, silver, and copper was developed. It was four miles west of the Iron Chief in T3S, R12E.[98]

j) Mystery Mine

This property was situated about two miles north of the Desert Star Mine. Gold and silver ores were found, the vein being

---

94. Guthrey to Dir. of Investig., May 6, 1937, p. 16.

95. Ibid.

96. Ibid.

97. Ibid., p. 14.

98. Ibid.

developed by a shaft.[99] It was reportedly a small-scale gold placer operation conducted from 1933 to 1936 by L.L. Benthall of Indio, California.

k) Barrel Tanks Placer

This property was located in Section 15(?), T3S, R13E, along the north slope of the Eagle Mountains in the vicinity of (or the same as) the Mystery Mine. This site is about six miles southeast of the Mission Well. William S. Wayne operated and prospected the property from 1936 to 1960. This was reported to be a small-scale hand-operated dry-washing operation.[100]

l) Lucky Turkey #2 Mine

No data was found by the writer concerning the history of this property.

m) Hard Digging Mine

This mine was located on December 23, 1935, by Mrs. Bill Walch of Beaumont, California. It was about five miles southeast of the Sunrise Mine and about three miles northwest of the Black Eagle Mine.

n) Swastika #1-7 Mine

This group of seven claims was located about 1931 in the Eagle Mountain area by William T. Little, J.M. (or W.) Bundschuh, and Thornton C. Taylor. No location information was found.

o) Storm Jade Mine

This jade deposit was discovered in the late 1940s by Barry Storm. Building a small cabin, he lived there from 1956 until about 1967.[101]

---

99. Ibid., pp. 14-15.

100. C.H. Gray, Jr., J.R. Evans, and Richard Saul, "Mines and Mineral Resources of Riverside County, California," [1961], in JTNM library.

101. Vredenburgh et al., Desert Fever, p. 31.

3. Mill Sites

No mills other than those mentioned in the previous section were noted.

4. Evaluation of Resources and Recommendations

a) Mine Sites

No mining sites in the Eagle Mountain Mining District were visited by this writer. Those mining operations of the most consequence in the area (Iron Chief, Black Eagle) were once included within the monument boundaries but were later excluded so that intense mining activity could take place. Most of the mine sites left inside the monument were small placer operations of little historical or economic significance.

(1) Kaiser Steel Corporation Properties in the Placer-Mystery Canyons Area

This property consisted of eight patented mining claims and portions of three patented claims within the boundaries of Joshua Tree National Monument. These included the Ferro and Superior claims on which were found small deposits of iron minerals. In the 1970s these claims were inspected and appraised by mining engineers. They were located in Sections 14 and 15, T3S, R13E, north of and adjacent to the boundary of the northeast portion of the monument. The claims were on the northern flank of the Eagle Mountains and extended from Placer Canyon (Superior No. 17) on the east northwest to the edge of Pinto Basin (Superior No. 12). Ferro No. 40 was about 3,000 feet west, separate from the other claims. All of these were patented by the Iron Chief Mining Company in 1915-16.

These small iron deposits were about five miles from the westernmost mining activity of the Eagle Mountain operations at the Black Eagle Mine. The deposits contained some test pits and short

adits, but otherwise were undeveloped. Only a few old foot trails were noted on some of the slopes overlooking Pinto Basin.[102]

(2) Mystery (Mirtru) Mine

This mine is located in Section 15, T3S, R13E, at the base of the north slope of the Eagle Mountains, about six miles southeast of Mission Well. Mine workings consist of vertical shafts, trenches, and adits. The mine was idle in 1959. In 1976 the site was visited by the LCS crew, which determined it to be ineligible for the National Register. The remains of a campsite were found in the canyon between Kaiser's Ferro No. 40 and Superior No. 12 claims. Well-marked foot trails led to workings in the upper canyon. Several level building sites were found as well as a small metal cabin. The mine possesses no historical significance and should be left to natural deterioration.

(3) Mystery Canyon Ruin

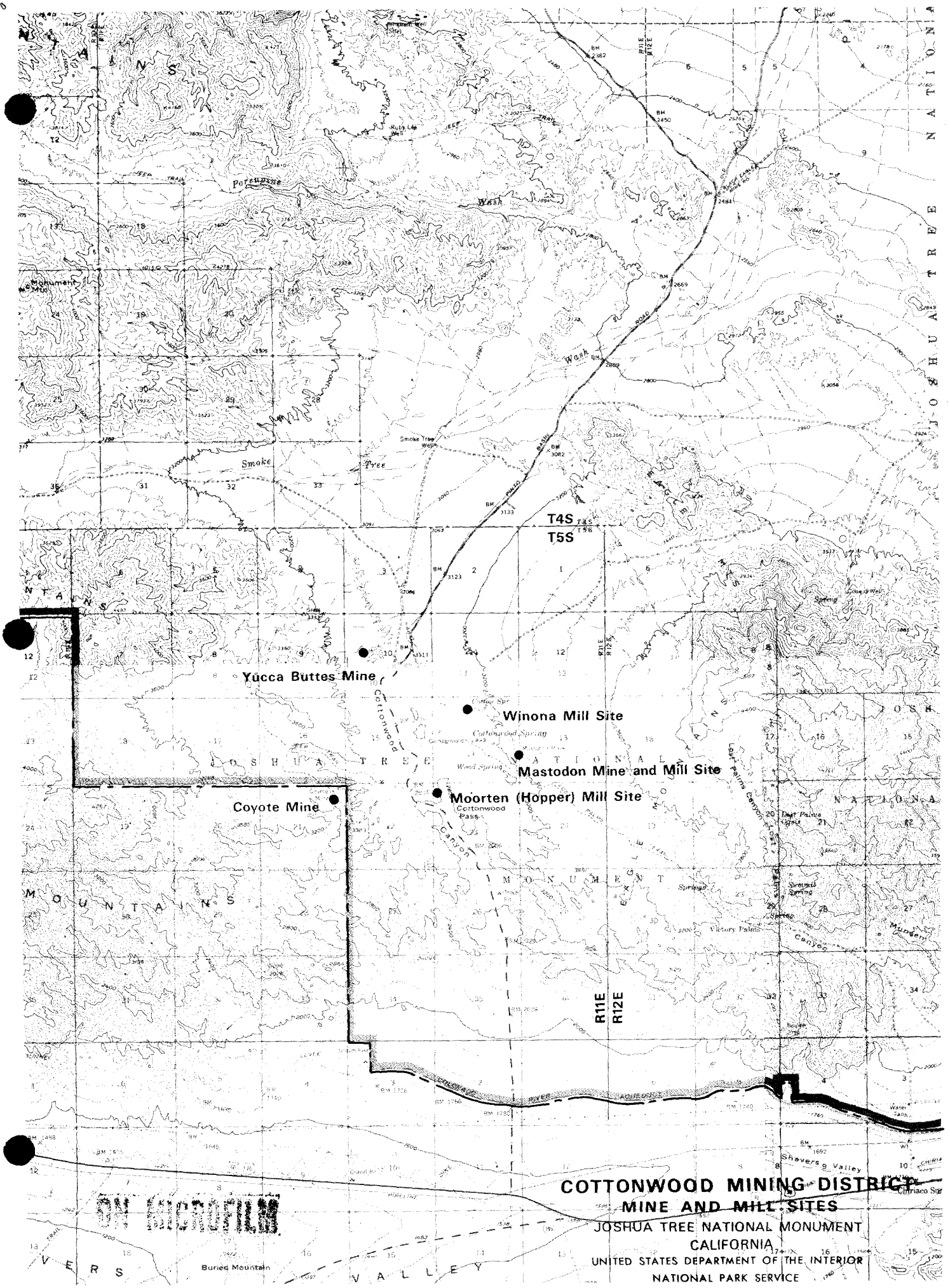
The LCS crew also visited a ruin in Mystery Canyon. Two level building sites and a roofless stone building shell were found. Its exact location cannot be determined by this writer. No further information has been found on this site. It is not historically significant.

(4) Blind Mule Placer Mine

This site is located in the southeast quarter of the southwest quarter of Section 8, T3S, R13E. A claim marker in an arroyo provided the name to the LCS crew and a location date of 1932. Another small metal cabin identical in its details to that at the Mystery Mine was found. The arroyo above the cabin had been placer mined.

---

102. Charles T. Weiler, "Appraisal of Mineral Interests Inherent in the Kaiser Steel Corporation Properties in the Placer-Mystery Canyons Area within the Joshua Tree National Monument, Riverside [County], California, January 1975," file L3023, Div. of Mining and Minerals, WRO, NPS, San Francisco, Ca., pp. 2-3, 5, 7, 11-13.



COTTONWOOD MINING DISTRICT
MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

DSC / SEPTEMBER 1983 / 156-25001

Magazines found in the cabin dated from the mid-1950s. This was another small placer operation that does not possess historical significance.

(5) Lucky Turkey #2 Mine

When this site was inspected in 1973, a timbered vertical shaft about 150 feet deep terminated at the end of a 270-foot-long adit. The mine is not considered significant.

b. Mill Sites

No mill sites were visited by the author and none of significance in the Eagle Mountain Mining District are known to be within the monument boundaries.

F. Cottonwood Spring Mining District

1. History

Cottonwood Spring lies in the southernmost part of the monument. The oasis was inhabited historically and now supports a campground and ranger station. The Cottonwood Spring Oasis is the smallest of the four oases in the monument area--the others being at Twentynine Palms, Fortynine Palms, and Lost Palms. It is the only one that is largely man-made, having been developed from a flowing spring supporting a scattering of small desert shrubs and plants that thrived on moisture.

Despite its isolated location, the Cottonwood Spring area was destined to become heavily utilized. The presence of a dependable source of surface water and of economically viable mineral deposits drew cowmen, homesteaders, and prospectors. The oasis did not see large-scale white utilization until the nineteenth century. As activity in the Dale Mining District commenced, profound changes were wrought at Cottonwood Spring, especially from about 1870 to 1910. Both Cottonwood and the Twentynine Palms oasis became overnight stops on the freight wagon roads to Dale from Mecca and Banning. As one of two water sources between Dale and Mecca (the other being Shaver's Well), Cottonwood became a popular stopover for cowboys, miners, teamsters, and other desert travelers. The area was homesteaded, although few

names connected with this use have been found. A Williams Homestead near the oasis was mentioned in one archeological study that surveyed Sections 13 and 14, T5S, R11E.[103] Teamsters may have planted some of the trees at Cottonwood that gave the oasis its name. Homesteaders and miners living in the wash near the Winona mill planted many exotic trees and shrubs, such as eucalyptus, cottonwoods, pomegranates, and palm trees.

At one time water from the spring was pumped about twenty miles to the Iron Chief Mine in the Eagle Mountains. According to Cactus Slim Moorten, an early inhabitant of the spring, a pumphouse was built by the mine company at the spring about 1890 or 1895. A large reciprocating engine pumped the water through a one-inch pipeline that followed almost a straight line to the mine. A man on a burro rode the pipeline to check it during both extremely hot and cold weather. After the Iron Chief abandoned the pumphouse, it was utilized as living quarters by various people.[104] When J. Smeaton Chase stopped at Cottonwood around 1918 he found a man living in a rock cabin at the spring who ran the pumping plant. This fellow had also planted a garden for radishes, beans, and tomatoes. Chase also mentions an arrastra and scattered rock samples. This is probably where ore from some of the Monte Negras mines was milled.

The output of the spring was as much as 3,000 gallons a day in the early 1900s. When Moorten lived there in the early 1930s, Cottonwood Spring, Cotton Spring, and Wood Spring were all government water reserves. The water from Cottonwood Spring was not piped or contained. Excess water simply sank into the ground. The spring was just a flow from a cleft in the rock. It was later cemented up by the

---

103. Ronald D. Douglas, "The Cottonwood Springs Archaeological Reconnaissance: Preliminary Report" ([Fullerton: California State University]?, 1978), n.p.

104. H. Sansum interview with Cactus Slim Moorten, Oct. 28, 1969, JTNM files, pp. 3-4.

government and a door put across it. Three or four cracks seeped water all the time.[105] The decline in mining operations during the 1930s resulted in reduced freight traffic along the old routes, causing Cottonwood Spring to become relatively quiet in the early 1930s.[106] It was then, however, that many mining locations were made in the area, causing more activity.

2. Mine Sites

a) Coyote Mine

The Cottonwood Spring Mining District was in operation by 1892, though only one mine, the Coyote, was being described. It was a quartz deposit developed by two shafts and was idle at that time.[107] The property is immediately outside the monument boundary, about 2 miles southwest of Cotton Spring, in T5S, R11E. In 1933 the mine was being worked by a family that was living in the old Iron Chief pumphouse at Cottonwood Spring. By the late 1930s several tons of ore from the claim had been milled at the Hopper mill, recovering $12 per ton. The mine was owned at this time by Chester Morten and Edith Hopper.[108]

b) Snow Cloud Lode

This property, also outside of the national monument, about fifteen miles west of Cottonwood Spring in T4S, R10E, was considered part of the Cottonwood Mining District. It was located August 9, 1934, by Alfred A. Bell of Thermal, California. Development

---

105. Ibid., pp. 5, 10-11.

106. Jerry A. Moore, "A Day at Cottonwood Spring," published by the Joshua Tree Natural History Association in cooperation with the National Park Service, revised 1973; Steve Nelson, "Palm Oases of Joshua Tree National Monument," pamphlet published by the Joshua Tree Natural History Association in cooperation with the National Park Service, 1974.

107. William H. Storms, Old Mines of Southern California (Toyahvale, Tex.: Frontier Book Co., 1965), pp. 90-91.

108. Moorten interview, Oct. 28, 1969, p. 3; Guthrey to Dir. of Investig., May 6, 1937, p. 15.

by the late 1930s consisted of an inclined shaft sixty feet deep and adits. Ore had recently been shipped and several tons were still in the ore bin at the time the claim was investigated.[109] Bill Keys operated the mine at one time.

c) Southern Cross Lode

This property was situated about 2½ miles southwest of Cottonwood Spring, in T5S, R11E. It was located in 1931 by N. E. Hopper, C. E. Wilson, and others. Development by 1937 consisted of two shafts on a quartz vein. Several tons of ore had been milled at the Hopper mill with a net recovery of $24.85 per ton.[110]

d) Yucca Butte Lode

This claim, located in 1934, was about 2½ miles northwest of the Hulsey property (Winona mill), in T5S, R11E. Ore from this quartz deposit was processed both at the Hulsey mill in Cottonwood Wash and at the Gold Crown mill.[111]

e) Eureka Mine

Notice was found of a mineral location by this name in section 14, T5S, R11E. This was a prospect held by George W. Hulsey in connection with his mill site in that same area.[112]

f) Snow White Mine

The exact location of this property is unknown, so it is unclear if it was part of the Cottonwood Spring Mining District. The only reference to it mentioned that it lay in an unsurveyed township

---

109. Guthrey to Dir. of Investig., May 6, 1937, pp. 17-18.

110. Ibid., p. 15.

111. Ibid.

112. Central Files, 1907-49, RG 79, NA.

south of Pinto Basin and mostly west of the south entrance road through Cottonwood Pass, in T4S, R11E. It was located by Spell and Warner in 1941.[113]

g) Mastodon Mine

This quartz claim, named for a nearby peak shaped like a prehistoric elephant's head, operated during the 1930s. The original location was recorded November 11, 1934. Approximately in Section 13, T5S, R11E, the twenty-acre property consisted of one claim and one millsite. The original assay was reported in one article at $744 a ton, but the mine was worked only sporadically after faulting severed the main vein. By the late 1930s the vein had been developed by a forty-five-foot shaft.[114] The mine was owned by George W. Hulsey of Indio. Labor was kept up by the Hulsey family until 1971 when the property was obtained by the National Park Service.

3. Mill Sites

a) Winona Mill (Cotton Spring)

The date that plant operations first started at the old Winona mill site are uncertain. Although one article states that a five-stamp mill to process ore from the Mastodon Mine and other nearby claims was built in the 1920s,[115] this is doubtful, because little mining activity was going on there during this period. It is more probable that the mill did not enjoy large-scale production, at least, until the mid-1930s. Cactus Slim Moorten, who operated a small custom mill south of Cottonwood during the 1930s, stated that George Hulsey moved into the

---

113. J. Volney Lewis, Reg. Geologist, Memorandum for Regional Director, July 22, 1941, FARC, San Bruno, Ca.

114. "Cottonwood Spring--Where Man and Nature Interact," Roadrunner Magazine (March 1977), p. 9; Guthrey to Dir. of Investig., May 6, 1937, pp. 13-14. The California Journal of Mines and Geology, July 1945, reported an average value of ore milled at $40 a ton in gold--a more reasonable figure. P. 138.

115. "Cottonwood Spring," Roadrunner Magazine (March 1977), p. 9.

Cottonwood Spring area after working a placer on the east side of the monument in the Eagle Mountains. Hulsey settled at a spring that was a government water reserve, which became the Winona mill site. Moorten said a mill was definitely operating at Winona during the period from 1934 to 1939.[116] In 1936 a custom plant was reported in operation in the Cottonwood Mountains treating ore from different small properties in the area, but its name was not mentioned.[117] By 1945 a large mill, then idle, was described at Cottonwood Spring in Section 14. The owner was R. A. Theobald (Theobold?) of Los Angeles:

> The mill has a capacity of 40 tons per day. Ore to coarse ore bin, capacity 20 tons, then by belt feeder to 9-inch by 8-inch Fulton jaw crusher to 20-ton fine-ore bin. From fine-ore bin to 4-foot by 4-½-foot ball mill, in closed circuit with drag classifier, overflow from classifier to amalgamation plates to amalgamation trap. Water from trap pumped by 2-inch centrifugal pump to cone classifier; overflow from cone to feed from ball mill. Product from bottom of cone to Universal concentrator, or to 2-cell Groch flotation machine; tailings from concentrator to settling tank, and water from settling tank returned to ball mill. The mill is driven by 40 horsepower Buick motor. Recovery is reported to be 85 percent of gold values.[118]

b) Mastodon Mill

The Mastodon Mine property is said to have been equipped with a ball mill having a capacity of twenty-five tons in twenty-four hours by the late 1930s. Ores milled had a value of $60 per

---

116. Moorten interview, Oct. 28, 1969, pp. 4-5, 25.

117. Walter W. Bradley, State Mineralogist, to Harry R. Sheppard, House of Representatives, Dec. 15, 1936, Central Files, 1907-49, RG 79, NA.

118. California Journal of Mines and Geology, 1945, p. 129. Moorten said the ball mill at Winona was put in about the time he left the area, which would have been late 1939. Interview, Oct. 28, 1969, p. 24.

ton with a recovery of $40 per ton. The mill was operated by the mine owner, George W. Hulsey.[119]

c) Hopper Mill (Moorten Mill?)

This plant is mentioned frequently as operating on ore from mines in the area during the 1930s. Mrs. Hopper had developed water for a mill site she held in Section 22.[120] This will be discussed further under the Moorten Mill Site.

d) Desert Star Mill Site

This writer found no information on this site, but it was mentioned by an archeologist of the California State University at Fullerton as being tentatively identified during an archeological survey of Sections 13 and 14, T5S, R11E.[121]

e) Moorten Mill

During the 1930s a five-stamp mill was erected in Cottonwood Wash in Section 23, T5S, R12E, by Chester Moorten (Morton, Morten) and Edith Hopper. This plant, frequently referred to as the Hopper Mill, not only treated ore from the Coyote claim and several of their mines, but also performed custom work on ore from other mining claims.[122] According to an oral interview with Moorten in 1969, he actually filed on the mill site in 1934. The small gold mill he erected housed five stamps weighing about 200 pounds apiece. Moorten lived there alongside his car. He first arrived in the area around March 1934 and finally discontinued the mill operation in about October 1939. He

---

119. Guthrey to Dir. of Investig., May 6, 1937, p. 14.

120. S.E. Guthrey, Special Agent, Div. of Investig., Dept. of Int., to B.B. Smith, Dir. of Investig., June 16, 1938, Central Files, 1907-49, RG 79, NA, p. 20.

121. Douglas, "Cottonwood Springs Archaeological Reconnaissance," May 17, 1978, n.p.

122. Guthrey to Dir. of Investig., May 6, 1937, p. 15.

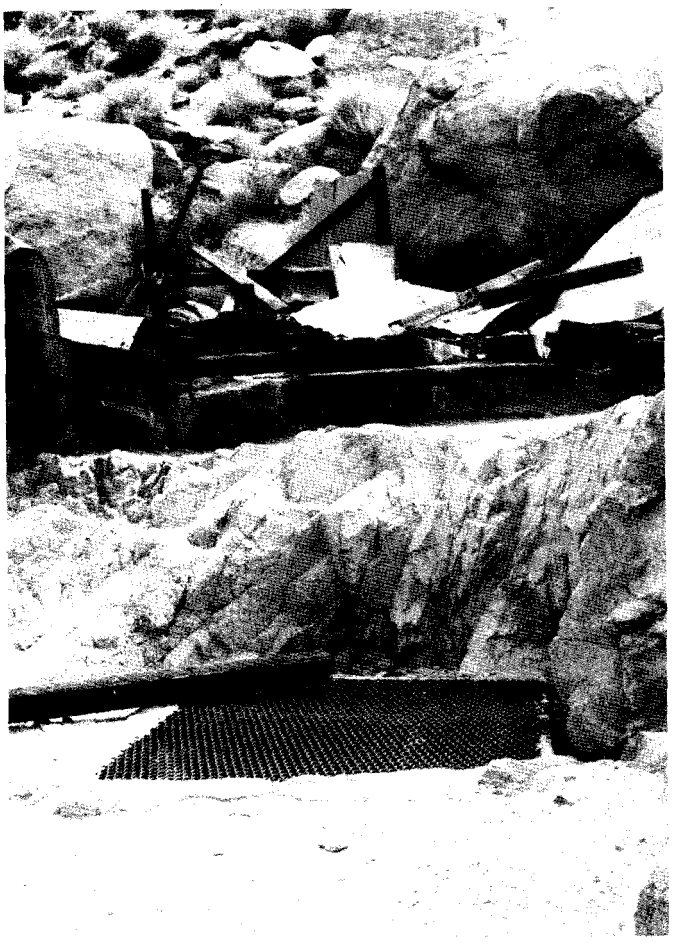
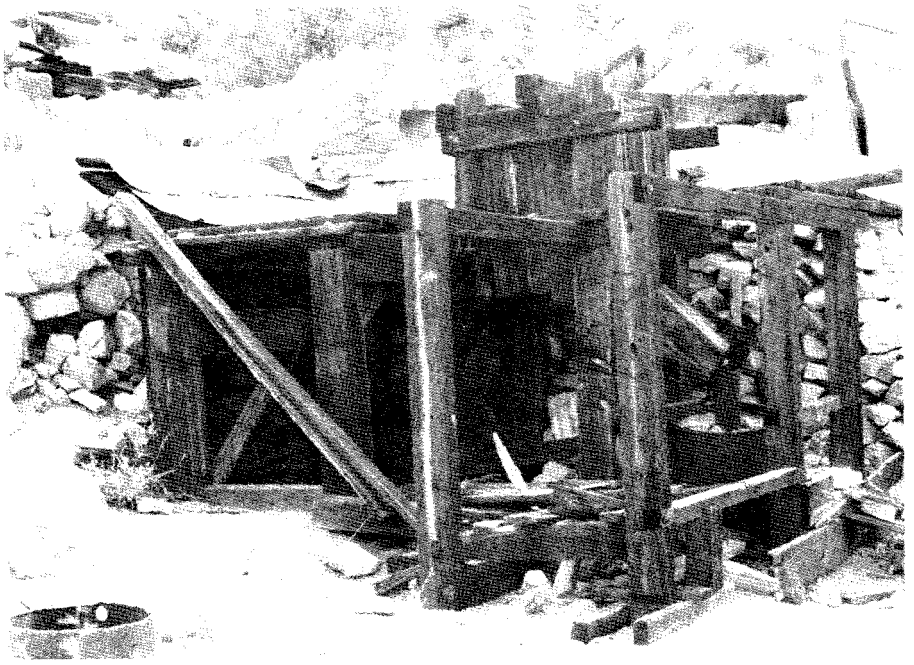


Illustration 45 (left).
Mastodon Mine. Collapsed office and grated vertical shaft.

Illustration 46 (below).
Ore bin and superstructure over second vertical shaft. Note crusher in section to right. NPS photos by Linda W. Greene.



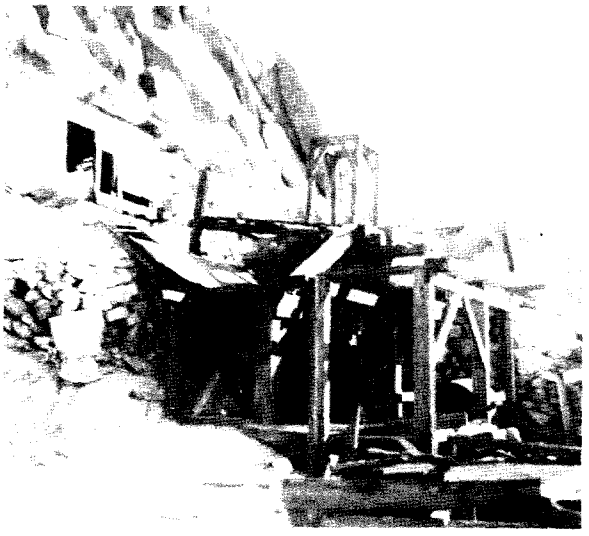




Illustration 47 (top).
Mastodon Mine, n.d. Note revolving crusher on right-hand side of middle structure. Photo courtesy JTNM.

Illustration 48 (left).
Close-up view of iron crusher filled with concrete, now lying on its side. NPS photo by Linda W. Greene.

held mining properties east of Cottonwood Spring and near the old Iron Chief Mine on which he kept up assessment work until 1950.[123]

4. Evaluation of Resources and Recommendations

a) Mine Sites

(1) Mastodon Mine

This is the only mine property with workings visited by the writer in the Cottonwood Spring area. The mine is in the SW¼ of Section 13 and the NE¼ and SE¼ of Section 14, T5S, R11E. This gold mine is at the western base of a large geologic formation of quartz monzonite that was reportedly named by miners for its resemblance to a mastodon's head and trunk. The site can be reached by a three-mile hike from the Winona mill site to Mastodon Peak and back to Cottonwood oasis via the Lost Palms trail.

In the early 1970s the Mastodon Mine was investigated by mine safetying personnel. On site they found two shafts, an open inclined one approximately seventy-five feet deep, and another about twenty feet deep, covered with old wood. The Mastodon Peak Trail crosses between these two workings and through the middle of the mine area. The mine office stood on a ledge above the easternmost shaft. By the time this writer visited the site ten years later, the one hazardous shaft had been grated and the building had collapsed. Extant is a structure comprising the wooden framework that encloses the other shaft, a one-chute ore bin, and what appears to be the remains of a crushing operation. The claim owner was reported to run a small, homemade twenty-five-ton-capacity ball mill in conjunction with his mining operation.

The Mastodon Mine is not considered to have historical significance. It is, however, an interesting stop for people hiking the Mastodon Peak trail. The property contains no safety

---

123. Moorten interview, Oct. 28, 1969, pp. 8, 10, 14, 20, 22-23.

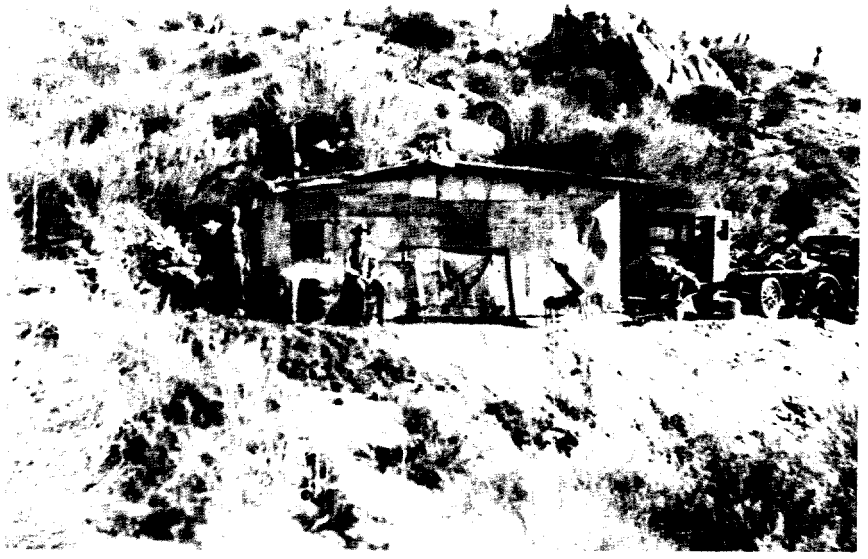


Illustration 49.

Winona mill site residence, 1930-31, Harold Hulsey, Sr., seated. Courtesy JTNM.

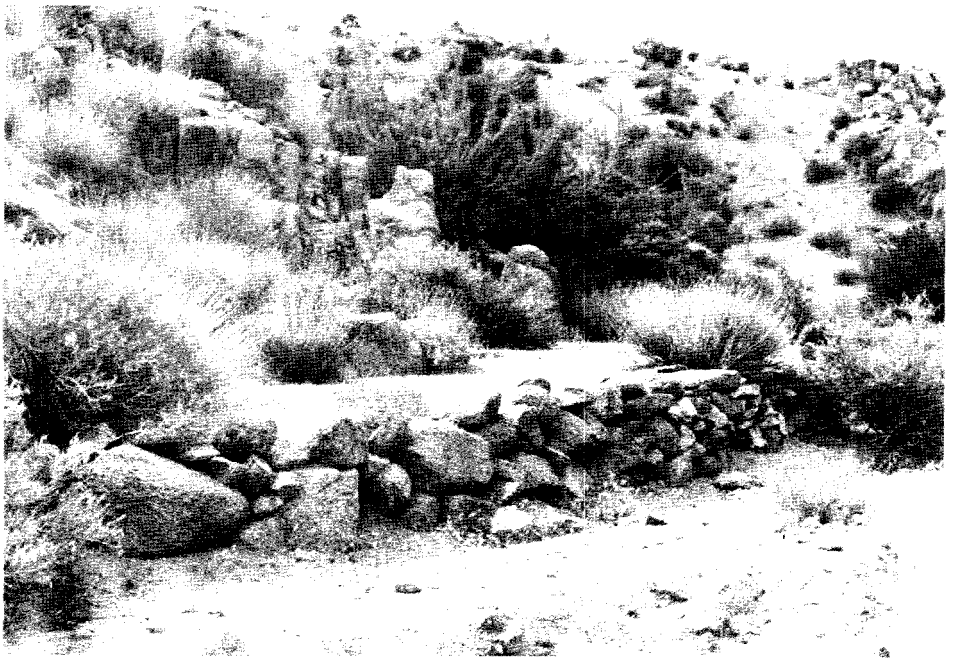


Illustration 50.

House site along wash near Winona mill, 1982. NPS photo by Linda W. Greene.

hazards now that the one deep shaft next to the trail has been grated. The ore storage and crushing area connected to the other shaft is in good shape. Its condition has changed little in the past several years. The mine office above the trail has collapsed. The elimination of some of the corrugated metal and bits of loose lumber on the building foundation would not detract from the historical interest of the site. It is undoubtedly a tempting place for visitors to explore in its present state, but it also offers cool shelter for snakes. Illustration 47, showing the site with the office building standing, could be used on an identifying marker.

b) Mill Sites

(1) Winona Mill (Cotton Spring)

The wash passing north-south in front of this mill site in the north half of Section 14, T5S, R11E, contains evidence of early habitation probably of some duration. Found were two wells covered by cement slabs. Numerous building foundation levels, marked by low rock walls, can be seen along the edges of the dry wash. The inscription "G. W. H. 10/12/37" was found, indicating the presence, and possibly the living quarters, of George W. Hulsey, owner of the Mastodon Mine and Winona mill. By 1963 three acres of the Winona mill site had been developed with three old shacks, two concrete mine buildings, and other miscellaneous structures. The buildings were razed in that year, the refuse cleaned up, old water lines removed, and retaining walls mostly knocked down. A bench below the millsite was the former location of a house connected with the operation.

Today the only evidence of the Winona mill operation remains in the form of building foundations and cyanide-stained waste dumps. Ruins on site consist of a large roofless concrete platform enclosed on three sides by seven-foot-high walls and with pipes leading from it, indicating it probably housed a water tank; a second concrete building foundation whose use is unknown; and the mill ruins themselves, consisting of concrete machinery pilings and foundations.



Illustration 51.

Winona mill, probably before 1930-31. Courtesy JTNM.



Illustration 52.

Winona mill, n.d., looking north up wash near Cotton Spring. Courtesy JTNM.

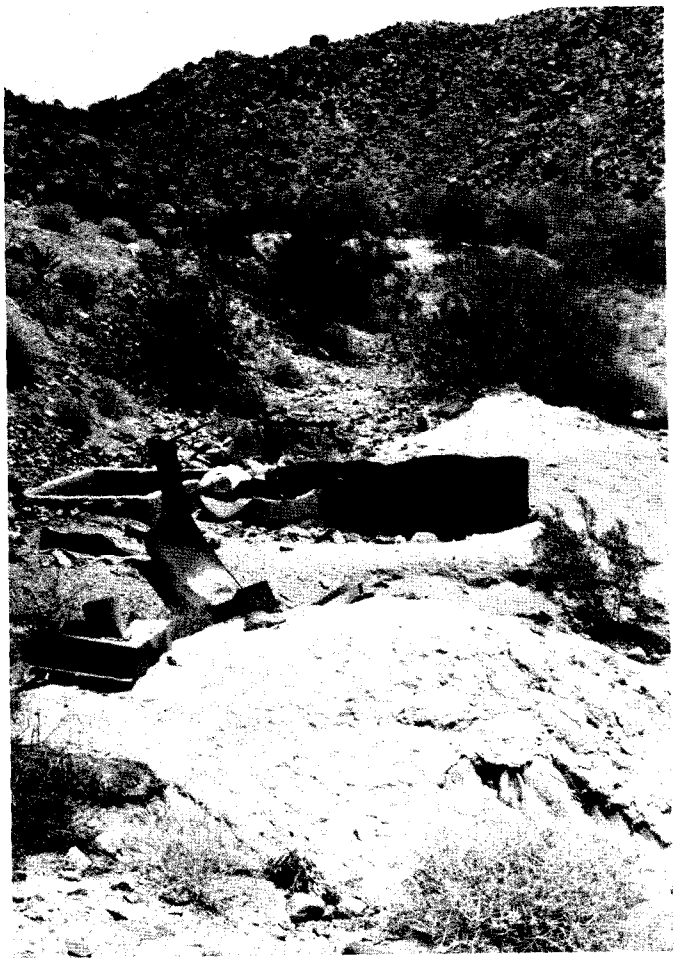
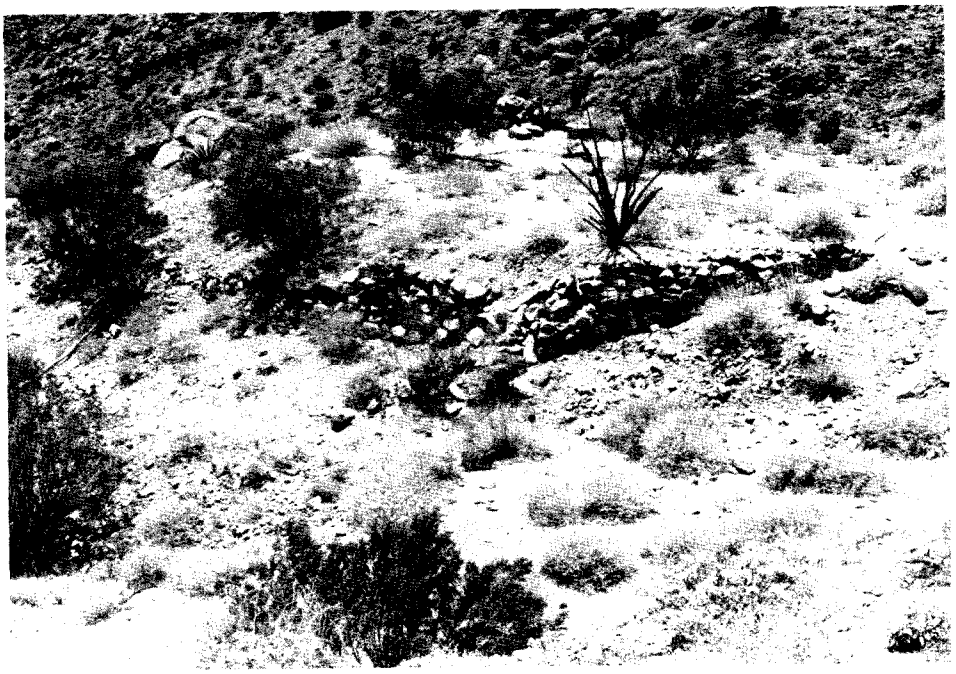


Illustration 53 (left).
Cast-iron and concrete vats, Moorten mill in Cottonwood Wash.

Illustration 54 (bottom).
Rock walls and L-shaped concrete building platform, Moorten mill.
NPS photos by Linda W. Greene.



For about five years the Winona mill performed custom milling for small mines around Cottonwood Spring. Because the Eldorado Mine to the northwest is being nominated to the National Register, partly on the basis of representing a custom mill of the 1930s, the Winona mill will not be nominated. The ruin should be left to natural deterioration.

(2) Moorten (Morton, Morten) Mill

This mill site is reached by a trail that follows the wash south from Cottonwood Spring. Following Cottonwood Canyon for about a half mile brings the hiker to Moorten's mill site, lying on the western slope of the canyon. All that remains of this milling operation are a concrete building slab, some stone retaining walls, and four round sheet-metal vats. Purple glass fragments were found there and several rusted car parts were scattered over the flat wash.

This mill ruin of the Cottonwood Mining District is not considered to be historically important. The Moorten site should be left to natural deterioration.

A 1930s-period custom mill in the monument will be represented on the National Register by the Eldorado Mine and mill, which is considered significant because of its size and the presence of more documentary data.

c) Other Historical Sites

(1) Cary's Castle

This one-room prospector's house was adapted from a sheltered cave formed by very large adjoining rocks. Walls of stone masonry and concrete were built among large monzonite boulders that formed portions of the walls and roof. The south wall was almost entirely stone masonry and contained a wooden door and screen-covered window well. A masonry retaining wall and a firepit were west of the dwelling. It is assumed that a miner lived there because a road leads from the "house" to a vertical shaft. This "house" was still furnished in 1945, with a cot and other rough, makeshift furniture. No one at the

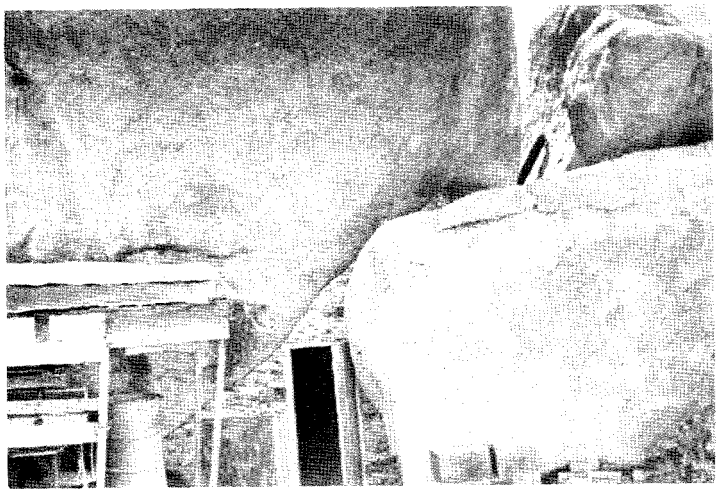


Illustration 55.

Exterior view of Cary's rock "castle" near Lost Indian Tank, 1945. Courtesy JTNM.

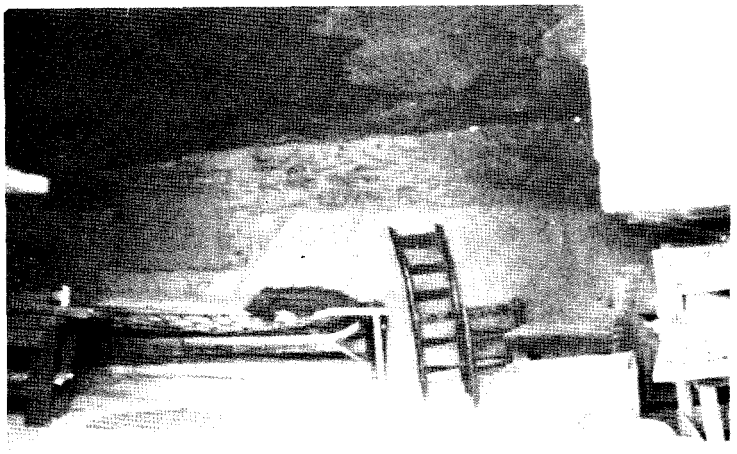
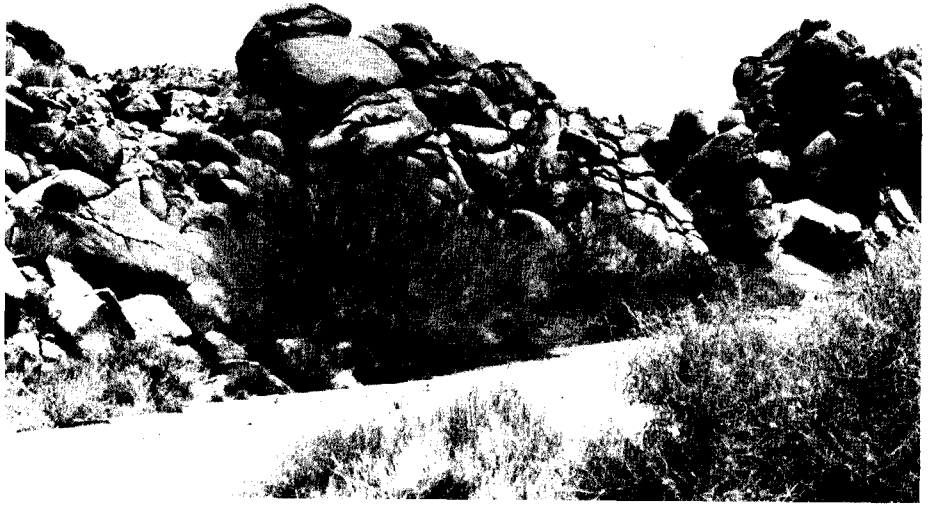


Illustration 56.

Interior view of "castle," 1945. Courtesy JTNM.



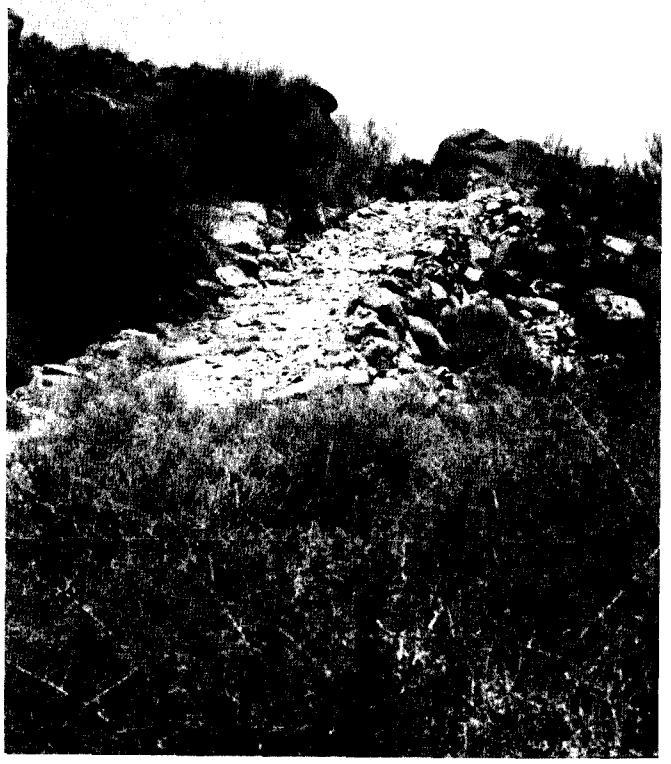
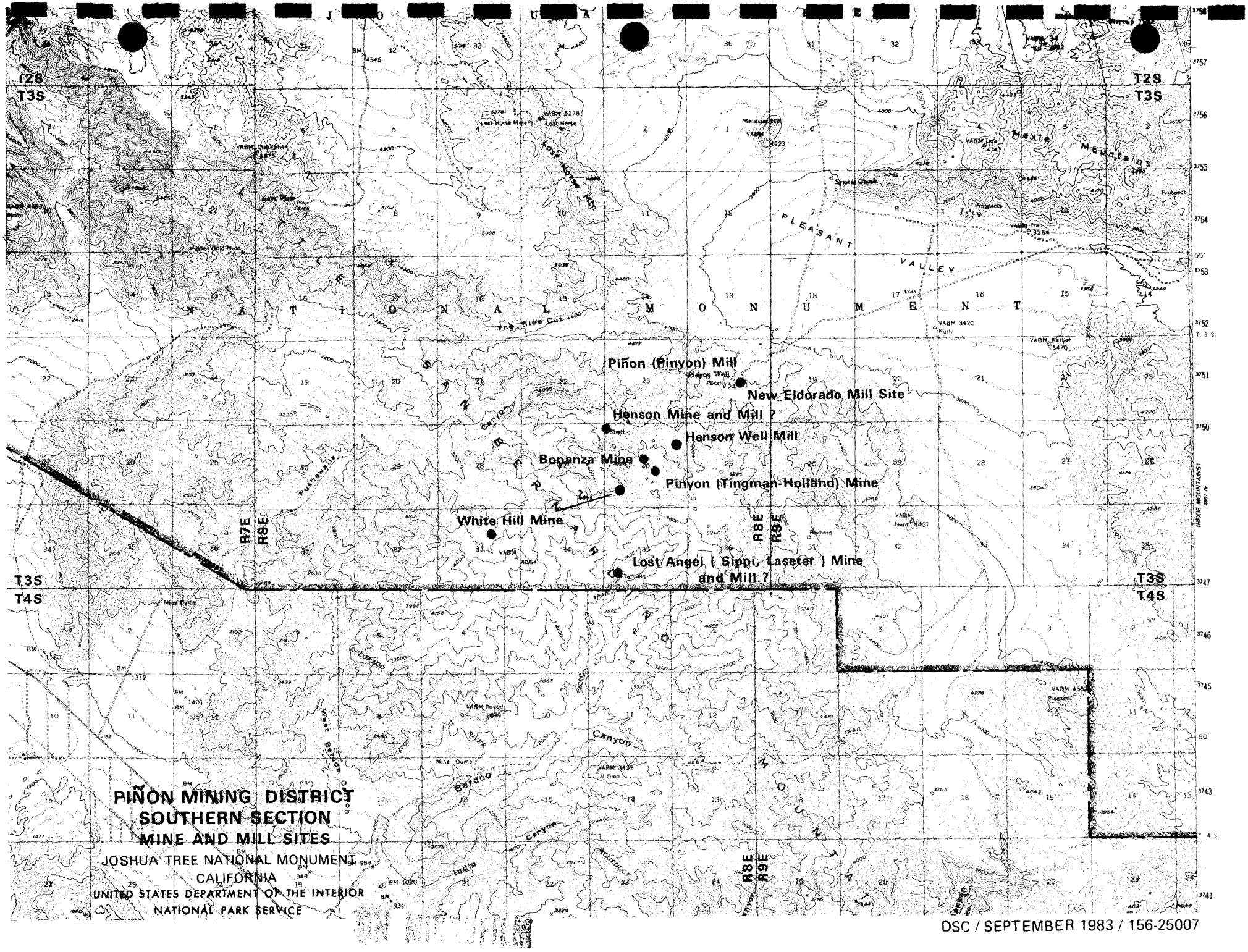




Illustration 57 (top left).
Cottonwood Wash. Rock waterfall to right of picture, Little Chilcoot Pass at upper left.

Illustration 58 (top right).
View showing composition and width of road.

Illustration 59 (bottom left).
Road bed coming down out of pass.
NPS photos by Linda W. Greene.



DSC / SEPTEMBER 1983 / 156-25007

Cottonwood Ranger Station knew the exact location of this shelter, so its current condition is not known. It was not considered by the LCS evaluation team to be of National Register significance, but if still in existence should be left to natural deterioration as an interesting example of vernacular architecture.

Interpretively this site is interesting as an example of how man can secure a comfortable home without much effort by taking advantage of existing natural conditions. Such adaptation is a necessary part of wilderness living.

(2) Little Chilcoot Pass

This old freight road, built possibly in the 1880s to bypass a dry waterfall in Cottonwood Wash, will be discussed in the section on Roads and Trails in the Pre-Monument Period.

G. Piñon Mining District

1. History

The Piñon Mining District started taking shape in the late nineteenth century. It was organized around claims in the Piñon Mountain area of the Little San Bernandino Mountains, but eventually grew to encompass far more. Its western boundary ran by the Lost Horse Mine north as far as the Desert Queen Mine and included several claims in that vicinity. The district spread southeast to the Golden Bee Mine and embraced several properties bordering Pleasant Valley. Fargo and Berdoo canyons were also included in this district. Because of its size, the writer will discuss it in terms of Southern, Northern, and Middle sections.

Southern Section

Activity in the southern end centered around Pinyon Spring (later developed into a well), which became a focal point for miners entering the monument from the Coachella Valley. By 1890 a small mill had been established at the spring site. In 1892 the miners named the district Piñon (Mountain).[124]

---

124. Lucile Weight, "Century old landmark-preservation [needed?], Desert Trail (Twentynine Palms, Ca.), Feb. 25, 1982.

2. Mine Sites

a) Pinyon (Tingman-Holland) Mine

This property is in the south half of Section 26, T3S, R8E, 1½ miles southwest of Pinyon Well along the crest of the Little San Bernardino Mountains. The mine was worked in the 1890s by Alfred G. Tingman, a Southern Pacific Railroad agent, and Ed Holland, a mining engineer, both of Indio. These men were reportedly operating two mills in The Blue Cut, northwest of the mine, by 1891. In 1894 it was reported that "some very high-grade rock has been taken from several claims of this group, which was crushed in a 2-stamp mill a mile from the mine. The deepest work on these veins is 70 feet from the surface."[125] Two years later L. B. Woodworth of Los Angeles was owner of the Piñon Mountain quartz mines, where he had a small force at work on several claims. Ore was still being crushed at the Pinyon Well two-stamp mill.[126] In 1900 the property was purchased by Ertel and Glove of Los Angeles, who intended installing machinery and working the large tailings body before continuing development. The old works at this time consisted of two shafts--one 75 and the other 100 feet deep, in addition to about 400 feet of tunnels.[127] In 1902 W. F. Sherwood of Los Angeles purchased from Dr. Mary S. Erth (Ertel?) a two-thirds interest in this and the Golden Calla Mine in the Piñon District.[128] In 1903 the current owners reported a 4½-foot-wide vein of good ore in a claim adjoining the old Piñon Mine, "which was worked 10 or 12 years ago."[129] As late as 1907 the mine was operated by W. F. Wilkinson of Indio. After being inactive for many years, the property was relocated by William F. Keys in the 1920s, but little or no work was performed. The Keyses held the Pinyon

---

125. Twelfth Report of the State Mineralogist, 1894, p. 224. The mill mentioned is believed to be the machinery now in the Wall Street mill.

126. Thirteenth Report of the State Mineralogist, 1896, p. 313.

127. Engineering and Mining Journal 70, no. 24 (Dec. 15, 1900): 707.

128. Ibid. 73, no. 8 (Feb. 22, 1902): 286.

129. Ibid. 75, no. 26 (June 27, 1903): 980.

Group of claims (White Hills, Mountain View, Pinyon, and Grand View) in Section 26.[130]

b) Bonanza Lode Claim

The Bonanza claim was located in 1905, amended in 1921, and patented by the New Eldorado Mining Company on July 12, 1923.[131] At the time of patent the map showed a road to the property, a cabin, a well, and a ten-foot discovery shaft. The mine was located in the northeast quarter of Section 26, T3S, R8E. This location covers Henson's Well, a spring used for many years for the milling and reduction of ores from mines in the vicinity.

c) Lost Angel (Sippi, Laseter) Mine

This property, in the southwest quarter of Section 35, sits in a narrow canyon high on the southwest slope of the Little San Bernardinos, 2-3/4 miles southwest of Pinyon Well. In 1945 it was erroneously reported as being in Section 22. The Sippi Mine, probably the Lost Angel, is said to have been worked by a Mr. McFarland in the 1890s. The Lost Angel was owned many years ago by W. H. Laseter of Twentynine Palms. From 1937 to 1945 the mine's eight claims were leased to C. L. Woods of Indio. A. F. Perry acquired the property in 1945 and sold it to Clyde Jones of Indio in 1956. The mine has apparently not been worked since about 1937.[132]

---

130. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

131. Record of Patent, Bonanza Lode Mining Claim, #911384-7-12-1923, file L3023, Joshua Tree Patented Mining Claims, Office of Mines and Minerals, WRO, NPS, San Francisco, Ca; Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

132. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

d) Henson (Hansen, Hensen, Hanson) Mine

This mine is in the northwest quarter of Section 26, about 1½ miles southwest of Pinyon Well, on the north slope of the Little San Bernardinos. The early history of the property is unknown, but it may have been part of the Pinyon Mine operations about half a mile to the southeast. By 1960 William F. and Frances M. Keys held the Grand View claim as part of the Pinyon Group. Keys stated that the "Hansen shaft" was on the Grand View claim.[133]

e) White Hill Mine

On August 3, 1923, Wm. F. and Mrs. F.M. Keys located the White Hill Mine. It was said to be situated about 3½ miles southwest of Pinyon Well, and yet about one-half mile southwest of the Bonanza Mine. The property is thought to be either in Section 26 or 33, T3S, R8E.[134]

3. Mill Sites

a) Pinyon Well Mill (Piñon Mill)

Pinyon Well began as a spring, where water could be obtained anytime of year by digging in the ground. The site was a natural activity center for mining in the area because of the presence of water for milling and domestic purposes. So a well was sunk and a pump installed and a small camp arose. A steam-powered two-stamp mill was erected in 1890 or 1891 by the mining company (Tingman and Holland) working the Piñon Mountain area. Each stamp weighed 850 pounds. The mill had a capacity of four tons per twenty-four-hour period.[135] Ore from several small mines was crushed in both the stamp mill and a nearby arrastra. In 1895 Jim McHaney hauled in ore from the Desert Queen Mine farther north to be milled. In 1907 George Wharton James described the Pinyon Well camp: "There are a few cabins and a stamp mill situated in a

---

133. Ibid.

134. Location Notice, White Hill Mine, Book 53, Mining Claims, Records of Riverside County, California, p. 460.

135. Thirteenth Report of the State Mineralogist, 1896, p. 315.

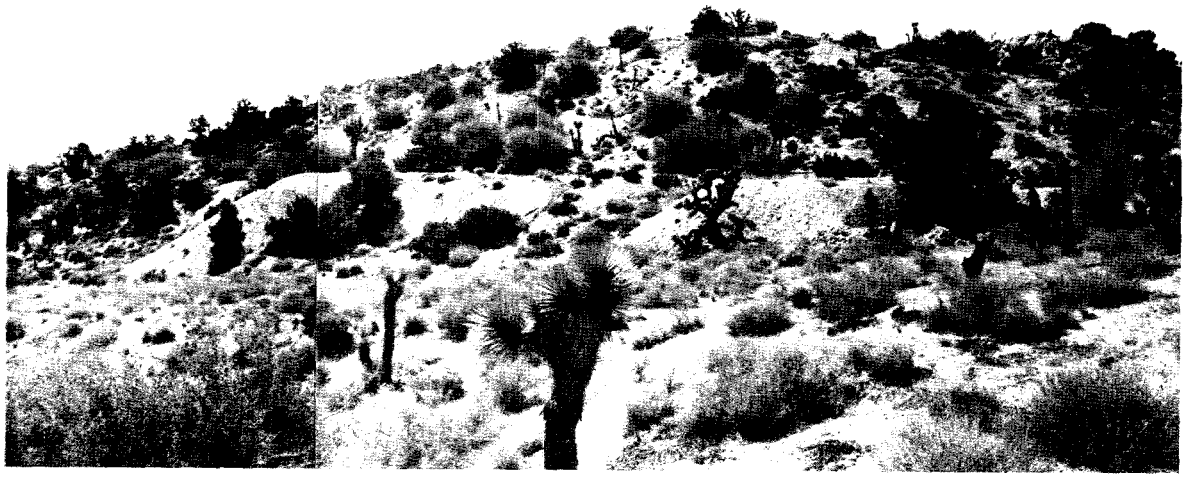


Illustration 60.

Pinyon (Tingman-Holland) Mine, waste dumps, 1982.



Illustration 61.

Rock-walled structure at base of mine dump. NPS photos by Linda W. Greene.

cozy nook in the mountains, and--pleasing fact--the homes of families, where the voices of women and children are heard."[136] By 1918 the mill site was abandoned. All that remained were two old buildings, the old wells and a rusty pump, the wrecked mill, and miscellaneous tools and pipeline parts. In 1921 the New Eldorado mill site of 4.13 acres was located at Pinyon Well, for which a patent was issued in 1923. Water from the wells was supplied to the Eldorado Mine to the east through a pipeline nine miles long. The wells have probably not been used since the Eldorado closed in the late 1930s.[137] In 1923 the United States Geological Survey inspection of water holes in the monument noted that the wreck of an old two-stamp mill, two deserted cabins, and some abandoned shafts still marked the well site.

b) Henson (Hansen, Hensen, Hanson) Well Mill

Henson Well is in the northwest quarter of Section 26, T3S, R8E, about 1.3 miles from Pinyon Well. Near the well are the remains of an old arrastra and some small stone buildings. Water from here was syphoned to the Eldorado Mine along with that of Pinyon Well.[138]

4. Evaluation of Resources and Recommendations

a) Mine Sites

(1) Pinyon (Tingman-Holland) Mine

This property was reached by following a wagon road from Henson well up toward the crest of the Little San Bernardino Mountains. Development consisted of a drift adit driven on the principal ore vein that may have connected with two vertical shafts lined with pinon logs. In addition there are several adits and prospect holes. All the workings are largely caved in today. The large waste dumps indicate

---

136. James, Wonders of the Colorado Desert, II:484.

137. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

138. USGS Water-Supply Paper 497, 1923, p. 273.







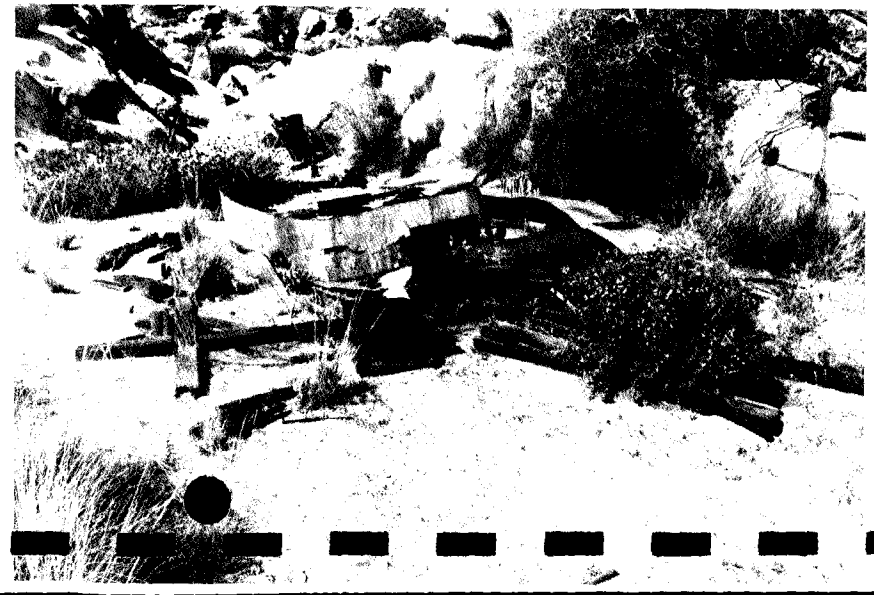


Illustration 62.

Area of mining activity adjoining Pinyon Mine. NPS photos by Linda W. Greene.

that underground workings must have been extensive. At the base of the waste dumps are the remains of a small stone structure with crumbling rock walls, measuring seven to eight feet across. It was probably an assay or watchman's office or a blacksmith shop. There are also prospect pits on a south-facing hill across from these main workings. The vertical shaft at this site is uncovered, rather deep, with timbers and other debris at the bottom. It could be a safety hazard. Over another ridge southeast of the Pinyon Mine another small area of activity was found. Excavations consisted only of an adit and a filled-in shaft at its entrance. An interesting mechanical apparatus of some kind was found several hundred yards away, whose purpose was not clear. It is in ruins, but consists of a wooden platform on metal pipe legs, to which a metal funnel was attached. Other pieces of the contraption lying around on the ground consisted of scoops fashioned from motor lubricant cans, large square-cut spike nails, and a circular wooden wheel, 2½ feet in diameter, with a pipe protruding through the center. The machinery had been positioned over a rocky area at the head of a wash.

The road leading downhill toward Pinyon Well from the Pinyon Mine is steep and rough, much too difficult for trucks to negotiate. Willis Keys, in a 1975 interview taped at Keys Ranch, pointed out to monument rangers some heavy steel plates used in steep country where brakes would not hold when hauling ore from mines like the Pinyon. These items were chained to the heavy ore wagon and run under both rear wheels like a skid. The wagon would then slide on them like a sled down the hill. When not in use, the plates were carried in the wagon bed.

The U.S. Bureau of Mines credits the Pinyon Mine with 483.75 ounces of gold in 1896 and with producing twenty tons of ore yielding 7.74 ounces of gold in 1907.[139]

---

139. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.



Illustration 63.

Henson Mine and what might be a mill ruin, 1982. NPS photo by Linda W. Greene.

The Pinyon Mine was one of the earliest mines in the monument area, although information on development, ownership, and production is scanty. Because its shafts were lined with piñon logs, it is considered by Western Regional Historian Gordon Chappell to be locally significant--representative of a type of early shaft construction prior to the time milled planks and beams became accessible. Because of that, its early discovery date, and its probable association with the Henson Well milling site, it will be included within the boundaries of the proposed Piñon Mountain Historic Mining District.

(2) Bonanza Lode Claim

The exact location of this claim is not known to the writer.

(3) Lost Angel (Sippi, Laseter) Mine

By 1945 development at this site consisted of a 75-foot-deep shaft and a 150-foot adit on the vein. A five-stamp mill also stood on the property, which was idle. In June 1957 the shaft was not found, an adit on the west side of the canyon was only about 50 feet long, and the mill was gone. The U.S. Bureau of Mines records that in 1937 two tons of crude ore yielded two ounces of gold and one of silver.[140]

The site was not visited by this writer but was seen by the LCS crew in 1976. At that time the site consisted of three vertical shafts, two adits, two building foundations, some low masonry walls with a fireplace, and a cement well dated 1937.

The site is not significant in the mining history of the monument and is not considered eligible for the National Register. It should be left to benign neglect.

(4) Henson (Hansen, Hensen, Hanson) Mine

The Henson vertical shaft was sunk in the northwest quarter of the northwest quarter of Section 26, T3S, R8E. To the east in the northeast quarter of the northwest quarter of Section 26,

---

140. Ibid.



Illustration 64.

Pinyon Well mill, ca. 1911 or 1912. Courtesy JTNM.

a second quartz vein has been explored by several short adits. The mine's production is unknown.

The Henson Mine was visited by this writer in 1982. The mine area is reached by a rough four-wheel-drive road leading from Pinyon Well down Pushawalla Canyon. On a north-facing slope is what appears to be a mill site, consisting of a twelve-foot-high masonry wall with some concrete machinery pilings on the flat area in front of it. There is also a block of wood imbedded in the ground, measuring about four feet by two feet, that must have been a support post. Above the stone wall is a deep vertical shaft. About fifteen feet down, a tunnel veers off to the west. A concrete block and a bolt were placed behind the shaft--possibly part of a hoisting mechanism. This shaft is a potential safety hazard.

The Henson Mine was evidently not a significant producer, because no figures have been found nor any information on its developers or early history. No description of the type or extent of milling operations has been found. The site is not considered eligible for the National Register, but should be left to natural deterioration.

b) Mill Sites

(1) Pinyon Well Mill (Piñon Mill)

The Pinyon well mill site is in the north half of the southeast quarter of Section 24, T3S, R8E, on the south side of the Pushawalla Canyon trail east of the Little San Bernardino Mountains. In 1923 patent plats indicated three wells, two cabins, and a mill building on the site. Three shafts within a distance of about 400 feet indicate exploration for water.

Remains on site today consist of a water trough, some low masonry walls, and building foundations. Concrete tanks are extant that were presumably used as water reservoirs when the well area was the mill site for the Eldorado Mine. During the historical period the site has been an important source of water in the western part of the monument for mining, milling, and domestic purposes. The most





Illustration 65.

Two stone structures at the Henson Well mill site. NPS photos by Linda W. Greene.

important aspect of the mill site was the two-stamp mill, which serviced mines in the area from about 1891 to 1933. It is assumed it was not moved from this location until the 1930s. The mill is no longer there, however, now being housed in the Wall Street mill building, which is on the National Register. Pinyon Well was an extremely important early water location and mill site in the monument. It was the hub of mining activity for the southern and middle sections of the Pinon Mining District, first providing crushing services and then water that was either piped or hauled to neighboring mines. Without this water mining activity in the south would have been severely curtailed, especially at the Eldorado Mine, which is being nominated to the National Register. The well and mill site was also important as a crossroads in the southwestern section of the monument.

For these reasons the Pinyon Well mill site will be nominated with the neighboring Henson Well mill site and the Pinyon (Tingman-Holland) Mine as the Piñon Mountain Historic Mining District.

(2) Henson (Hansen, Hensen, Hanson) Well Mill

Henson Well is about three-quarters of a mile south of the Pinyon Well-Indio (via Pushawalla Canyon) Road at a point 1.3 miles from Pinyon Well. It was accessible by burro and possibly wagon, being situated on a small flat in a narrow canyon near the summit of the Little San Bernardinos. Nearby an arrastra and a few small stone buildings were constructed.[141]

This site remains almost intact today, probably due to its isolated location and the fact that no distinct trail leads to it. Along the sides of a wash are the remains of three or four drywall masonry structures of unknown function. Also standing, behind a large boulder, is a stone fireplace with a tall chimney. It is in excellent condition. Whether or not a structure existed on the flat area in front of

141. USGS Water-Supply Paper 497, 1923, p. 273.



Illustration 66.

Henson Well mill site. Stone cabin to right. Note crushing wheel of Chilean mill embedded in sand.



Illustration 67.

Rock chimney at Henson Well mill site. One of the cabin ruins is visible just beyond the large boulder in the middle of the picture. NPS photos by Linda W. Greene.

it is not clear. Two rock crushing wheels of cement banded with iron were found on site. One is lying in the lower part of the complex in conjunction with a gear part; the other is still in place in the channel of a small stone arrastra further up the wash. A photo of this latter Chilean mill with its revolving grinding stone was taken around 1914 and is reproduced as Illustration 70. This mill performed early custom grinding for neighboring mines. Upstream (south) from the arrastra a few yards is a stone and cement-walled semi-subterranean structure (water reservoir?) about three feet square. Possibly this was Henson Well, now filled in. Sticking up in the center of the wash are several small-diameter metal pipes whose function is unknown. An intact crucible was found in the bank of the wash.

This is an interesting mill site and appears fairly old. It is not known with any certainty who lived or worked there or if this was a habitation and/or work site. These might have been mine buildings (offices, tool sheds) associated with the Pinyon Mine farther up toward the summit. The walls and floor of the arrastra are not in as good shape as are those of other small stone arrastras within the National Park System. A portion of the channel and walls has been covered with silt so that only about half the structure remains visible. The crushing wheels are present, however, and a good picture exists of the mill in operation. The presence of probably late nineteenth-century or early twentieth-century mill buildings adds to its importance. Around 1913 W.A. Sherwood bought the Tingman and Holland properties around Pinyon Well, including the stamp mill and primary rights in the Pinyon and Henson wells. The Chilean mill was probably processing ore for the Dewey Mine at the time the 1914 picture was taken. This mill is perceived to have historical and interpretive significance as an example of an "improved Chilean mill"--a structure as simple in construction as an arrastra, but using large cast-iron wheels to grind rather than drag stones. During a study similar to this one conducted in Death Valley National Monument by Park Service historians, no similar structure was found with crushing wheels intact. A brief inspection of this site turned up an intact crucible, and it is quite possible that other items connected with the mining or processing of ore could be found.



Illustration 68.

Rock-enclosed structure (well site?) just up wash from Chilean mill, the crushing wheel of which can be seen to the left of the large bush.



Illustration 69.

Remains of Chilean mill at Henson Well. Two of these large cement-filled, iron-bound wheels revolved around the channel seen in foreground. NPS photos by Linda W. Greene.

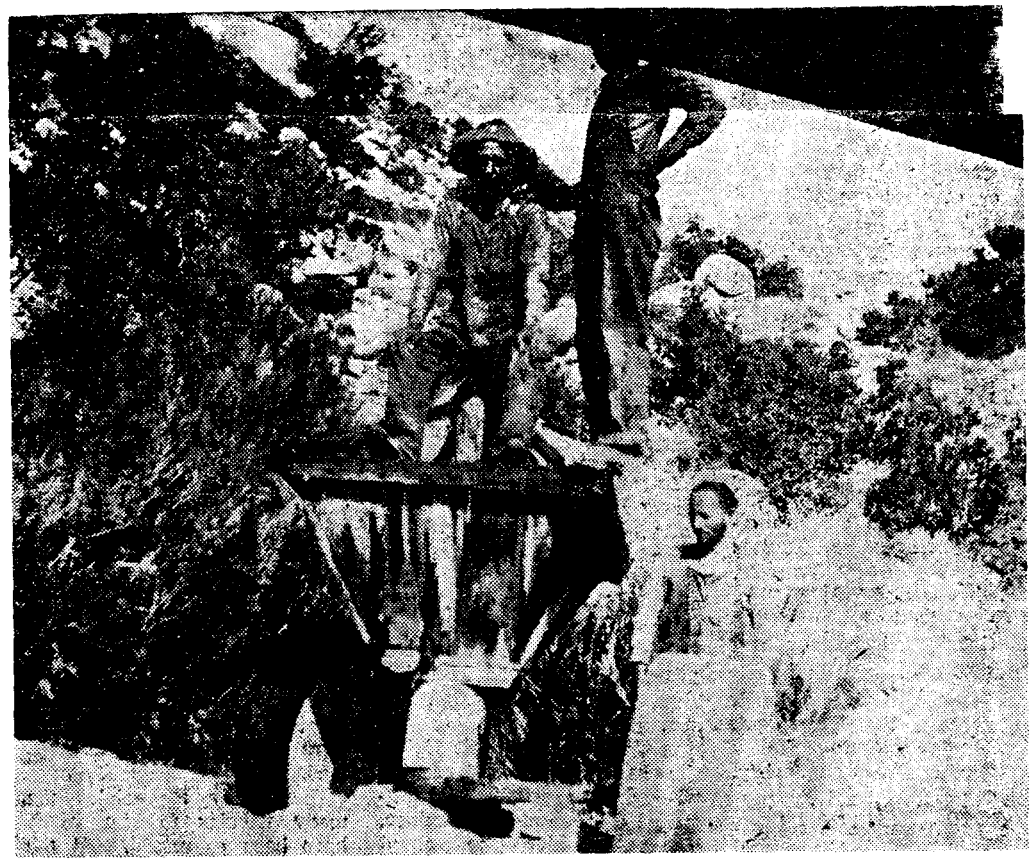


Illustration 70.

Picture of Chilean mill at Henson Well during its period of operation, ca. 1914. From Beldon, "Lizard Hunter Uncovers Rich Hoard of Gold," San Bernardino (Ca.) Sun Telegram, Jan. 15, 1961.

Because of the presence of the Chilean mill and the potential of the site for yielding data important to historical and industrial archeology, this site will be nominated to the National Register along with Pinyon Well as the Piñon Mountain Historic Mining District.

Northern Section

Mines as far north as Queen and Lost Horse valleys were considered part of the Piñon Mining District. For a short time following the discovery of the Desert Queen lode, however, this area was often referred to as the McHaney Mining District. Properties discussed in this section are those located in T1-2S, R7-9E.

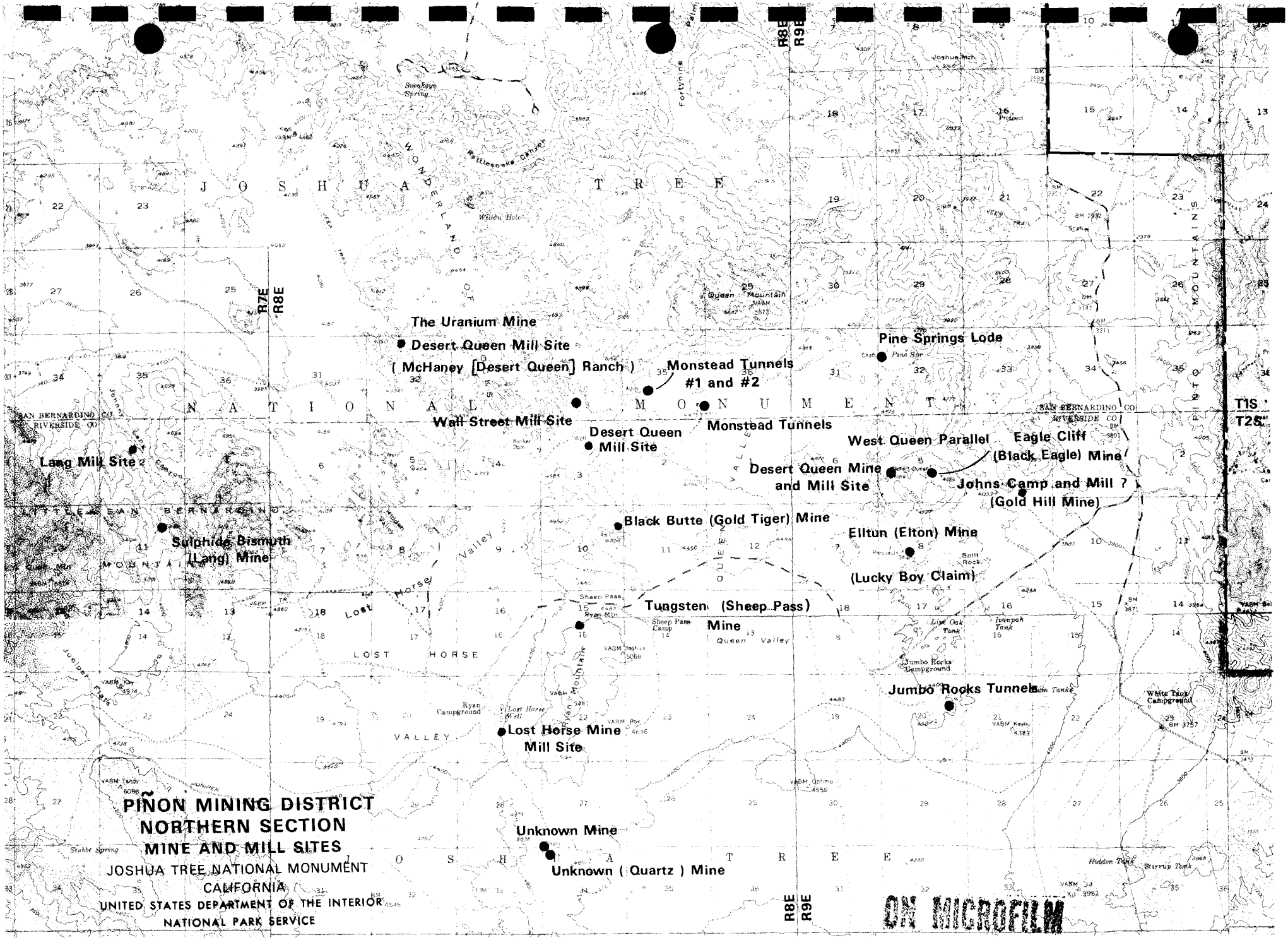
2. Mine Sites

a) Desert Queen Mine

(1) General History

The early history of this property is clothed in confusion and discrepancy, so that much of the sequence of events and ownership becomes speculation. The most popular story of its discovery centers around an individual named James, who is said to have explored the Desert Queen Mine area around 1892 or 1893. Shortly after he began working the mine, trouble arose with some local cowboys. One version states that James got into an argument with members of this "McHaney gang," one of whom reportedly erected claim markers in the area of James's discovery. According to the Riverside (Ca.) Enterprise, James met Charles Martin, the alleged claim jumper, on the disputed ground in the presence of George Meyers and one of the McHaneys. James attacked Martin with a knife after the latter refused to remove his monuments, badly cutting him. Somehow Martin got hold of a gun and shot James. The body was buried immediately, because of the extreme heat. It might also be asked whether this was done to forestall some embarrassing questions about where James was shot![142] It was said by

142. Harold O. Weight, "Legends of the Lost Horse Mine," Desert Magazine (January 1979), p. 11.



PIÑON MINING DISTRICT
NORTHERN SECTION
MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ON MICROFILM

DSC / SEPTEMBER 1983 / 156-25002

some that James had been forced to sign a quit-claim deed to the mine before he was murdered.[143]

Bill Keys once added further details to the story. He stated that James worked at the Lost Horse Mine and went prospecting on Sundays. On one of these forays he found the Desert Queen lode. Eventually cowboys (George Meyers, Jim McHaney, and Charley Martin) in the area noticed his monuments and the rich deposits nearby and decided they wanted the mine. Luring James into their presence by the ruse of having him check out another possible strike, they shot him, and to make their plea of self-defense look legitimate, McHaney superficially stabbed Martin eighteen times.[144] An inquest was held at the McHaney Ranch in April 1894 and a verdict of self-defense arrived at, although the degree of honesty with which these proceedings were carried out is questionable.

The McHaneys have also been mentioned as discoverers of the mine. One version of the McHaneys' acquisition of the property recounts that Mike Boniface, an oasis Indian, showed Bill McHaney the mine.[145] According to Lucile Weight, in later years Bill said he found the mine and filed on it in January 1895; other accounts say both brothers found it.[146] Bill McHaney said in 1933 that the mine was found on January 24, 1895, by his brother, who took $10,000 in gold ore off the surface. Bill received one-half interest and gave one-quarter of it to his sister.[147] According to Chester A. Pinkham, an old-timer in the

---

143. "Joshua Tours Lead Over Historic Area," Daily Sun (San Bernardino, Ca.), Aug. 8, 1960.

144. Steve Smith interview with Bill Keys, Oct. 29, 1966, on file, JTNM(?).

145. Carol Evans, Remembrances of the High Desert (Yucca Valley, Ca.: Artcraft Print Shop, 1966, p. 32.

146. Weight, "Century old landmark," Feb. 25, 1982.

147. McHaney interview, March 1933, p. 3.

area, the mine was discovered by Jim McHaney, who first noticed the gold deposit while running cattle in the area. The deposit had long been known to the Indians at the Twentynine Palms oasis.

First recorded production from the "McHaney" or "Desert Queen" Mine was in the spring of 1895. At that time Bill McHaney hauled the first load of ore in a four-horse wagon to the two-stamp mill at Pinyon Well.[148] Seven tons of ore milled yielded ninety-seven ounces of gold, which, at $17 per ounce, amounted to almost $1,700. This was an average of $240 per ton.[149]

Hauling ore over a rough wagon road to Pinyon Well proved time-consuming and probably unsatisfactory because of the limited capacity of the mill. It was reported in 1895 that Jim McHaney had sent for a five-stamp mill from the Baker Iron Works of Los Angeles. The mill was set up at the McHaney ranch where there was water and was running by August 1895. (Bill McHaney also packed water to the Desert Queen Mine from a well at Pine Spring.) The first run of forty hours produced $3,400. The second run of thirty-eight hours yielded $3,600, and the third run of forty-two hours gave $4,400 in gold. There was

---

148. Steve Smith interview with Bill Keys, Jan. 20, 1967.

149. Mining and Scientific Press 70, no. 17 (Apr. 27, 1895): 266. The U.S. Bureau of Mines gives the production of gold from the Desert Queen Mine in 1895 as 1,209 ounces. Ray G. Brown, Mineral Report, Mineral Patent Application of Wm. F. and F. M. Keys for the Desert Queen, West Queen Parallel, Desert Queen No. 1, South Queen Parallel, South Queen Extension, and Desert Queen No. 2 Lode Mining Claims, and Wall Street Mill Site, July 30, 1959, p. 1. Bill Keys said that with part of this money, Charley Martin's interest in the mine was bought out by the McHaneys, while Meyers was given a herd of cattle in exchange for his share. This left Jim and Bill as sole owners. But Bill gave his sister Carrie McHaney Harrington a third interest. Keys said she ran Jim off the mine and got the banker, Zambro, to pay off the indebtedness and she took over the operation. The five-stamp mill was put up by the Baker Iron Works people who ran it till they were paid off and then gave it to the Desert Queen owners. Bill Keys interview, Oct. 29, 1966.

reported to be enough on the dump to run the mill at full capacity for a month.[150]

The record of ownership over the next few years is unclear. The initial gold find at the mine proved extremely rich, but the wealth was spent as soon as it was procured. Jim, especially, took this opportunity to indulge himself, and his high-flying lifestyle ultimately became his ruin. His lavish spending on fast women and cheap booze, plus the high costs of mining and milling in the desert, quickly exhausted all available funds.

Pinkham recalled that the McHaneys, low on both mining know-how and development money, enlisted the aid of S.F. Zambro, a San Bernardino banker, but when this occurred is speculative. According to Pinkham it was after the bank moved in to oversee their investment that water was developed and the mill erected. This means that the bank would have become a partner at least by the summer of 1895. Pinkham also recalled that soon after the mine was discovered, mining experts offered $80,000 cash for the property but were turned down by Jim, who assumed the deposit extended a considerable distance further into the ground. The engineers, however, declared that the deposit, in a barren granite formation, could not go much deeper and based their offer on what lay on the ground, allowing a reasonable profit on the investment. He also states that due to Jim's continued reckless spending, Zambro was compelled eventually to foreclose on the property.[151]

Somewhere around this time Jim and Bill drifted apart. Bill moved back to the oasis at Twentynine Palms, dividing his

---

150. Engineering and Mining Journal 60, no. 8 (Aug. 24, 1895): 180; Ibid. 60, no. 13 (Sept. 28, 1895): 304. Each stamp weighed 850 pounds and the mill capacity was ten tons per twenty-four hours. Thirteenth Report of the State Mineralogist, 1896, p. 315.

151. Chester A. Pinkham, "The Desert Queen Mine and Vicinity," Central Files, 1907-49, RG 79, NA.

time between that place and a cabin at Music Valley, where he was prospecting as late as the 1920s. Jim eventually turned to counterfeiting at Seven Palms for a livelihood, which landed him in the federal penitentiary for seven years. After that he is said to have worked for the Los Angeles street cleaning department.[152]

The Desert Queen Mine appears to have been involved in much litigation during the last few months of 1895. According to Bill Keys, Zambro had several people running the mine, probably under some type of lease/option arrangement. The bank evidently installed supervisors to guard its interests in the claims and to watch over all operations pertaining thereto. In the fall of 1895 it was announced that the bond for the sale of the Desert Queen Mine had been filed along with bonds for five other claims bought by W. M. MacMillen of Denver for a reported $120,000. The new owner would take possession in October.[153] A month later it was reported that the owners of the mine had adjusted their "differences" and the mine and mill would soon be in operation again. H. B. Adsit of Colorado was taking over as superintendent.[154] The property then went to C. M. Thompson of Pasadena as owner in 1896, at which time it was reported that the mine had been "superficially worked quite extensively during the past two years. Some of the quartz has been so rich in gold as to cause the most extravagant reports of the value of the mine."[155] H. C. Steele, of Banning, was the mine superintendent. According to Bill Keys, the ore at this time was hauled to the railroad station at Palm Springs for shipment to a smelter in El Paso, Texas. Zambro at one point discovered that Steele and Adsit, his supervisors, were embezzling from the company

---

152 "Joshua Tours," Aug. 8, 1960.

153. Engineering and Mining Journal 60, no. 15 (Oct. 12, 1895): 352.

154. Ibid. 60, no. 21 (Nov. 23, 1895): 496.

155. Thirteenth Report of the State Mineralogist, 1896, pp. 310-11.

and dismissed them. From that time on, he and Carrie McHaney Harrington (sister of Bill and Jim) ran the mine.[156]

By 1898 it was reported that Jackson Steele had bought the cyanide tanks of the Old Virginia Dale Mine and would cyanide the Queen tailings. The mine had been in litigation for a long time and was about to be reopened. A new shaft would be sunk and a cyanide plant added. By November the plant was "running successfully."[157] An entry for 1902 stated that the Desert Queen, owned by S. F. Zambro, had not been worked for some time but was now being developed again.[158] The mine was still operating in 1907. The Zambro bank reportedly had milled over two million dollars worth of ore that was shipped to the smelter.

Sometime around 1905 to 1910, the mine passed to a mining engineer named William Morgan, who reportedly invested almost half a million dollars in the mine's development. The new shafts opened did not produce as high quality ore as the original find. Morgan hired young Bill Keys about 1910 as supervisor and later assayer of the mine. Keys remained on the job several years, drilling, blasting, mucking, and taking care of the mine, machinery, and millsite, but he was never paid after the mine ceased to be a profitable operation. After Morgan's death in 1917, his wife left the desert. Through Morgan's attorney, a property-wage settlement was agreed upon, and Keys, in lieu of back wages, became owner of the Desert Queen Mine and its property.

---

156. Bill Keys interview, Oct. 29, 1966.

157. Engineering and Mining Journal 66, no. 2 (July 9, 1898): 45; Ibid. 66, n. 5 (July 30, 1898): 135; Mining and Scientific Press 77, no. 19 (Nov. 5, 1898): 458.

158. Engineering and Mining Journal 73, no. 15 (Apr. 12, 1902): 530.

The Desert Queen was active from 1912 through 1914 and again in 1923. From 1932 to 1941 the mine was in nearly continuous operation. The ore was free milling and most of the gold was obtained by amalgamation. From 1912 to 1915 ~~period~~, Keys processed the Queen ore in the five-stamp mill that he said was put up in 1894 by the Baker Iron Works for McHaney and Co. In the 1930s and early 1940s the ore was processed in a two-stamp mill built by W. F. Keys. According to his son Willis, Keys had a two-stamp mill at the ranch run by a steam engine. After the ore was ground in the mill the mixture was turned out into a nearby slow-turning arrastra for amalgamation.[159]

The U.S. Bureau of Mines gives a total production from the Desert Queen of 3,845 ounces of gold.[160] It is said to have produced several million dollars. The first production was reported in 1895 and the last in 1941. From about 1948 to 1961 the mine was operated for only brief periods of time. In 1961 the Dessert Queen ore was assayed and its value per ton estimated to be about $210 to $215.

(2) Bill Keys Ownership

William Keys purchased an interest in the Desert Queen Mine in 1911. He also operated the five-stamp mill, processing ore from the Desert Queen, West Queen Parallel, and other mines. The original claims on the Desert Queen property were located in 1895, according to Keys, and he obtained title to them in 1917. Prior to 1925 he gave a quit claim deed to another party in order to borrow money and received a mortgage back on the claims. Sometime in the early 1920s a Mr. Geils leased the mine and made a small killing from a little section of almost pure gold found in a pocket that had been overlooked.[161] Rather

---

159. JTNM Fact File.

160. Brown, Mineral Report, p. 2.

161. Willis Keys interview, March 1975, p. 7.

than foreclose the mortgage, Keys and his wife relocated the claims in 1925 and 1932. Keys ran the mill only two or three days a year and took a day or two to clean up and melt in order to get around $1,000. What he took out of the claims usually paid his expenses and exploration.[162]

In 1929 the Desert Queen Mine comprised five claims in Section 5, T2S, R8E. Development consisted of several tunnels from 50 to 300 feet in length, driven at different elevations, and an open cut 200 feet long by 50 feet wide and 15 feet deep. The total amount of drifts and crosscuts was about 2,000 feet. The property was operated last in 1921.[163]

In the mid-1930s a Charles Phelps came over to the Desert Queen Mine after having leased the Lost Horse for a while. In September 1935 he and others started working the Desert Queen Mine Group, consisting of seven claims: the Desert Queen, South Queen Extension, South Queen Parallel, North Queen Extension, North Queen Parallel, West Queen Extension, and West Queen Parallel.[164]

Keys owned several claims in connection with the Desert Queen Mine. There is much discrepancy in the names of these various claims because Keys claimed numerous properties under different names at several different times. Properties owned and improved upon by Keys included:

---

162. Summary of Testimony, Pt. III, United States of America v. Wm. F. Keys, F. M. Keys, Contest No. 6897, Involving the Desert Queen No. 1, Desert Queen No. 2, South Queen Parallel, South Queen Extension Lode Mining Claims in Sections 5, 6, 7, 8, T.2 S., R.9 E., S.B.M., Calif., Recorded in Books 54, 84, 85, Pages 572, 132 and 129, Official Records of Riverside County, dated Nov. 3, 1961.

163. Report XXV of the State Mineralogist, 1929, p. 477.

164. Proof of Labor, Received for record June 30, 1936, Book No. 286, pp. 282 et seq., Official Records, Riverside County, Ca.

The Desert Queen Claim: contained several thousand feet of underground workings, consisting of drifts, crosscuts, winzes, and raises. (Keys stated under oath that he relocated the Desert Queen claim on July 1, 1925.)

The West Queen Parallel Claim: comprised several small shafts that later caved in.

Desert Queen No. 2 Claim: located July 1, 1925. Has concrete dam across the dry wash near north end of claim. Excavation at discovery point was two feet deep. Discovery point was on Section 7, which was patented to Southern Pacific Railroad in 1910.

South Queen Extension Claim: located mostly on Section 7, with north end overlapping on Section 6. Shaft on north end, about 100 feet deep. Located July 1, 1932.

South Queen Parallel Claim: located July 1, 1932. About half of claim is on Section 7, half on Section 6.

Desert Queen No. 1: located July 1, 1925. Mostly situated on Section 6, about 1/3 of southern part on Section 7. Supposedly contained some uranium.

Wall Street Mill Site: located July 9, 1930. This will be discussed in section entitled "Mill Sites."[165]

b) Eagle Cliff (Black Eagle) Mine

Few details are known about this mining property about one-half mile east of the Desert Queen Mine. On May 27, 1895, a lead ledge to be known as the Eagle Cliff Mine, about three-fourths of a mile east of the Desert Queen Mine, was located by Robert Muir. For the year ending December 31, 1897, $200 worth of labor was performed on

---

165. Brown, Mineral Report, pp. 3-4.

"the contiguous locations belonging to the same owners known as the Eagle Cliff and Free Gold Claims. Said work consisted of sinking one shaft 75 ft. and sinking one shaft 40 ft." Owners were listed as M. Metcalf, W. S. Forrest, S. Guyot, R. W. Keiler, Jos. Mort, J. D. Thompson, and Rufus W. Keeler. The only other mention of this property found in mining records was dated December 16, 1899, in association with the name R. W. Keeler.[166] Only two references to the property were found in mining journals. In 1896 it was reported that "at this mine, in the McHaney district . . . at a depth of 75 ft., a 20-in. vein of rich ore has been struck."[167] Two years later it was noted that

> At the Eagle Cliff mine, in the Colorado Desert, ore which, in a milling test of a ton turned out $125 has been struck. Originally the shaft went down on a fairly good vein of ore, a vein of talc running with the ore. At a depth of twenty five feet the ore petered out, but the owners continued to follow the talc until a depth of eighty feet was reached. Last week the talc again opened into a vein eighteen inches wide.[168]

According to Willis Keys, his father held the mine for many years, during which time it was known as the Black Eagle. He suggests his father kept up assessment work from about 1916 on. Willis recalled going to the mine with his father, beginning about 1927 or 1928. He further stated that his uncle Albert Lawton and a partner extracted some ore from the mine in 1933 and had Bill Keys process it at the Wall Street Mill. The ore averaged about $35 a ton in gold, but the inaccessibility of the property made operating it difficult. Ore was packed out on a burro. Lawton and his partner were living in a small cabin "about ½ mile south of the Desert Queen Mine" at this time. Bill

---

166. Location Notice, Eagle Cliff Mine, Book S, p. 311; Proof of Labor, Eagle Cliff Mine, Book V, p. 253; and Book 17, p. 203, Mining Records, San Bernardino County, in Hall of Records, San Bernardino, Ca.

167. Engineering and Mining Journal 61, no. 19 (May 9, 1896): 452.

168. Mining and Scientific Press 77, no. 19 (Nov. 5, 1898): 458.

Keys periodically took out small amounts of ore from the Eagle Cliff property.[169]

In 1980 Lucile Weight wrote an article on the Eagle Cliff Mine that contained some interesting information that might pertain to this property. She found that during the flurry of prospecting activity immediately following the discovery of the Desert Queen Mine, a Los Angeles attorney J. B. Bledsoe and associates located several claims in the area. One of these was the Desert Rose, sold in 1895 to Henry W. Spencer, a Los Angeles mining man. In January 1896 Spencer relocated the property, described as being about a mile from the Desert Queen. Whether or not this was an earlier name for the Eagle Cliff Mine is conjectural. In late April 1896 mention was made of the Eagle Cliff Mining Co. in the McHaney District.[170]

c) Johns Camp (Gold Hill Mine)

This property is in the southeast quarter of the southwest quarter of Section 4 (proj.), T2S, R9E, eight miles south of Twentynine Palms. Little information was found on the ownership of this mine, its dates of operation, or its production record. An inscription on a concrete block in what appears to be a mill foundation reads "A. B. J. April 1, 1931." Mention is made that in 1929 the Gold Hill Mine, comprising five claims about six miles east of Keys Ranch, was owned by C.H. Wiser and Anvil B. Johns of Rialto, California, and J.A. Johns of San Bernardino. Mine development, consisting of shallow shafts, was idle.[171]

---

169. Willis L. Keys to writer, Jan. 17, 1983.

170. Lucile Weight, "Forgotten trails and mysterious ruins," Desert Trail (Twentynine Palms, Ca.), Mar. 6, 1980.

171. Report XXV of the State Mineralogist, 1929, pp. 479-80.

d) Elltun (Elton) Mine (Lucky Boy Claim)

This lode mining claim of approximately twenty acres was situated in the west half of Section 8, T2S, R9E. The property was orginally filed on on July 7, 1922, and amended on August 14, 1937, and February 3, 1942. The last two amendments were filed after the establishment of the monument in 1936 when filing of mining claims was prohibited. There is no recorded production from the mine. The claimant at one time stated that about twenty tons were shipped to the Stuebner Mill at Barstow, but the rock was too low grade to enable recovery of any profit over and above the mill cost.[172]

e) Jumbo Rocks Tunnels

The Jumbo Rocks Tunnels are in the northeast quarter of Section 20, T2S, R9E. Nothing is known about their developers or their production.

f) Pine Springs Lode

This mining claim in Section 32, T1S, R9E, was located by William F. Keys and Frances M. Keys on July 1, 1923. According to Keys, two brothers worked the mine earlier, but never extracted ore of value. He said they were procuring hematite but thought it was silver. Workings found on site in the late 1960s consisted of a 100-foot-deep vertical shaft shored with timbers.

g) Monstead Tunnels

No information was found on the mining activity at this site. In the early 1970s two twenty-acre patented claims were owned by a Boy Scout representative who kept the site for Boy Scout field use.

h) Black Butte (Gold Tiger) Mine

This mining property is in the northeast quarter of Section 10, T2S, R8E, one mile north of Sheep Pass in some low hills

172. Paul H. Knowles, "Report on the Validity of the Lucky Boy Claim, Unpatented Lode Claim, Joshua Tree National Monument, Riverside County, California," May 18, 1973, Office of Mining and Minerals, WRO, NPS, pp. 1, 7-8.

between Lost Horse and Queen valleys. The mine workings are old and possibly date from the 1890s. The property was located by W. F. Keys on April 21, 1936, and known as the Gold Tiger, but apparently he never operated it. The vein was explored by shallow open cuts, shafts, and drift adits, largely collapsed now. The principal workings were the "Gold Tiger Tunnel" and the "Ironclad Shaft." The production record is unknown.[173]

i) Tungsten (Sheep Pass) Mine

No historical data was found on this property in Section 15, T2S, R8E.

j) The Uranium Mine

Little is known about this claim located by W. F. Keys. It comprised about twenty acres in the northwest quarter of Section 32, T1S, R8E.

k) Sulphide Bismuth (Lang Copper) Mine

This property, in the northeast quarter of Section 11, T2S, R7E, was reportedly first located by Johnny Lang about 1900 and known as the Lang Copper Mine. Development was performed mostly by Lang during the early 1900s. In 1925 the claim was relocated by W. F. Keys.[174]

l) Unidentified Mine

This property is in the northeast quarter of the northeast quarter of Section 33, T2S, R8E, 1-3/4 miles south of Ryan Campground and Lost Horse Well, on the northeast slope of the Lost Horse Mountain. Its history, ownership, and production are not known. Development consists of a narrow trench, a shaft, and an adit. The dump size suggest large underground workings. The mine can be reached by a quarter-mile foot trail from the end of the jeep road in the

---

173. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

174. Ibid.

valley to the east.[175] Monument records indicate this property may have been later owned by Kaiser Steel Corporation.

m) Unidentified Mine

This quartz property in the northwest corner of Section 34, T2S, R8E, 1-3/4 miles southeast of Ryan Campground in a valley between Lost Horse Mountain and Ryan Mountain, was apparently a Kaiser Steel Corporation possession also. Its original owners are unknown, but it appears to be an old working. Development consists of one vertical shaft of unknown depth and a tunnel.[176] Its production is unknown.

3. Mill Sites

a) Desert Queen Ranch and Mine Mills

Bill Keys operated the five-stamp mill at the Desert Queen Ranch that was brought in to process the Desert Queen Mine ore when the McHaneys were developing that property. Baker Iron Works built the mill, set it up at the ranch, and ran it until the firm was paid off. According to Willis Keys, his father ultimately removed the mill, leaving only the timbers and a few bolts to mark the original mill site. This was done sometime after 1948 when Keys was released from prison.[177] Bill Keys erected another small two-stamp steam mill alongside the five-stamp one. Adjacent to it was a mechanized arrastra built by Keys that further processed the ore crushed by the steam mill. This arrastra might have been constructed by Keys using parts of an earlier arrastra, perhaps the one reportedly built near the present Wall Street mill site by Tully sometime between 1900 and 1905, or the one Keys stated had been built near the Desert Queen Well.

There is strong evidence that a crusher existed at the Desert Queen Mine prior to the 1930s. In addition to a Blake-type

---

175. Ibid.

176. Ibid.

177. Art Kidwell interview with Frank Kiler, Jan. 13, 1978, on file at JTNM.

crusher, according to the state mineralogist, the site contained a twenty-ton Herman ball mill and a Wilfley table. The plant was driven by a twelve-horsepower gas engine.[178]

b) Wall Street Mill

The present Wall Street mill site was the scene of much activity during the monument area's early years. The first well was supposedly sunk on the site in 1896 by Bill McHaney to water his cattle. After he left, about 1898, another cowboy, George Meyers, moved there briefly to camp and water his cattle. He built a corral nearby at the Little Reservoir (Bagley Well?) site to the west, but left in the summer of 1900. Next to arrive was a preacher from Colton, California, named Tully. He built an arrastra and milled ore there for five years. Another cowboy, Joe Reynolds, camped and watered his cattle there from about 1905 until the fall of 1911. He was followed by a man named Duncan and then by Bill Thornton and U.C. Wirtz, owners of the nearby Gold Tiger Mine. All had moved away by 1911 or 1912.

The property was idle until 1929 when Orrin Booth and Messrs. McGinnis (Earl E.) and Tulsey located on the property. They built a cabin and cleaned out the abandoned well, planning to mill gold ore from their nearby mine at this mill site. (According to Willis Keys, Booth and his partners had a mine in the south end of Queen Valley that they called the Wall Street Mine. He further said that the Wall Street mill site had originally been the mill site for the Louise Mine, a tunnel around a hill east of the mill site. The owners of that mine dug an earlier well in a clump of trees on the mill site.) Trouble arose between the partners, however, and the property was offered for sale. Bill Keys bought it in 1930. His relocation of the mill site was recorded July 9, 1930. Except for a short period during that first summer when the property was leased to Ober (Oberer?) and Son, Keys owned the mill site.[179] The Obers milled ore from the Gold Tiger Mine. This mill site

---

178. Report XXV of the State Mineralogist, 1929, p. 477.

179. Michael Perkins Papers, in JTNM files.

was referred to as the "Treasure Queen Millsite and Well" in the 1930s and in one survey was confused with Stubbe Spring, which was also referred to as the "Treasure Queen Mill Site." The name "Wall Street Mill" was possibly bestowed by Booth in the late 1920s.

The two-stamp mill Bill Keys set upon this site was first made in Los Angeles for E. Holland & Co. by the Baker Iron Works about 1891 and was used at Pinyon Well. It was shipped to Indio, California, and freighted up Blue Cut Canyon to Pinyon Well, where it stood until 1933, serving several mines in the area. After Keys bought this mill site from Booth and McGinnis about 1930, he cleaned the well and fixed up the house. In 1933 Keys moved the Pinyon Well mill, which he had purchased from the New Eldorado Mining Company. White and the New Eldorado Company had used it from 1918 to 1930, after purchasing it from the Dewey Mine, run by Sherwood & Co., which had purchased the mill from Holland around 1912 or 1913. Willis Keys stated that the lessee Oberer moved the mill from Pinyon Well to the wash near the old arrastra site near the present Wall Street mill and that his father moved the mill a couple of years later to its present location and rebuilt it. The present site of the mill is not the original one, which was down by the wash near the present road. Orrin Booth worked for Keys at the mill and remembered helping haul it up from Pinyon Well. Keys erected the building that housed the mill machinery.

Keys periodically milled his ore and performed custom work for other mines in the area up to 1943. Willis L. Keys & Co. came to the site around 1947-48 and used it until 1949, when it shut down. Willis Keys stated that at one time, probably in the late 1930s, somebody came in and cyanided the mill tailings. The mill was not operated again until the summer of 1966, and then only briefly. The Wall Street Mill was relinquished to the National Park Service by Keys's estate on September 24, 1971.

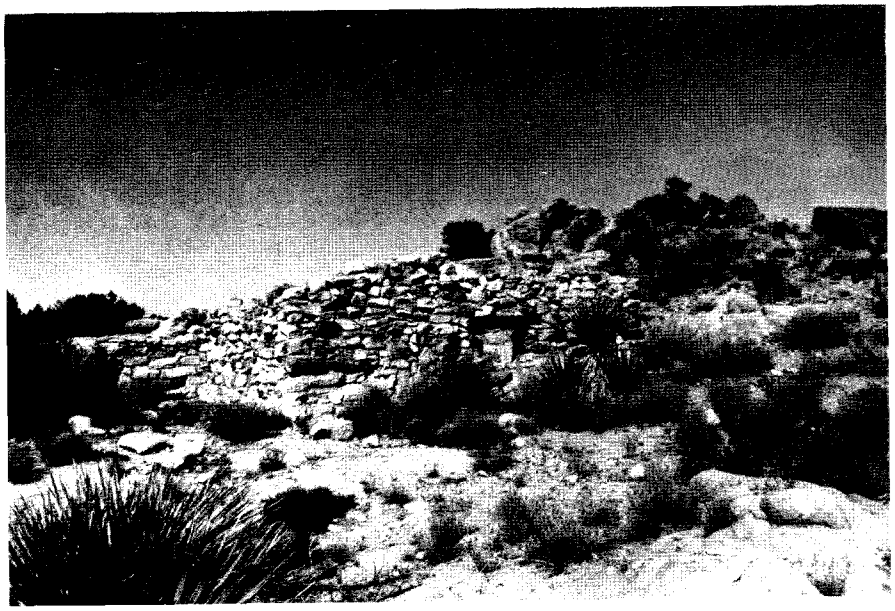


Illustration 71.

Desert Queen Mine cabin ruins, 1982.

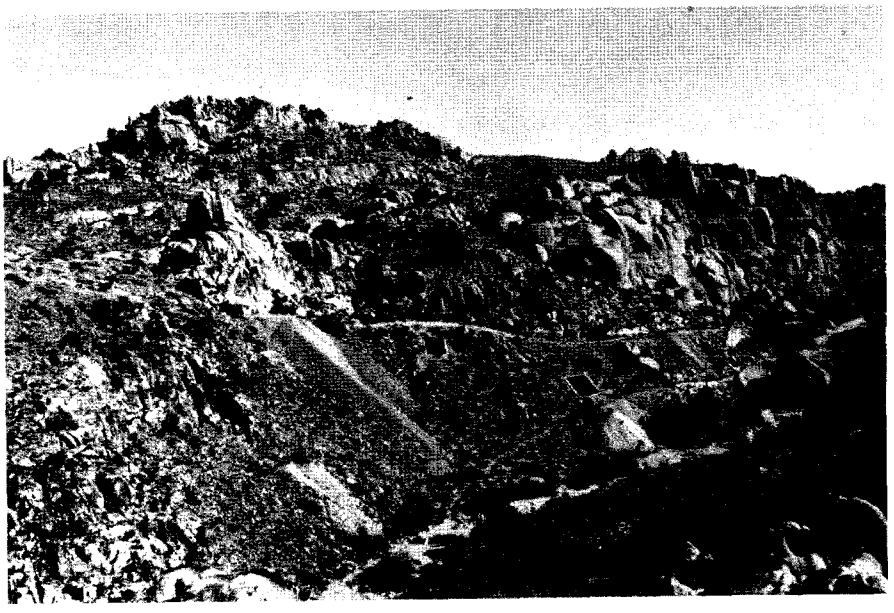


Illustration 72.

Desert Queen mining area. NPS photos by Linda W. Greene.

4. Evaluation of Resources and Recommendations

a) Mine Sites

(1) Desert Queen Mine

The Desert Queen Mine group of claims is in the southwest quarter of Section 5, T2S, R9E. It is approximately 14½ miles south of Twentynine Palms. About 13 miles of the road is paved and 1½ miles are unimproved desert road.

The main mine area consisted historically of several tunnels and inclined and vertical shafts. During a detailed mine survey in 1976, four large vertical shafts, five inclined shafts, and ten adits, five of which had started caving, were found. Tailing piles dot the hillside, but were generally small except for the one below the main adit that formed a mound sixty-five feet high spilling into the wash below. One-half mile northwest of the main mining site were six more tailings piles and additional workings. The stone ruin of a blacksmith shop was found in these upper workings. The mine area was littered with historical wooden and scrap metal debris as well as several sections of pipe. Also present on the slope near the mine workings were two cyanide tanks, lengths of cable, some mine tramway track in the main tunnel, several concrete pads, and an air compressor and reservoir mounted on large wooden beams. Most of the sheet metal, timbers, and equipment were located near the main adit and tailings pile. Cement pads and other equipment stood just above the canyon floor. On the opposite hillside was a winch and the remains of a stone house with crumbling walls.[180] A close inventory was not taken by this writer, so it is uncertain how many of these items are still on site.

The stone and cement three-room structure on the hillside across the gulch from the main Desert Queen tunnel is extant. Only a few details are known about living arrangements at the mine. When Keys first visited the Desert Queen Mine around 1911, there were

180. National Register of Historic Places Inventory-Nomination Form, Desert Queen Mine, dated June 10, 1975.

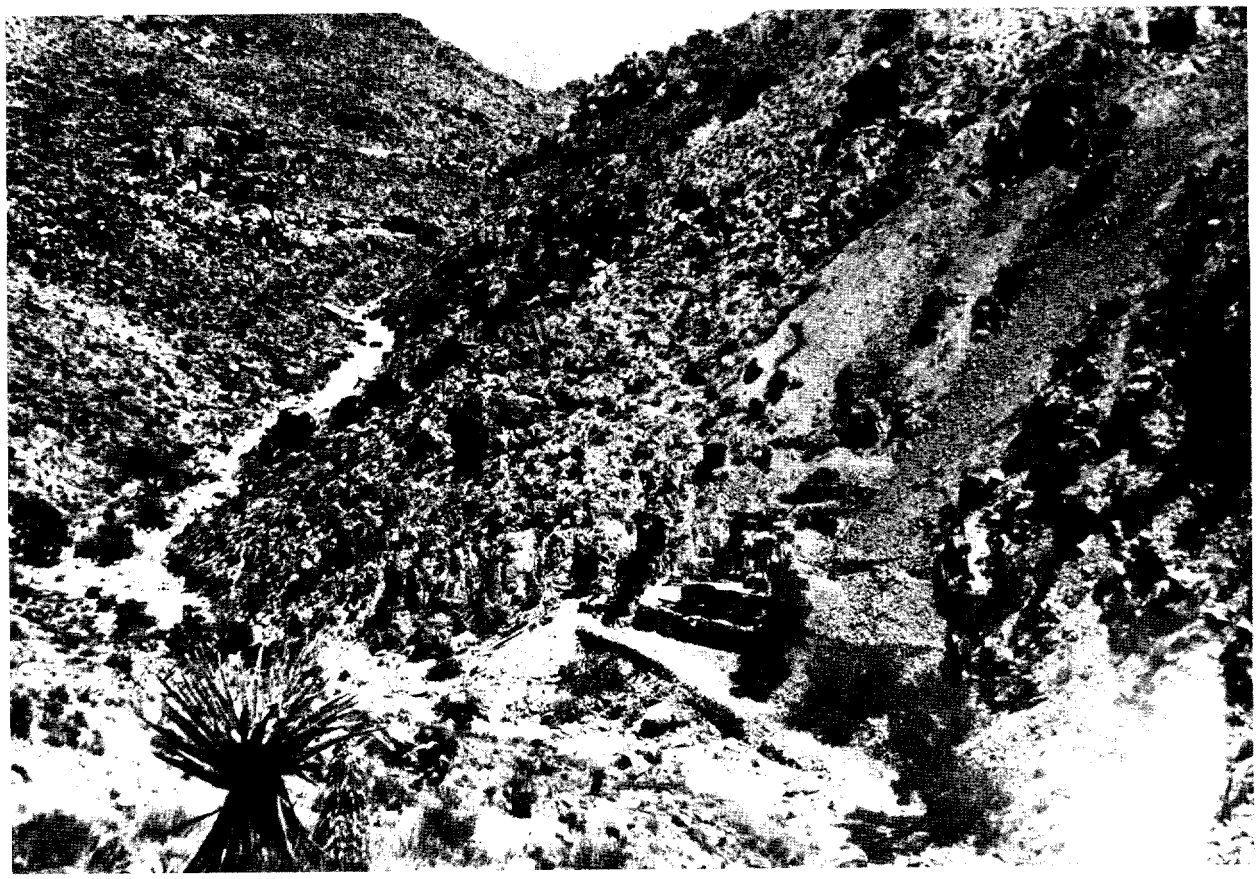




Illustration 73.

Mill (Phelps/Saunders?) at Desert Queen Mine, n.d. NPS photos.

three redwood cabins, one of which belonged to William Morgan. Keys tore the cabins down in 1918. Morgan's cabin was reassembled at the Keys Ranch and used as a kitchen.[181] When Charles and Della Phelps worked the Desert Queen Mine tailings, Della kept house in one of the buildings on a small flat strip above the mine.[182] According to Willis Keys, a cabin was built by his uncle, Albert Lawton, and George Legates to live in while working the mine. It was a one-room bunkhouse with a dirt floor.[183]

Around 1935-37, Phelps and a Robert Saunders built a cyanide plant on the floor of the wash below the mine. Above, on a cement foundation, they had a pump with a small one-cylinder engine for circulating water. They built three leaching tanks and had a slimes tank down lower, a little above the area where the old tunnel penetrated the base of the hill. They then screened the entire hillside. Water was obtained from Barker Dam by tank truck and hauled to the buildings on the opposite side of the canyon from the mine. The circular concrete base of the old water tank is extant. From the tank a one-half-inch pipeline went down the canyon and up the other side to the plant. Saunders and Phelps received a percentage of the values they leached out. According to Saunders there had not been any actual mining at the Desert Queen for years prior to that time. Saunders said there was no mill there when they arrived, but there was evidence of a crusher. The mine was a high-grade surface deposit. The owners would throw the ore down the hill, sack it up in the bottom of the canyon on a leveled-off area, and pack it out on mules. "There was a tunnel going in from the bottom of the canyon [about five feet below the level where the tanks were situated], and there was a base where the crusher had been. They had some kind of a diversion coming down to collect the ore that they threw over the hillside, so it would come in to the crusher. But they

---

181. Park Naturalist, Joshua Tree NM, to Park Historian, Cabrillo NM, July 25, 1968, JTNM files.

182. Weight, "They shared work, pleasures," Jan. 19, 1978.

183. Willis Keys interview, March 1975.



Illustration 74 (left).
Outside wall of rock house, Eagle Cliff Mine. Note tin can roof and six-light window. NPS photo by Gordon S. Chappell, 1976.

Illustration 75 (below).
View from inside shelter, showing roof deterioration. NPS photo by Linda W. Greene, 1982.



didn't have any mill."[184] Saunders said they did not grind any rock there at the mine, but screened it. They ran it through a trommel, then a riffle box, then into two false-bottom tanks where they leached the material with cyanide.

Saunders said there were two buildings at the camp on the hill. There was also a tent platform and tent in which he and another fellow slept. "This was next to the old Desert Queen buildings which were fairly intact."[185]

Bill Keys's daughter stated that her father built the road from the cabin at the Desert Queen down into the canyon and back up again to the mine so that the ore could be taken out by truck.[186] Willis Keys states that he and his father put a cable line across the canyon in 1948 after he returned from the service. The ore was then winched across the canyon so that they did not have to repair the road, which evidently had deteriorated. The cable was later taken down and used at Barker Dam to haul up cement when Keys was rebuilding it.[187]

The Desert Queen Mine was entered on the National Register on January 17, 1976. It was determined to be of local significance in the category of Industry and the sub-category of Mining. It was one of the most successful and longest-running mines in the Joshua Tree National Monument area. It is also significant because of its associations with Jim McHaney, a notorious outlaw and cattle rustler in the area, and with Bill McHaney and Bill Keys, whose lives are an integral part of the monument's history. It is recommended, however,

---

184. Harold Weight and Cheryl Erickson interview with Robert Saunders, Feb. 27, 1975, on file in WRO, NPS, San Francisco, Ca., p. 6. Preceding information from pages 3-6.

185. Ibid., p. 10.

186. Cheryl Erickson interview with Pat Keys Garry, Mar. 3, 1976, on file at JTNM, p. 29.

187. Willis Keys interview, March 1975, p. 7.

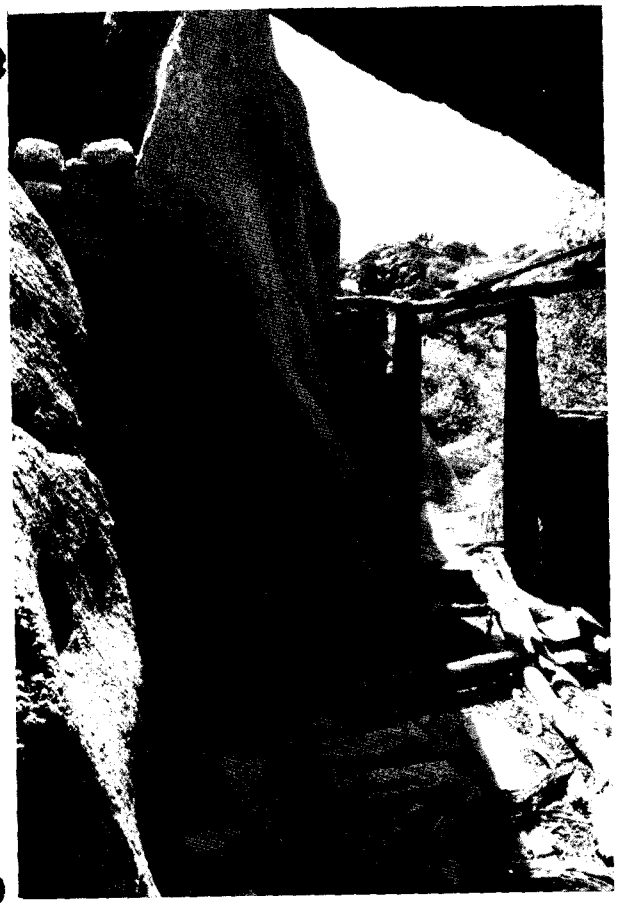






Illustration 76 (top left).
View from inside rock shelter toward front door. Fireplace to left. Roof on this end has completely collapsed.

Illustration 77 (top right).
Remains of what might have been a blacksmith shop, Eagle Cliff Mine. Hole in rock face probably held structural member supporting roof.

Illustration 78 (left).
Improvised blacksmith forge outside above structure. NPS photos by Linda W. Greene.

that the boundaries of the Desert Queen Mine area be revised to include the Eagle Cliff Mine (see below). The area would be known as the Desert Queen Mine Historic District.

(2) Eagle Cliff (Black Eagle) Mine

The Eagle Cliff Mine complex is in Section 5, T2S, R9E, about one-half mile east of the Desert Queen Mine. It can be reached by climbing above the Queen workings and continuing on east over the ridge until reaching an old wagon road that meanders in and out of side gulches, eventually meeting an old foot trail. Much of the route has to be guessed at, because its traces are becoming more and more faint. The writer approached the mine via an obscure trail to the south that can be found by hiking north off the Elltun (Lucky Boy) Mine access road. Soon after turning off the Pine City road onto this latter mine road, one comes to a small parking area on the left near some large rocks. Off to the left are some stone steps leading up to what might once have been a well. It is a circular masonry-walled tank with a cement cover containing a metal access door. This might have been an early homestead site. Willis Keys mentions a Harman family briefly living in this area. From this spot a wash trends northeast until the faint traces of the old Eagle Cliff wagon road can be seen on the hillside above. This road, whose route is sometimes difficult to discern, eventually arrives at the top of the south side of a ridge from which one can descend toward the north into the upper level of workings of the Eagle Cliff property. In this area is evidence of both habitation and mining activity in the form of an inclined shaft with timber shoring on the sides almost covered by a spreading oak tree, four cave shelters and a cave house, a tent site lined with stones, a small blacksmith forge or stone hearth, and a crude ore furnace. Several interesting historical objects were found by the LCS crew in 1976 in these rock shelters. Finds included a portable metal oven with 1887 patent dates, bellows, a checker or chess board drawn on a wooden box top, an iron mercury bottle, a gold pan, a candle box, a lard pan, and a pickle bottle.

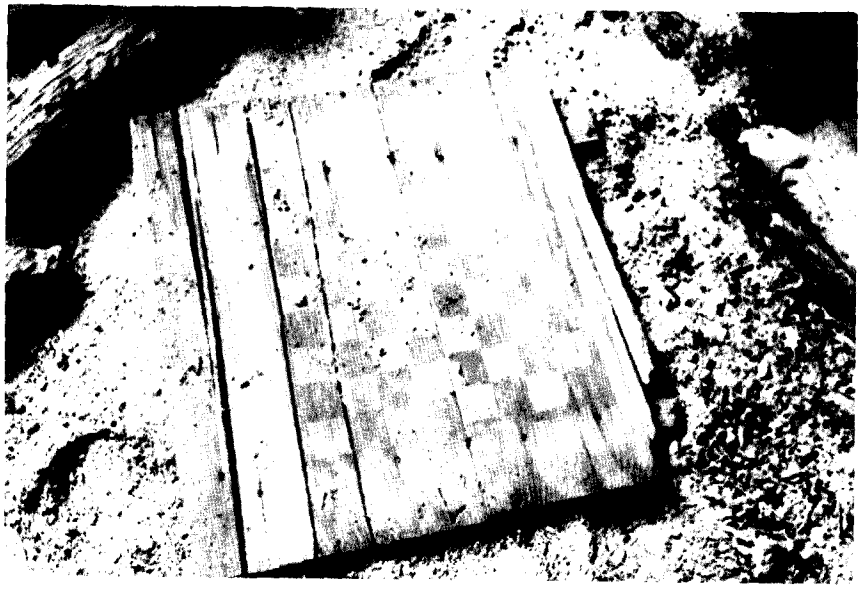
The main rockshelter cabin in this upper complex is formed from a narrow crevice in massive granite boulders. The

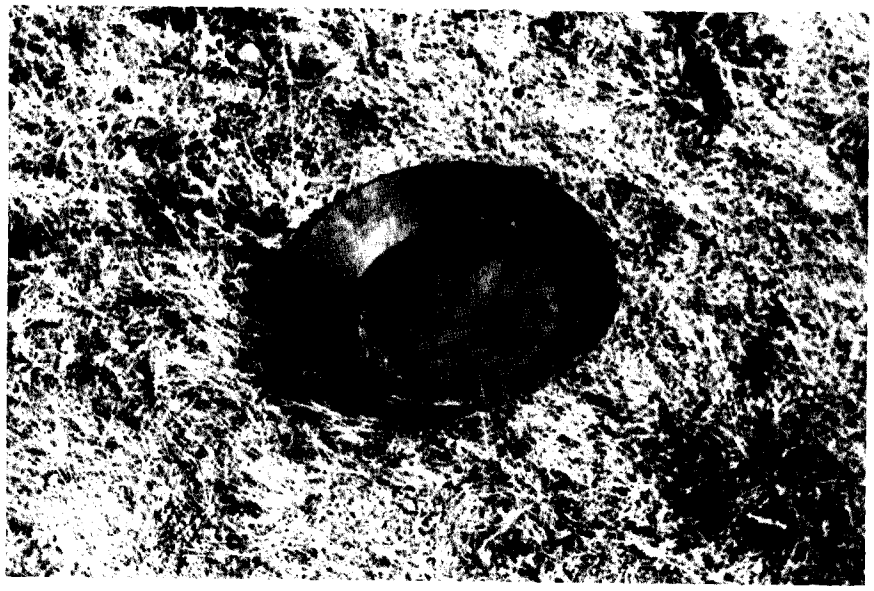
irregularly-shaped chamber measures about ten feet wide by thirty feet long. Drywall masonry with a six-light window forms the west wall of the shelter, which is roofed with flattened tin cans over boughs of brush. A door and another window were inserted in a short section of masonry wall facing south. This front wall and the piñon pine log door frame are rapidly crumbling. The roof over this section has collapsed. A fireplace stands near the front door. A masonry and iron stove is built into the northern end of the cave and several shelves and cupboards are attached to the walls.

From this upper complex one reaches the lower area via a steep foot trail through a boulder field down the middle of the canyon. Down below are two inclined shafts and a blacksmith shop. This last is tucked into a turn in the bluff, which forms two sides of the structure. A large granite boulder forms another wall. The fourth side is a dry masonry wall about six feet tall. Pinon pine logs that formed the roof have long since fallen in. In one end of the room is a small stone platform that may have been a hearth. Near this structure is a pine trunk and limb stuck in the ground. It is forked and shows signs of use of fire. Inset in the fork of the wood is a metal plate that might have been used as a pounding surface. This also might indicate that forging activities went on here.

From the two shafts and forge site an old foot trail leads down the water course and around the north side of a ridge to eventually meet the old wagon road.

Little documentary evidence has been found to shed light on the early owners or periods of development of this mine. Its interest for historians and interpreters today rests on the tangible remains of human habitation of the site. The presence of several rock shelters and a tent site, forges, and a rock shelter developed to the extent of being roofed and furnished with glass-paned windows, a built-in stone counter/drainboard/stove and fireplace, and shelving for storing goods indicates that at some time in the mine's development a small group of men lived there for an extended period of time. Whether this was the





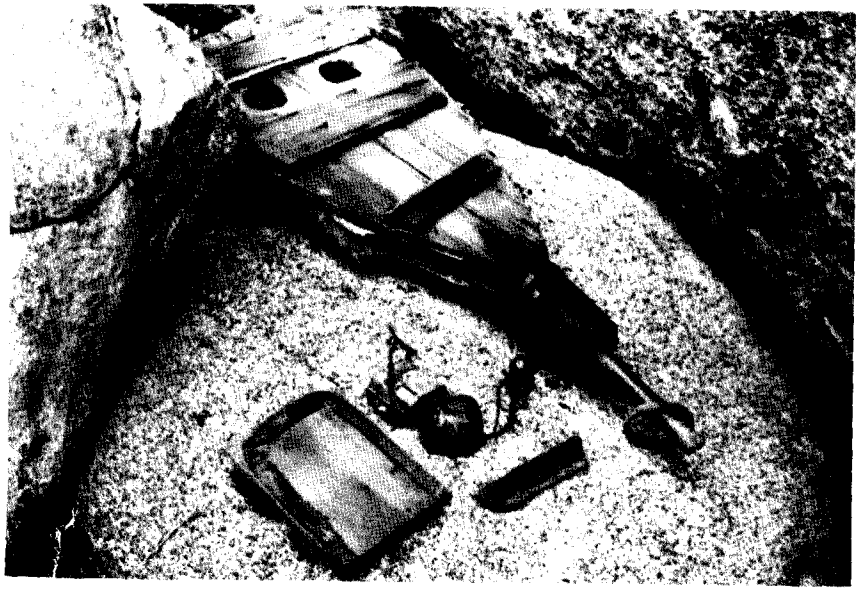




Illustration 79.

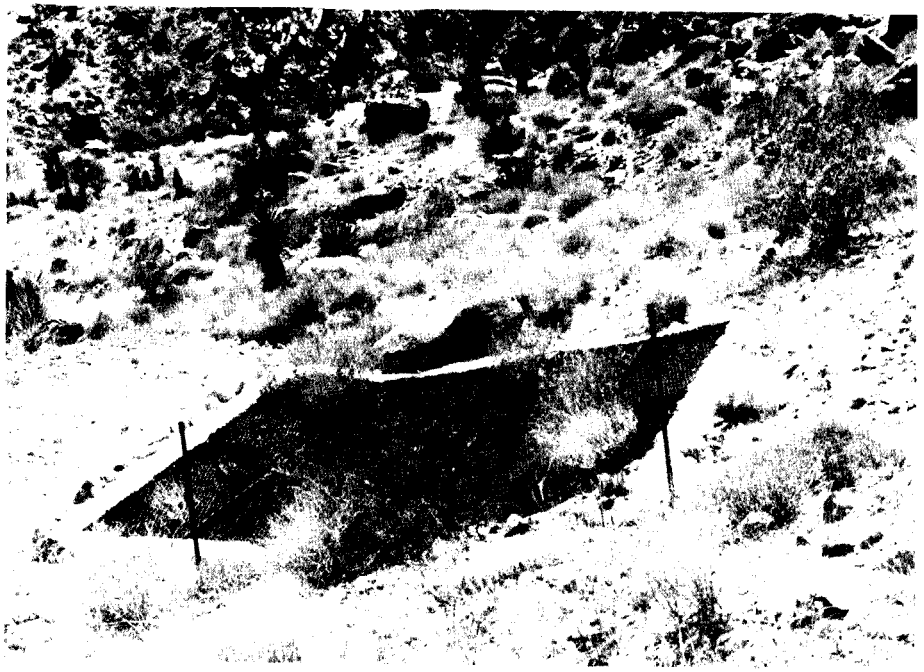
Artifacts found at Eagle Cliff Mine. Clockwise from left edge: checkerboard, gold pan, portable oven with 1887 patent date, bellows. NPS photos by Gordon S. Chappell, 1976.

Eagle Cliff Mining Co. operation mentioned by Lucile Weight is not known, but it seems plausible.

The property was not significant in the mining history of the monument in terms of production. Its association with Bill Keys apparently was minimal and periodic. It has, however, yielded several interesting artifacts of the 1890s-early 1900s mining era and, because of its remote location and remaining structures, retains a flavor of the early mining days in the monument. The main rockshelter at the site is an interesting and perhaps unique example of man's adaptation to a hostile environment and illustrates how a comfortable existence can be found in the desert. The structure is slowly crumbling, but stabilization efforts would be costly and difficult and would turn the home into a more stable structure than it was originally. Most of the artifacts of interpretive value on the site were removed by the LCS crew, who carefully photographed and described artifacts and structures they found at the site in 1976.

The Eagle Cliff Mine appears from available data to be an early mining property in the monument. A location date of 1895 suggests activity there took place during the heyday of the McHaney Mining District. The most significant structure on site is the roofed rock shelter. Because it is an interesting example of vernacular architecture, illustrating a type of late nineteenth- or early twentieth-century miner's home, it is recommended that the Eagle Cliff Mine site be included within the Desert Queen Mine National Register boundaries as part of a Desert Queen Mine Historic District.

The significance of the Eagle Cliff Mine lies in its being representative of a type of High Desert mine complex. It also possesses an integrity lacking in similar sites. Its significance also lies in its examples of vernacular architecture. In addition, the Eagle Cliff Mine has provided artifacts related to mining technology that complement the Desert Queen's examples of mining techniques as exemplified by shafts, adits, and tunnels and both crushing and cyanide milling processes. Together the two sites illustrate various aspects of activity of



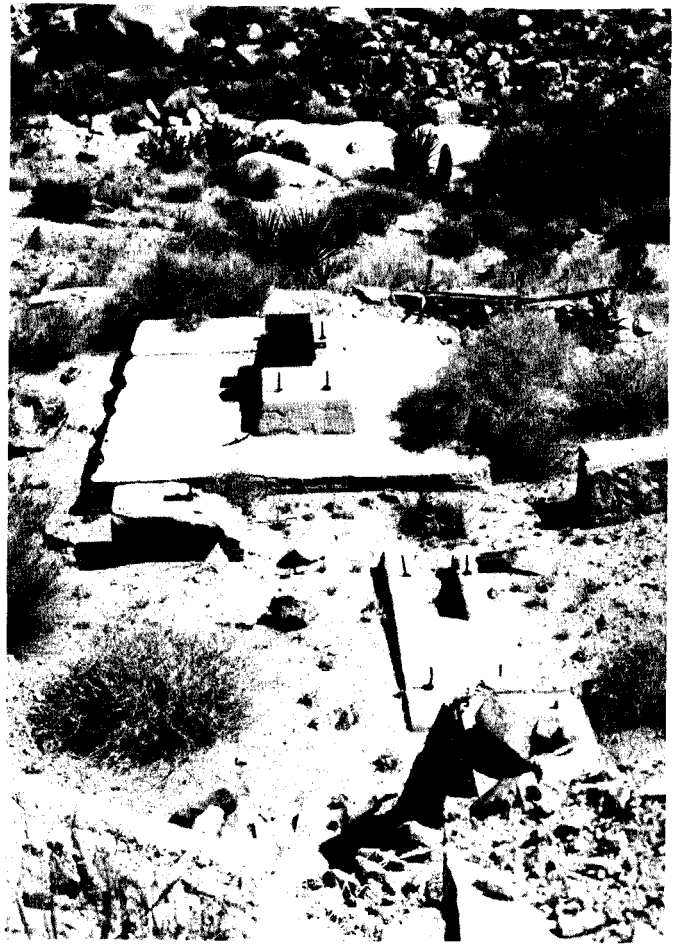




Illustration 80 (top left).
Grated vertical shaft at Gold Hill Mine, 1982.

Illustration 81 (top right).
Mill ruin, Gold Hill Mine.

Illustration 82 (bottom left).
Water storage reservoir in wash near Johns Camp. NPS photos by Linda W. Greene.

the late-nineteenth and early-twentieth century mining period in the monument, including tools, processes, and habitations. Other artifactual items found at the Eagle Cliff shed light on recreational pasttimes and household furnishings of early desert miners.

The Eagle Cliff site will be included on the revised Desert Queen Mine National Register form converting the nomination to a contiguous historic district. This revised district will include the old wagon road to the Eagle Cliff as well as all buildings, structures, sites, and objects of historical or potential historical archeological value.

(3) Johns Camp (Gold Hill Mine)

This property is reached by hiking about a mile north from the main east-west monument road from a point about 1¼ miles west of the Pinto Wye junction. Very faint traces of an old road can be seen entering the main highway at that point, and it is presumed this provided access to the mine area. It seems strange that no records of development have been found, for this appears to have been an extensive operation supporting a mill.

The mine workings are on the west-facing slope of a range of hills above a wash. Development was by several drift adits, shallow pits, and minor trenches. A vertical shaft was also found at the site. All shafts and tunnels have been grated or filled in. The mill foundation consists of a concrete pad and machinery pilings. Across the canyon to the west is another adit, and there are several caved adits in the area. Down the wash south of the mine and toward the main road, but still within the hills, a campsite was found on the west bank of the wash. It contained a small metal water reservoir protected by a masonry wall, a trash dump containing bottles, springs, and old tin cans, a caved-in outhouse, and a twenty- by ten-foot concrete pad.

Because of the lack of information on this site, its importance in the mining history of the area can only be surmised. One has to assume a lack of information denotes a lack of significance.

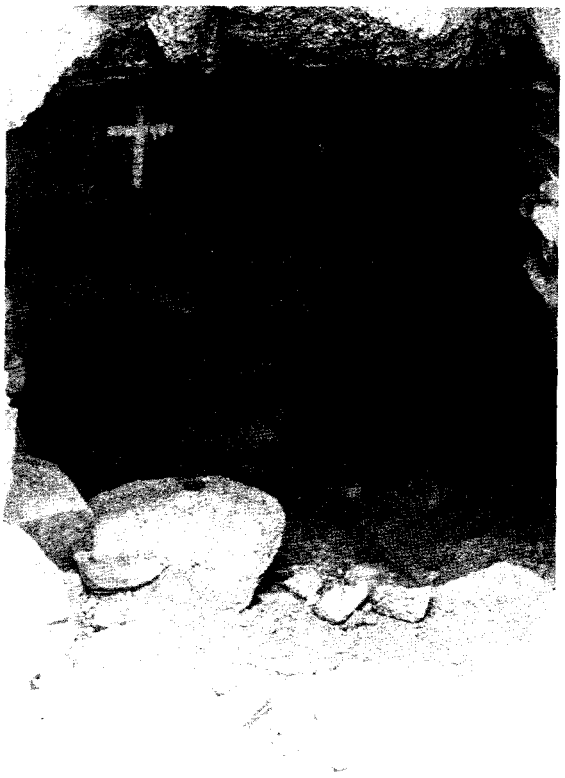


Illustration 83.

Jumbo Rocks tunnels, 1982. NPS photo by Linda W. Greene.

All that is known is that it apparently was worked in the 1920s and early 1930s and was of sufficient size or at least promise to warrant construction of a mill and establishment of a camp. The site does not appear to meet the criteria of significance or integrity for the National Register. All potential mine hazards have been minimized by covering the holes and tunnels with metal grates. Unfortunately the metal was not rustproof and has turned a bright orange. Several of these shining in the desert sun are a sight to behold. Fortunately some of them are becoming overgrown with shrubs and their glaring ugliness lessened. It is recommended the site be left to natural deterioration.

(4) Elltun (Elton) Mine (Lucky Boy Claim)

The mine area can be reached by driving south from Twentynine Palms about nine miles on the paved monument road to the intersection with the Geology Tour dirt road. From here a road is followed north for one mile, then east on the Elltun Mine access road for 1.5 miles. Facilities on the site in 1973 consisted of an old wooden structure near the center of the claim. About 200 feet south of this was an old stone and concrete foundation reported to be the remains of a house. Four old vertical shafts were noted and were reported to be at least 50 feet deep with some lateral workings.[188] The mine workings were filled in by bulldozers, the waste dumps flattened, and the site naturalized before the mine could be evaluated for National Register eligibility.

Despite attempts at development, the Ellton Mine never turned into a paying proposition. Willis Keys stated that some dry washing was carried on there in connection with placering. There was no water on the claim. The mine was never significant in the mining history of the monument. Now no trace of the mine remains. Because it lacks significance and integrity, the Elltun Mine site is not considered eligible for inclusion on the National Register.

---

188. Knowles, "Report on the Validity of the Lucky Boy Claim," 1973, p. 15.

Illustration 84.

Three views of Monstead property, 1967. Courtesy JTNM.







(5) Jumbo Rocks Tunnels

The Jumbo Rocks site consists of prospect holes and adits. Two connected tunnels driven into a rock cliff are each only about thirty feet long. The site is not significant.

(6) Pine Springs Lode

The LCS crew in 1976 determined that the site did not possess historical significance. Somewhere in a rocky area near Pine City, one of the McHaney brothers (probably Jim) reportedly had a hideout.

(7) Monstead Tunnels

In the southwest quarter of Section 35, T1S, R8E, is the old Monstead Tunnel No. 1. It is about 6 feet high and driven about 300 feet into the hillside. The old Monstead Tunnel No. 2 is nearby, extending over 500 feet into the hillside. A shaft is about 100 yards around the hill to the east from the tunnel entrance and is only about 6 feet deep. In the southeast quarter of Section 35, about 100 to 150 yards northeast of the Monstead cabin site, are remains of tunneling and shaft work. The cabin had been removed by 1973, before it could be evaluated under criteria for the National Register of Historic Places. Only a concrete (trailer?) platform and a house foundation remain, plus a pit containing trash (pipe, bedsprings, and other metal parts), and a stone loading platform. The site has no significance and no integrity.

(8) Black Butte (Gold Tiger) Mine

This property is in the northwest quarter of the southeast quarter of the northeast quarter of Section 10, T2S, R8E. It is reached by a dirt road (blocked) originating in Section 3 and is about one-half mile south of the back road connecting Hidden Valley Campground and Queen Valley. The property was examined in 1972. Four open shafts and four closed ones were observed. The largest shaft, a vertical one, was located on top of a ridge and covered with old decaying wooden doors.[189] There were also tunnels on site.

---

189. District Ranger Irwin C. Cowley to Superintendent, JTNM, Sept. 18, 1972, file in Div. of Mining and Minerals, WRO, NPS, San Francisco, Ca.

It is not known whether this mining property was worked prior to Bill Keys's location in 1936, although this writer found an undocumented reference to ownership of a Gold Tiger Mine by Bill Thornton and U.C. Wirtz prior to 1911-12. The probabilities are that this mine had been worked earlier and Keys filed on an abandoned claim. Unfortunately no early records of production, development, or ownership have been found. On the basis of exsting information, the mine site is not considered eligible for the National Register because of a lack of historical or associative significance.

(9) Tungsten (Sheep Pass) Mine

This property is in the northeast quarter of the southeast quarter of the northwest quarter of Section 15, T2S, R8E. It is about 350 yards up the north slope of Ryan Mountain and can be reached by foot from the Sheep Pass road. A small tailings dump and sloping adit are the only evidence of activity here. The mine is not considered historically significant. If actions affecting the site are anticipated, it should first be inspected by a qualified historian.

(10) The Uranium Mine

No information was found on this property's exact location or productivity. It may be the one just south of Keys's ranch house. It would appear that some uranium was detected here, but whether any was extracted is uncertain. The mine is not considered eligible for the National Register due to a lack of historical or associative significance.

(11) Sulphide Bismuth (Lang Copper) Mine

This property is in the northeast quarter of the southwest quarter of the northeast quarter of Section 11, T2S, R7E, 2-3/4 miles west of Hidden Valley on the west side of Johnny Lang Canyon. By jeep road it is about two miles south of the Quail Spring road in Lang Canyon and then about 1½ miles farther south by foot. It was an iron-rich deposit developed by adits and a 100-foot-deep vertical shaft equipped with an old windlass and a wooden ladder. Production of the mine is not known, although Keys stated that twenty tons of bismuth

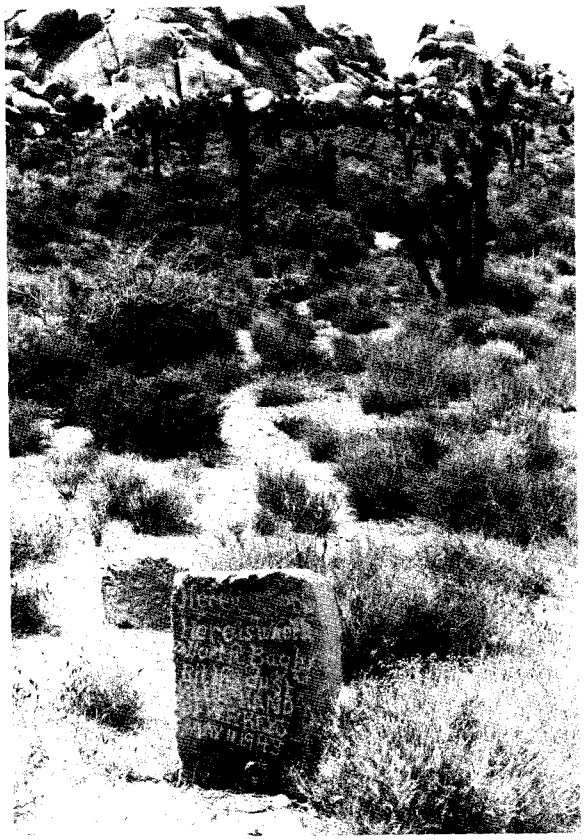
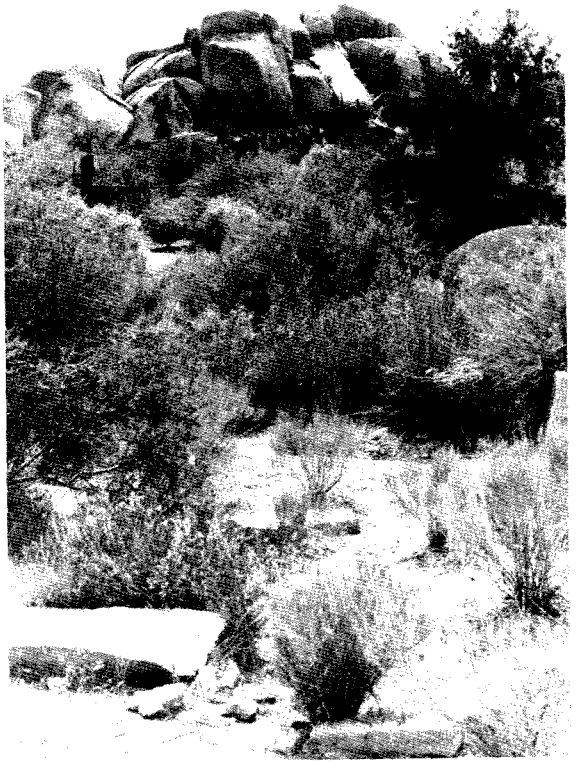


Illustration 85.
Monument along road to Wall Street Mill. Erected by William F. Keys on site of Worth Bagley killing. NPS photo by Linda W. Greene.

Illustration 86.
Gravestone quarry site used by William F. Keys. In background is Wall Street mill. NPS photo by Linda W. Greene.



reportedly produced in 1904 from the Lost Horse Mine actually came from this property.[190]

(12) Unidentified Mines

Neither of the old Kaiser Steel Corporation properties was visited by this writer and little data on their present condition was obtained. They are not considered significant in the mining history of the monument.

b) Mill Sites

(1) Desert Queen Ranch and Mine Mills

The McHaney five-stamp Desert Queen Mine mill was dismantled from its original location at the Desert Queen Ranch by Bill Keys sometime after 1948. Only the timbers and a few bolts remained on site. The mechanized arrastra is still in place, however, at the site of the old Queen mill. (The steam-powered mill was transferred by Keys to another location.) This arrastra is considered to be historically significant and useful for interpretive purposes.

No machinery exists at the Desert Queen Mine from that milling operation.

(2) Wall Street Mill

The Wall Street Mill Site is located in the southwest quarter of unsurveyed Section 34, T1S, R8E, about 3½ miles west of the Desert Queen Mine. The well on site is covered with a frame superstructure and a boxed-in wellhead cover. An overhead pipe supplied water to a storage tank near an outside shower and the kitchen of the bunkhouse that used to exist on site. The well was twenty-five to thirty feet in front of the building and about fifty feet deep. Water was pumped from the well by a gasoline engine and reciprocating pump. This well and pump were an important part of the mill's technology and are considered historically significant.

---

190. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.



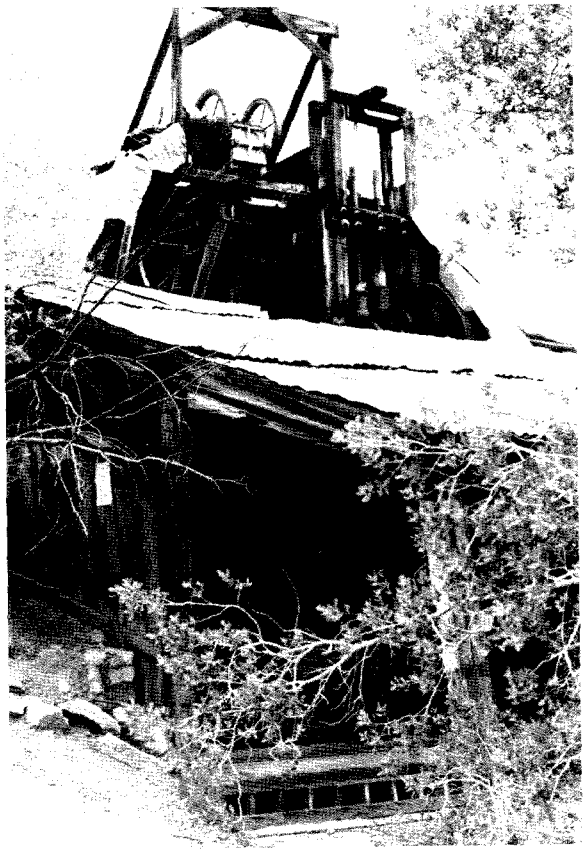




Illustration 87 (top left).
Well that supplied power to mill. Bunkhouse stood in open area behind well.

Illustration 88 (top right).
Exterior of Wall Street mill.

Illustration 89 (below left).
Interior of Wall Street mill. NPS photos by Linda W. Greene.

The Wall Street mill complex consisted of three other structures in addition to the well: the mill building housing the stamp machinery; a bunkhouse, now gone; and an outhouse, now collapsed. The stamp mill building is framed with heavy timber and built on a sloping hill to enable gravity feed in the milling process. Supposedly much of the timber framing on the mill was done by a woman millwright, Mrs. Hopper. This might be the Edith Hopper who was involved in mining and milling activity in the Cottonwood area. The roof and parts of the exterior walls are covered with corrugated metal. A long wooden ramp supports an ore tramway erected on top of the building to carry the ore unloaded from trucks to the crusher. A twelve-horsepower Western gas engine powered the two-stamp mercury amalgamation mill.

A 1939 inventory of the Wall Street mill plant described the mill machinery contained in a corrugated iron and frame mill building thirty feet long and twenty feet wide as: a Myer concentrating table; a twelve-horsepower gas engine; a Fulton jaw crusher; amalgam plates; a 1,000-gallon galvanized iron tank; a 1,500-gallon galvanized iron tank; almost 200 feet of pipe; an ore loading platform; a ½-ton ore car; and a platform scale.[191] This is slightly confusing because the Perkins papers indicate the mill was not enclosed until 1966. If it was done in the late 1930s it might have been built by Mrs. Hopper, because this was the period she was active in monument mining. Maybe the later Keys work was replacing an earlier enclosure. The mill building is still generally in good repair.

The bunkhouse on site, which may have grown from the cabin built by Booth and McGinnis, was a two-story structure of wood frame construction. It was in such a decayed and dangerous condition that it was removed by the National Park Service. It was not considered significant or essential to the integrity of the mill site.

---

191. United States, Department of the Interior, National Park Service, Western Region, Historic Preservation Team, "Wall Street Mill, Joshua Tree National Monument, Preservation Study," n.d. [ca. 1974], p. [4].

The Wall Street mill was added to the National Register on November 12, 1975. It is considered to be of local technological/mechanical significance under the general category of Industry. It is significant as a complete and operable (with a small investment of time and labor) gold-ore crushing mill featuring late-nineteenth-century stamp mill machinery.[192]

Middle Section

Mines in the middle section of the Piñon Mining District are sometimes referred to as being in the Pinto Basin Mining District. These properties will be discussed from east to west.

2. Mine Sites

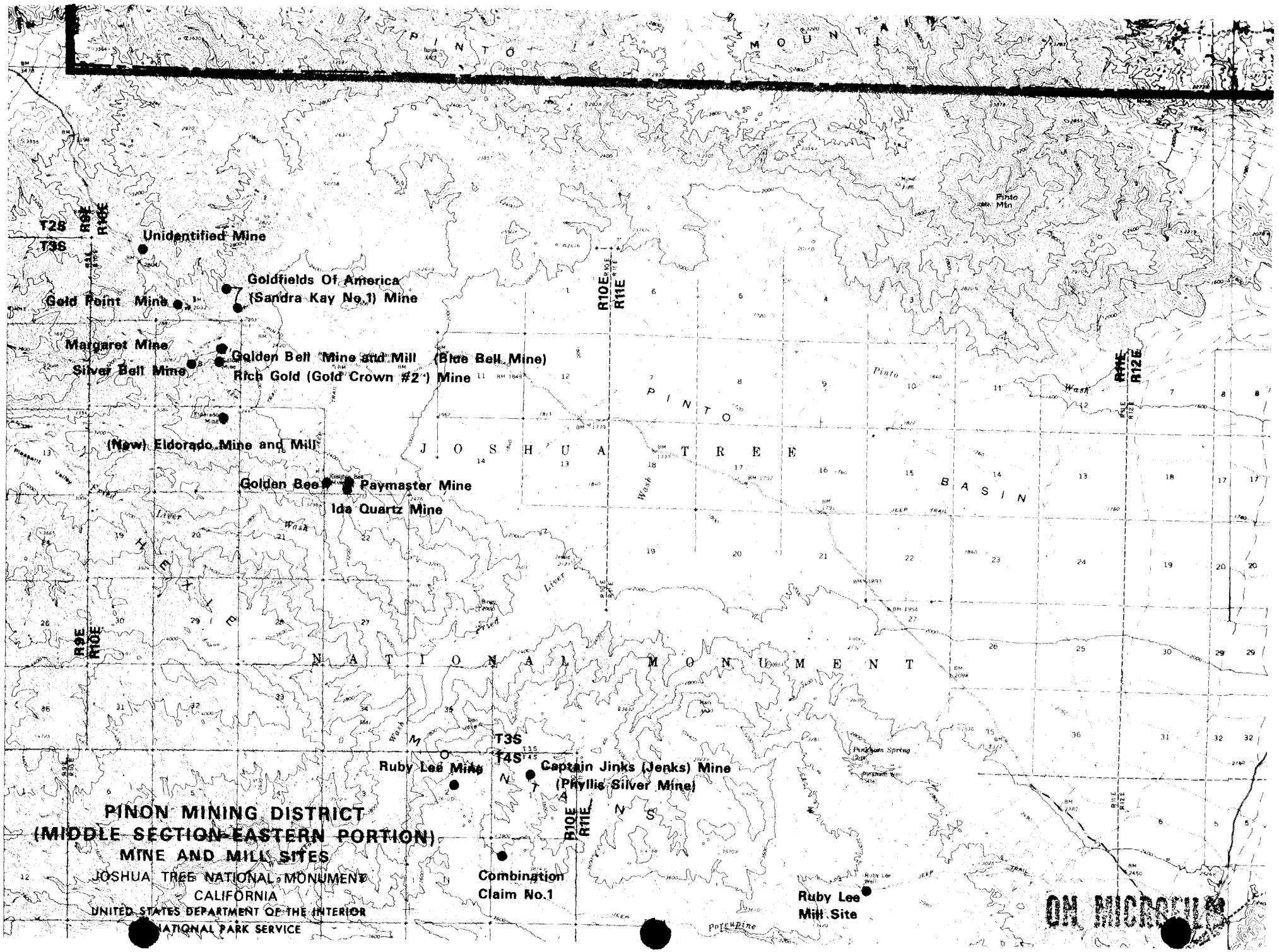
a) Gold Point Mine

This property is in the southwest quarter of Section 5, T3S, R10E. A Gold Point lode mining claim was located on January 1, 1934, by Frank and Otto Notterman and Irene and David Workman. In 1935 the mine was being worked by Leon Campbell and a crew of five. The claim was declared null and void by the General Land Office in March 1944. Bill Keys claimed ownership in 1959 and filed notices of assessment work. According to Keys, Notterman and Campbell had been taking out vanadium and lead. Keys later relinquished the mine to the monument.

b) Rich Gold (Gold Crown #2) Mine (Blue Bell Mine) (Also see Golden Bell [Blue Bell] Mine)

The location of this property was not determined by the writer. It is supposedly in Section 8, T3S, R10E. It was originally located as the Gold Crown #2 and then relocated as the Rich Gold Mine on July 1, 1931, by S. B. Trujillo and Loyd E. Kinder of San Bernardino. Periods of development and production records are not known. According to government reports, the Rich Gold No. 1 and No. 2, Gold Bell, and Golden Trumpet claims situated in Section 8, T3S, R10E, comprised the Blue Bell Mine. They were located in 1933 by George W. Dooley of San

192. Chappell, Gordon, National Register of Historic Places Inventory-Nomination Form, Wall Street Mill, June 10, 1975.



PINON MINING DISTRICT
(MIDDLE SECTION-EASTERN PORTION)
MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ON MICROFILM

DSC ITEM 1983 6-250

Bernardino and others. A quartz-iron vein was developed on the Rich Gold No. 1 claim. Gold ore from this vein was taken to the Gold Crown and Eldorado mills for treatment.[193]

Robert Saunders recalled leasing a level of the old Blue Bell Mine with a partner Dave Carroll from a man named Rodgers (Rogers?). A German fellow and his son were leasing and operating another level of the mine at this time, which was probably in the early to mid-1930s, at which time the Blue Bell was described as a consistent producer. The ore taken out of the mine was milled by a man named Campbell. This is probably H. W. Campbell who lived at the Eldorado Mine and ran the mill there. Saunders said that both copper and gold were taken from the Blue Bell. Ore brought out of the mine by an old auto engine with a hoist on it was stored in a bunker and then Campbell hauled it to his mill for processing. The shaft was two or three hundred feet deep.[194]

c) Unidentified Mine

This property in Section 8, T3S, R10E, has not been identified by the writer. James Evans mentions it in his 1961 study, but had no information on its ownership, history, or production.

d) Silver Bell Mine

This Silver Bell Mine is in Section 8, T3S, R10E. There exists some confusion in the records between this property and the Silver Bell Mine east of the north monument entrance road. Evans states that this Pinto Basin property was originally owned by W. F. Keys. It was prospected for gold in the 1930s and then lay idle for several years. In the mid-1950s the area was explored for copper and several tons of ore

---

193. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," p. 51; Guthrey to Dir. of Investig., May 6, 1937, p. 13.

194. Saunders interview, Feb. 27, 1975, pp. 2, 13.

were processed at a mill in Section 16, T1N, R9E, about 2½ miles north of Twentynine Palms on Utah Trail. The concentrates produced were not marketed.

e) Golden Bell (Blue Bell) Mine

The Golden Bell Mine is contiguous to the Rich Gold claims on the south-facing slope of a ridge in Section 8, T3S, R10E. The Golden Bell lode mining claim was located on July 1, 1931, and the Golden Trumpet lode on November 18, 1934.[195] The Golden Bell claim was patented in 1959. The mine was active from 1934 to 1937 and from 1939 to 1941. During those years it was owned by M. A. Rogers of Twentynine Palms. C. A. Benito of Twentynine Palms owned or leased the mine from 1954 to 1957. There is no production record after cleanup work in 1954. In 1960 one unpatented claim was owned by George W. Dooley. James L. Dooley inherited the Golden Bell claim from his father.

f) Eldorado (New El Dorado) Mine

Legend tells that about 1901 James M. "Chuckawalla Jim" Wilson discovered gold stringers in a boulder in a canyon of the Hexie Mountains about six miles east of Pinyon Well. Breaking up the rock and taking it to the Piñon mill, Wilson obtained around $500 after processing. He called the lode from which he took the rock the "El Dorado." Wilson did not perform much development work, and about 1903 sold the claim to John N. White, a former clergyman turned mine promoter. At the Eldorado White erected a camp and filed on more than thirty claims in the area. Before he could build a mill, however, he ran out of cash.

---

195. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.; Charles T. Weiler, "Appraisal of Mineral Interests Inherent in the Golden Bell Lode Mining Claim, Tract 22-121, Joshua Tree National Monument, Riverside County, California," April 1975, file L3023, Div. of Mining and Minerals, WRO, NPS, San Francisco, Ca., p. 6.

In 1907 some of the biggest investors in the property got together and reorganized into the New Eldorado (El Dorado) Consolidated Mining Company of Los Angeles. L. D. Johnson of Whittier was president and his son Charles became superintendent. Charles, a mining engineer, concentrated work on Claim 14, Wilson's original discovery. A shaft was sunk 300 feet with 100-, 200-, and 300-foot levels, and was later extended to 500 feet. The camp at this time consisted of white tents, a house, and a few other buildings. The mine closed in 1910, but two years later it reopened with Fred Vaile as superintendent. The first record of production of gold-silver ore was in 1911.

Vaile started milling ore at the mine in 1913 and continued into World War I. This was one of the few desert gold mines operated as late as 1918. Gold production amounted to $100,000. Although gold was the primary mineral obtained, also found were galena, wulfenite, and molybdenite--critical ores in great demand during wartime. Often special trips were made to get these materials to Indio for shipment.

Water shortages were always a problem for mining operations because no close dependable water source could be found. The Eldorado operators completed a nine-mile pipeline paralleling the road to Pinyon Well in 1918. A pump tender lived at the well site. At the foot of the grade leading to the mine was a public faucet for use by travelers. The New El Dorado (Eldorado) Mill Site in Section 24, including Pinyon Well, and three of the more important lode mining claims in Sections 16 and 17, were issued a patent on October 10, 1923. The claims had been located on April 5, 1906, and the mill site on August 31, 1921.[196]

---

196. James E. Cole, Custodian, JTNM, memorandum for the Regional Director, Region Four, Mar. 5, 1945, Central Files, 1907-49, RG 79, NA, p. 1.

The property was closed in 1922, but was reopened in 1924 under lease. When the property was visited in 1923, the shaft and workings extended to a depth of about 400 feet. In addition to the elements mentioned earlier, vanadanite and vanadium were being recovered. The ore was treated on amalgam plates and cyanided. There was a large camp house in the canyon as well as other mine buildings.[197] The state mining bureau reported that in 1923 the White Mines Corporation, John M. White, president, was developing a group of claims (unnamed) thirty-five miles north of Indio. On the property were a 150-foot-deep shaft and a 300-foot tunnel. Three men were employed.[198] In 1929 the mine's three claims were owned by Vaile and under lease to John White. The shaft was 500 feet deep, with development confined to the 450- and 500-foot levels. Mine equipment consisted of a fifteen-horsepower gas engine hoist and a stamp mill. Three men were employed.[199]

Leasing continued until around World War II. Older mill tailings were reprocessed during the Depression. By 1937 one operator had increased the mill size to ten stamps.[200] The mine was operating in 1938 when its owners requested permission from the government to drill a well in Section 8, T3S, R10E, for water to use at the New Eldorado Mine.[201] The mines were not worked after 1939, and in the fall of 1940 the pipeline from Pinyon Well was removed.

---

197. USGS Water-Supply Paper 497, 1923, p. 266.

198. California State Mining Bureau Report XX, 1924, v. 20, no. 1, p. 45.

199. Report XXV of the State Mineralogist, 1929, pp. 485-86.

200. Much of the early history of this mine was taken from L. Burr Belden, "Lizard Hunter Uncovers Rich Hoard of Gold," San Bernardino (Ca.) Sun-Telegram, Jan. 15, 1961.

201. Walter S. Clute to Director, NPS, June 13, 1938, Central Files, 1907-49, RG 79, NA.

Principal periods of development for the Eldorado (El Dorado) appear to have been from 1911 to 1916, and from 1936 to 1938. About 2,000 ounces of gold were recovered.

g) Golden Bee Mine

No detailed information about the discovery of the Golden Bee claims has been found. Ore was evidently first observed on the Dickey Boy lode in June 1934.

In the late 1930s E. "Frenchy" Auclair worked two claims, the Dickey Boy and the Mabel lodes, in Sections 21, 22, and 15, T3S, R10E. Ore was shipped to various custom mills in the district, the milling ore having a value of $50 per ton in gold. It was reported at this time that the mine had netted a profit of $20,000. Adjoining the Golden Bee Mine, in Sections 22 and 15, were the two lode claims of the Murphy property, known as the Yellow Jacket Nos. 1 and 2. These were located in December 1934. Their ore contained free-milling gold, silver, vanadium, and manganese (see Paymaster Mine).[202]

The Golden Bee was reportedly a small producer in 1938-39. It was leased by the State Lands Division for gold-mining operations in the late 1930s and early 1940s. Returns were marginal. In two years of operation only $123.20 in royalties was recovered by the state. Often smelter returns were less than the charges for smelting. According to a mining report, the older workings that had been mined previously were not extensive and were poorly mineralized.[203]

Principal development work in 1940 was confined to the Golden Bee vein and consisted of a tunnel, crosscuts, a shaft, drift, and

---

202. Guthrey to Dir. of Investig., May 6, 1937, pp. 12-13.

203. N. L. Harvey, State Lands Division, to D. J. Everitts, Apr. 27, 1976, in "Joshua Tree National Monument, Mineral Appraisal Report, Lands Included in Proposed Exchange with the State of California in Riverside & San Bernardino Counties, California," Aug. 19, 1976, Division of Mining and Minerals, WRO, NPS, San Francisco, Ca.

stope. Ore shipments were made by Golden Bee Mines, Ltd., (Eloge Auclair, president and manager) to Burton Bros., Inc., at Rosamond, in Kern County, and to the Gold Crown Mining Company's mill at Dale. Total production to date had been $40,000. Two men worked the mine, aided by a twelve-horsepower gas-driven hoist, a portable compressor, and air drills.[204] The property was idle in 1945.

At some time Auclair sold the mine to a former government mining engineer.

A 1959 survey of the mine area noted a main shaft about 150 feet deep. About 80 feet southwest were two minor shafts to the 10-foot level. The area adjacent to the main shaft, from the surface down to at least 30 feet, was honeycombed with narrow, irregular passageways. Also present were adits, shafts, drifts, crosscuts, and stopes.[205]

Other workings nearby, known as the Ida Quartz Mine, may be on the same claim.

h) Paymaster Mine

As mentioned in the previous section, a man named Murphy owned two lode claims adjacent to the Golden Bee Mine. In 1945 the Paymaster Mine was reported to consist of three claims in Section 15, T3S, R10E, at an elevation of 3,000 feet. They were owned by P. O. Murphy and E. Leith of Twentynine Palms. Development consisted of a shaft and drifts. Ore had been shipped to the Burton Bros. mill in Kern County and returned $35 a ton in gold. The property was idle at that time.[206] Bill Keys may have held an earlier interest in the mine (see Dams and Reservoirs, Grand Reservoir Site).

---

204. California Journal of Mines and Geology, 1940, p. 48.

205. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

206. California Journal of Mines and Geology, 1945, p. 141. (Note that there is also a Paymaster Mine in Section 20, T2S, R10E.

i) Goldfields of America (Sandra K[ay] #1) Mine

One other mining property is found near this group of mines on the northeast slope of the Hexie Mountains, but is across the road (northeast) from the Gold Point Mine. It comprises twelve claims on the southern slope of the Pinto Mountains in Section 4, T3S, R10E. In 1945 it was owned by Goldfields of America, Ltd., of San Bernardino. Development consisted of an inclined shaft about 100 feet deep and several other shafts from 50 to 75 feet in depth. Workings totalled 720 feet. It was idle at that time.[207]

j) Ruby Lee Mine

The Ruby Lee unpatented quartz lode claim is in the center of Section 2, T4S, R10E. It was originally filed on in February 1936 by Ruby Lee Rule and acquired by Mr. and Mrs. A. A. Dietemann in 1948. Mr. Dietemann stated that he had been involved in claim activities here prior to that time. Located in March 1936 in connection with the mine was an unpatented property known as the Ruby Lee millsite, in Section 10, T4S, R11E.

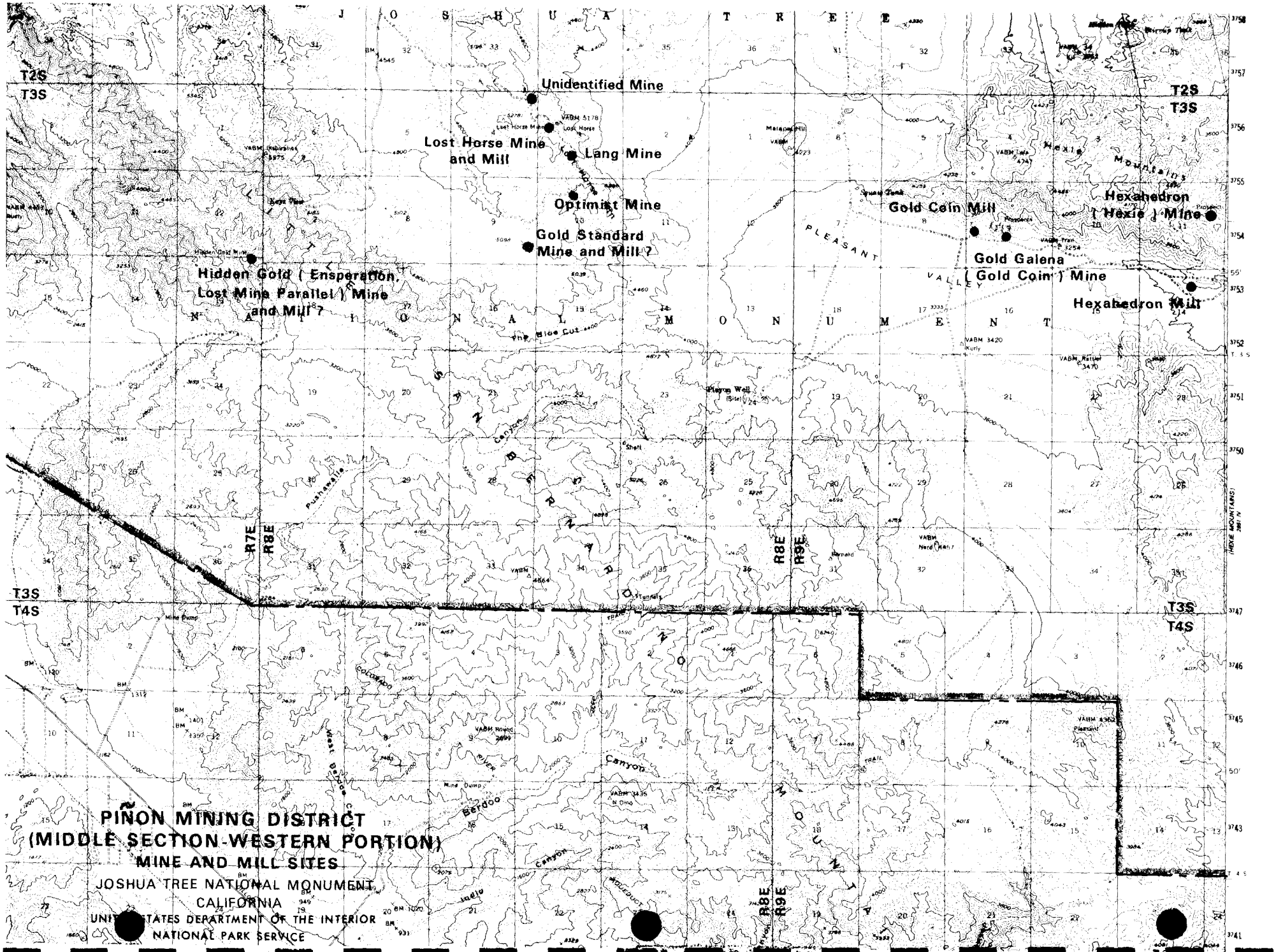
k) Combination Quartz Mining Claim No. 1

This property reportedly was in the northwest quarter of Section 12, T4S, R10E, at the north edge of upper Porcupine Wash. The claim was located by Chester A. Pinkham and Charles W. Landford in July 1935. Development work in the 1930s consisted of a vertical shaft fifteen feet deep joined at the bottom to a drift. Two shallow pits were opened uphill from the shaft. No production has been recorded.[208]

---

207. Ibid., p. 131.

208. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.



PIÑON MINING DISTRICT
(MIDDLE SECTION-WESTERN PORTION)
MINE AND MILL SITES

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ON MICRO

DSC / SEPTEMBER 1983 / 150-25000

l) Captain Jinks (Jenks) Mine (Phyllis Silver Mine)

This property is in Section 1, T4S, R10E, in the hills north of upper Porcupine Wash. The mine was supposedly discovered and worked by a Captain Jinks or Jenks in 1874. Chester A. Pinkham held it about 1900. In 1951 W. F., Frances M., and Phyllis Ann Keys relocated it as the Phyllis Silver.[209] No record of development or production was found.

m) Hexahedron (Hexie) Mine

L. Burr Belden suggested in an article on the Lost Horse Mine that Jep Ryan and his partner Kelsey bought the Hexahedron Mine about the time they bought the Lost Horse Mine (ca. 1894).[210] In 1896, however, the property was said to be owned by Tingman and Holland of Indio. Some prospecting and development work had been done showing a good grade of gold-bearing rock.[211] The property was active in 1907 with a crew of twelve men. The mine was mentioned in 1915-16 as being owned by the Indio Mining and Milling Company, J.S. Garrison of Victorville, Ca., president, and Roy Garrison mine superintendent.[212] By 1929 the mine was abandoned and a mill on site had been dismantled.[213]

Some of the blank spaces in the mine's history may have been filled in by Ronald Dean Miller, who stated that Al Tingman discovered rich gold ore in some hills north of the eastern end of Pleasant Valley around 1900. He subsequently sold these claims to Bill and John Garrison, who formed the Hexahedron Mining Company. Miller states that the company dug a well at the mine, but it never produced

---

209. Ibid.

210. L. Burr Belden, "Cattle Thieves Cause Victim to Find Rich Mine," San Bernardino (Ca.) Sun-Telegram, Apr. 26, 1959.

211. Thirteenth Report of the State Mineralogist, 1896, p. 311.

212. Report XV of the State Mineralogist, 1919, p. 536.

213. Report XXV of the State Mineralogist, 1929, p. 481.

sufficient water for mining operations. The company also erected a five-stamp mill, although most of their ore was sent to the New Eldorado mill.[214] Bill Keys stated in 1959 that the Hexie mill did the last of the milling for the El Dorado.[215]

Clifton Gray wrote that the Hexahedron Mine was being developed as early as 1894 under Ed Holland and A.G. Tingman. The mine, he says, was still active in 1914 and owned by the Indio Mining and Milling Company, but was inactive by 1918 and the mill dismantled.[216]

n) Gold Galena (Gold Coin) Mine

Information on this property is scanty. Gray states that the mine, located primarily in the western half of Section 9, T3S, R9E, was discovered about 1900. The property was operated by the German-American Mining and Milling Company in the early 1900s. That company had been organized in Los Angeles to open certain mines at "Indian Camp" in the Piñon District. Directors were F.C. Longnecker, S.L. Kistler, and A.N. Hamilton.[217] By the fall of 1908 it was reported that the company was working three mines--the Texas Chief, Lone Star, and Apex--"just south of the San Bernardino county line." These may be claims of the Gold Coin Mine. In December it was reported that new machinery would shortly be installed at the mine in Pleasant Valley.[218] A Mrs. Stead said that her husband owned and worked the Gold Coin in

---

214. Mines of the High Desert, p. 49.

215. JTNM Fact File.

216. "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

217. Engineering and Mining Journal 84, no. 10 (Sept. 7, 1907): 461.

218. Ibid. 86, no. 16 (Oct. 17, 1908): 782; 86, no. 23 (Dec. 5, 1908): 1122.

1911. The couple lived at the mine, hauling water from Pinyon Well. She said they used three lengths of pipe, on tripods, to transport the water from the well to their barrels in the wagon.[219] By 1916 the Gold Galena Mining Company of Los Angeles, F. C. Longnecker president, owned nine claims in Sections 4, 8, and 9. Workings ranged in depth from 70 to 100 feet on a vein containing galena carrying gold. The property had no mill and as yet there had been no production.[220]

The mine was closed in 1918. Gray states that in 1920 W.F. Keys located two claims--Pleasant Valley and Jackson--covering the areas most extensively explored. Keys did only intermittent development. In 1929 the Gold Coin Mine, owned by Longnecker, was reported to comprise five claims. Average value of its ore was $12 per ton. Two men were employed on development, which by then consisted of a shaft fifty feet deep.[221]

In the late 1930s a Mrs. Dodge was reportedly part owner of the mine.[222] A government report at that time stated that the property consisted of six claims located October 6, 1933. Development had resulted in an inclined shaft 100 feet deep. No record of production had been found.[223]

o) Gold Standard Mine

It is reported that this mine in Sections 9 and 10, T3S, R8E, was originally located in 1896 by the Burns Brothers. Joe Reynolds took over the mine and worked it from 1900 to about 1912 or 1914. W.F. and Frances Keys relocated the property, but when is

---

219. Mrs. C. D. Crawford to Supt. James E. Cole, Mar. 8, 1945, in JTNM Fact File.

220. Report XV of the State Mineralogist, 1919, p. 538.

221. Report XXV of the State Mineralogist, 1929, p. 478.

222. Weight, "They shared work, pleasures" Jan. 19, 1978.

223. Guthrey to Dir. of Investig., May 6, 1937, p. 13.

uncertain. Keys developed the mine by three open cuts and pushed some drifts from the shaft about thirty feet down. About $2,000 worth of improvements were made. Keys built a stone cabin on the claim and a mill. Also on site were a reservoir five feet high and ten feet in diameter, with a water trough and a tent camp. A Dr. Henry (?) last held the property.[224]

Gray states that the mine was first located by Johnny Lang in 1902 before being relocated by Keys and later sold to Dr. H. W. Milo of Vallejo, California, around 1955. Development work at the property was only intermittent for several years.

There is another Gold Standard Mine in Section 1, T2S, R12E, about one-half mile south of the Brooklyn Mine and about three miles southeast of the New Dale townsite, in the Dale Mining District.

p) Optimist Mine

This property is about one mile south of the Lost Horse Mine, in Section 10, T3S, R8E. Nothing is known about the mine's discovery, ownership, history, or production. It was owned by Kaiser Steel Corporation in the 1970s.

q) Lang Mine

No information was found on this property identified by the mine inspection crew as being in Section 3, T3S, R8E. It is possible it was explored in conjunction with the Lost Horse Mine operation by Johnny Lang.

r) Unidentified Mine

This property in Section 4, T3S, R8E, is on a ridge half a mile northwest of the Lost Horse Mine. Its discovery, ownership, history, and production are unknown. In the early 1970s it was owned by Kaiser Steel Corporation.

---

224. Excerpt from letter from Mike Perkins, Nov. 18, 1971, in JTNM Fact File.

s) Lost Horse Mine

As with the Desert Queen, there are several versions of the story of this mine's discovery. One relates that the deposit was found by Johnny Lang who came up from Texas in the early 1890s with his father George and brother Billy. George Washington Lang was an Arizona cattleman who brought large herds of cattle into southern California to sell. On one trip to the coast the younger son was left with part of the cattle herd in New Mexico while the father and Johnny took the others on west. George entered the Coachella Valley with the intention of moving the stock to what later became Lost Horse Valley to graze on its lush meadows.

After arriving in the Lost Horse area, young Lang met "Dutch" Frank Diebold at Witch Springs (now Lost Horse Well). Diebold, a prospector, had discovered what looked like a rich gold-bearing seam several miles north of Piñon Mountain, but had been driven off the land by the McHaney gang. Lang was no doubt sympathetic because he also had been threatened by the gang while looking for a lost horse. Lang offered Dutch one thousand dollars for the claim if it proved out, whereupon Lang and his father went out to inspect it. They were pleased with what they saw. Young Lang began working the property, but under the ever-present threat of being killed or at the least run off by the nearby outlaws.

Johnny's father had meanwhile located at Witch Springs, trading some cows to Jim McHaney for the privilege of using this area as a summer watering and grazing place. He advised his son to take in partners in his mining venture, and Lang did in order to protect his claim. Despite other variations in the story, it is known that on December 29, 1893, George W. Lang, John Lang, Ed Holland, and James J. Fyfe filed a notice of location on a gold-bearing lode "adjoining the Peoples Party Mine on the East."[225]

---

225. Notice of Location, Lost Horse Mine, received for record Jan. 3, 1894, Mining Claims Book No. 1, Official Records, Riverside County, Ca., p. 88. Whether Al G. Tingman was another early partner is uncertain, though many sources state this as a fact.

When operations started, the ore was processed in a two-stamp mill at Lost Horse Spring. In 1895 the partners sold their interest to Thomas and J. D. Ryan, who organized the Lost Horse Mining Company. The mine was patented on August 7, 1897, to Thomas C. Ryan, Jepp (D.D.) Ryan, Matthew Ryan, Jr., Ethan B. Ryan, and Samuel N. Kelsey. Matthew, a rich Montana rancher, financed the operation. The new company, with this backing, was able to erect a ten-stamp mill and install a water line from Lost Horse Spring. A shipment of ore was made from the mine to Banning every week, a five-day trip for two wagons, a water tank, and feed rack. Intermittent stops between the two places were made at Whitewater, Warren's Ranch, Warren's Well, and Quail Spring.

It has been said that $350,000 was extracted from the Lost Horse, mostly before the turn of the century. From 1896 to 1899 the company processed about nine thousand ounces of gold and some silver. These four years produced eighty percent of the wealth made in the first sixteen years of the mine's production. The Ryans later leased the mine to a succession of people who did not realize a profit. A fault was struck in the original tunnel and the gold seam lost. But several further attempts were made to work the mine. In 1915 Sam Ryan and Lon Migs went up to the mine. It is said by some that they installed gasoline-powered equipment to replace the steam-driven machinery. Their operations never amounted to much. About 1923 a Dr. Ward took supplies and equipment up to reopen the mine, but he eventually gave up. The property was idle until 1931 when, due to a rise in gold prices, General Mining and Development Company mined the upper level ore pillars and processed the ore in the ten-stamp mill. (It has also been said that this company installed the gasoline engines.) The last work apparently was done by J. D. Ryan in 1936, when he cyanided approximately six

hundred tons of tailings. It is said that all of the work done in the 1930s produced only a few hundred ounces of gold.[226]

A version of the mine's discovery given by Chester A. Pinkham differs slightly in regard to some of the earlier details. Pinkham agrees that Dutch Frank originally found the lode, but states that at the time of the ledge's discovery, Dutch was prospecting under a grubstake from parties with whom friction had developed. Diebold decided to leave the find alone until his grubstake had expired and then locate it in connection with someone else. Before this happened, however, along came Johnny Lang searching for a horse that had wandered off from his camp at Pinyon Well. While searching for the animal, Lang stumbled across this gold outcropping.

According to Pinkham, the first rich surface ore was run through the Piñon mill. Later water was developed close to the surface several miles north of the mine (Lost Horse Spring), and a small mill was installed there. It became too expensive to haul the ore, so a ten-stamp mill was erected at the mine, with water eventually piped in from several shallow wells at the former mill site. A crew of Mexicans and Indians was kept busy chopping juniper and piñon pine for fuel to run the mills, hoist ore, and pump water. Supplies came from Banning, sixty-five miles away.

After Lang died, Ryan acquired his interests. At depth the pay ore played out. A vein was followed for a short while

---

226. David Stephens, "The Lost Horse," Pioneer Days Souvenir Edition, 1974, suppl. to the Desert Trail (Twentynine Palms, Ca.), pp. 5-7. This writer has not found evidence that J. D. Ryan processed tailings by cyanide. A Mr. Phelps, however, is mentioned in several sources in connection with such an operation. J. D. Ryan tranferred his interest in the Lost Horse to Daniel Stafford and Sam Ryan in 1930 and they formed the General Mining and Development Company. Benjamin Levy, Historic Structures Report, Lost Horse Mine, Joshua Tree National Monument, Part I, Historical Data (Washington, D.C.: Div. of History, Office of Archeology and Historic Preservation, NPS, 1969), p. 11.

until Ryan gave orders to stop work. The mining crew was so certain of striking pay ore again, however, that the men offered to donate their labor for a time to see if the vein could be found if Ryan furnished the food, tools, and other necessaries. Just as the men were about to give up, after driving eighty feet farther down, they cut into a pay shoot that produced $75,000. After that was worked out, development stopped.[227]

Other versions say that Lang took in as partners Ed Holland and Alfred Tingman. They built the arrastra (Henson Well?) over at Pinyon Well to crush the ore, which was hauled by wagon. The partners sold to Jepp Ryan and Kelsey, who owned a well (or spring) closer to the mine (Lost Horse Spring) where they had erected a mill. With the money from the mine sale Johnny opened a saloon at the Twentynine Palms oasis.[228]

Clifton Gray agrees that Lang, Holland, and Tingman were owners of two claims comprising the Lost Horse Mine and that in 1894 ore was hauled to the Piñon Mountain mill. He reports that in 1897 a patent was issued to Nathan (Matthew?, Ethan?) Ryan and others, and that the mine was in practically continuous operation from 1895 to 1908, but under several operators: 1896-98, Thos. C. Ryan; 1899-1900, Lost Horse Mining and Milling Company; 1901, 1905, S. M. Kelsey; 1906, 1908, Lost Horse Mining and Milling Company. By 1896 a two-stamp mill had been built several miles north (at Lost Horse Spring). Workings at that time included an 80-foot drift adit, a 50-foot winze, and a 50-foot drift from the bottom of the winze. A 235-foot vertical shaft had been sunk with a horse-whim. In 1929 the shaft was 500 feet deep and a ten-stamp mill was present. Water was piped to the mine from Lost Horse Well.[229]

---

227. Chester A. Pinkham, "Pinkham Gives History of Lost Horse Mine," Central Files, 1907-49, RG 79, NA.

228. Belden, "Cattle Thieves Cause Victim to Find Rich Mine," Apr. 26, 1959.

229. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

Harold Weight wrote that although throughout most of 1894 the Lost Horse ore was hauled to the Pinyon Well mill, this soon proved unproductive because of the small capacity of the mill and scarcity of water. He states that Johnny Lang and J. J. Fife (Fyfe) constructed a larger two-stamp mill at Lost Horse Spring. The stamp battery was made by Baker Iron Works in Los Angeles, the six-h.p. gas engine by L. A. Windmill Co. The mill was in full operation by November 1894.[230] Weight also states that according to Keys, when the original owners sold out early in 1895 to J. D. and Thomas Ryan, John Lang retained an interest. The Ryans improved the property after they took it over. Water was piped 3½ miles and raised 750 feet to the mine by a steam pump at Lost Horse Spring. The steam operated a hoist, skip, and the new ten-stamp mill that was bought at a mine in the Chuckwalla Mountains and freighted to the Lost Horse in April 1897. It took four six-horse wagons and three eight-mule teams to pull it through Wilson Canyon and up to the mine.[231]

There is a story connected with an argument between J. D. Ryan and Lang that might be true if Lang did indeed retain an interest in the mine. Supposedly two shifts were operated at the mill, with Lang taking the night one and Ryan's brother the day crew. It soon became apparent that the day shift was turning out more raw amalgam than Lang's crew. Upon investigation it was found that Lang was stealing amalgam, and he was given the choice of selling his interest or going to jail. Lang sold out for $12,000 but did not move far away. He settled in an old cabin formerly occupied by a John Law and a man called Chase in what is now referred to as Johnny Lang Canyon. (These men were mentioned earlier in connection with cattle raising around Covington Flat.) Returns at the mine dropped in the early 1900s, and the owners never resumed full-scale operation. At that point Lang returned, evidently to retrieve amalgams he had stolen and buried around

---

230. Weight, "Legends of the Lost Horse Mine," p. 11.

231. Ibid.

the mill site. Lang started bringing raw bullion to Bill Keys twice a year, according to Keys the same amount each time--about $980 worth. Lang claimed this gold was being scraped from the mill's amalgamation plates, but Keys did not believe him. Keys estimated that Lang sold him nearly $18,000 worth of gold between 1917 and 1926.

Mining journals provide sketchy details on the Lost Horse Mine's operation, beginning in 1894. At that time the rock was being hauled eight miles to the Piñon Mountain mill. Owners were said to be Lang, Holland, and Tingman.[232] By the summer of 1895 a two-stamp mill operated by a gasoline engine was at work, probably the one at Lost Horse Spring.[233] In 1896 the mine was owned by Ryan and Kelsey. The Lost Horse mill was described then as steam powered, with two 850-pound stamps and a capacity of four tons every twenty-four hours.[234]

The Lost Horse Mining and Milling Company was incorporated in 1897, with a capital of $500,000.[235] In 1900 the property was reported bonded to U. S .G. Todd of Los Angeles for $200,000 from the current owners, Ryan and Kelsey.[236] By 1904 the mine had been closed down for several years, but was being reopened. The property was possibly still being developed as late as 1907.[237] In 1912 notice appeared in the newspaper that the Lost Horse Mine would be sold to

---

232. Twelfth Report of the State Mineralogist, 1894, p. 223.

233. Mining and Scientific Press 71, no. 2, (July 13, 1895): 30.

234. Thirteenth Report of the State Mineralogist, 1896, pp. 312, 315.

235. Engineering and Mining Journal 64, no. 8 (Aug. 21, 1897): 224.

236. Mining and Scientific Press 80, no. 18 (May 5, 1900): 494.

237. Engineering and Mining Journal 84, no. 4 (July 27, 1907): 182.

satisfy a judgement in the amount of several thousand dollars for Addie B. Ryan (wife of Jeptha DeGarret) who apparently had loaned the mining company large sums for development work.[238] Otherwise little is heard about the mine for several years.

In the early 1930s Charles R. Phelps, an insurance salesman for the Northwestern Mutual Life Insurance Company in San Francisco, came out to the desert, just after the price of gold rose to thirty-five dollars an ounce. He leased the old Lost Horse Mine and built a cyanide plant there to leach the tailings pile. He evidently ran into financial problems because of the delay in receiving payment for the gold extracted due to regulations of the Federal Reserve Bank. Without adequate capital, it was difficult to continue operations when payment did not come quickly enough to satisfy one's creditors.[239] An article in 1933 stated that the Ryans and a Mr. Stafford had reopened the Lost Horse and were working two shifts, milling the ore at the mine mill.[240]

The National Park Service acquired title to the Lost Horse Mine from the Ryan descendants in 1966. The mine shaft was sealed with a concrete slab, the mine road closed to vehicles, and the mill largely restored as a prime interpretive exhibit of the gold-mining era in the monument.

t) Hidden Gold (Ensperation, Lost Mine Parallel) Mine

Conflicting location data was found for this mine. Gray stated the property is in the southwest quarter of Section 7, T3S, R8E, and in the southeast quarter of Section 12, T3S, R7E. It was reportedly discovered by the Sellers brothers, who referred to it as the

---

238. "To Sell Once Famous Mine," Riverside (Ca.) Daily Press, Jan. 6, 1912.

239. Saunders interview, Feb. 27, 1975, p. 3.

240. Lou Jacobs, "Mining Notes," The Outpost (Twentynine Palms, Ca.), Sept. 28, 1933.



Illustration 90.

Daniel Stafford in front of the Lost Horse Mine stamp battery, June 21, 1932. Courtesy JTNM.



Illustration 91.

Cabins for the workers, Lost Horse Mine, July 1935. Courtesy JTNM.

Lost Mine Parallel. Bill Keys stated he worked the property in 1925, packing the ore on burros up the steep face of the Little San Bernardino Mountains to Keys View and then trucking it on out the road he built to Keys Ranch where it was milled in a two-stamp mill. Willis Keys stated in his 1975 interview that his father moved a small two-stamp steam mill from the Desert Queen Ranch to Pushawalla Canyon (he must mean the next canyon west) to be used in connection with the Hidden Gold Mine. Superintendent James Cole said the property was worked by Milton L. Knapp in 1930 or 1931. The mine was then taken over by John (Johan) and Margaret Samuelson around 1934. Les Earenfight remembered a trail used by Samuelson leading from the mine to Keys View. A cable also traversed this distance. Samuelson stated in 1939 that he had over 700 feet of tunnel work.[241]

u) Hersey and Dewey Mines

Two other mining properties are mentioned in early accounts of travel in the monument. One was the Hersey Mine, visited by George Wharton James in 1906: "we reach a little rock-house and tent four miles from El Dorado. It belongs to the Hersey Mine, and a little well of water, with a slight sulphurous taste, explains the location of the house."[242] The other was mentioned by J. Smeaton Chase: "At a point [in Pushawalla Canyon west of Pinyon Well] where a side cañon ran off to the west I noticed a weather-beaten sign-board showing that the Dewey Mine lay up there. This 'mine,' it seems, was a notorious case of 'salting,' . . . a fraud that nearly came off, but not quite."[243] Two properties stated by O'Neal to have been in the Hexie and Gold Coin region, to have used Pinyon Well water, and to have been filed on by Tingman and Holland were the Homestake (Hersey?) and Dewey.[244]

---

241. Johan Samuelson to Bureau of Mines, Dept. of Interior, January 1939, Central Files, 1907-49, RG 79, NA.

242. Wonders of the Colorado Desert, II: 483.

243. California Desert Trails, p. 141.

244. Peculiar Piece of Desert, p. 67.

3. Mill Sites

a) Eldorado (New El Dorado) Mill

By 1918 the Eldorado Mine was receiving water from Pinyon Well to run its mine and mill operations. By the 1920s the property had an amalgamation and cyanidation plant plus stamps.

b) Hexadedron (Hexie) Mill

Little is known about this mill. Supposedly a five-stamp mill was erected near the mine, but the date of construction is not known.

c) Gold Galena (Gold Coin) Mill

No details on this mill operation were found by the writer.

d) Lost Horse Mill

This ten-stamp mill was erected at the Lost Horse Mine by the Lost Horse Mining Company soon after 1897. Water to run the plant was piped in from Lost Horse Spring and later from several wells near the spring site.

4. Evaluation of Resources and Recommendations

a) Mine Sites

(1) Gold Point Mine

The Gold Point Mine is about 4.5 miles southeast of White Tank and adjacent to the Pinto Basin Road. Development at the property consisted of one shaft about 100 feet deep, a smaller one about 30 feet deep, and a small open cut. The U.S. Bureau of Mines reported in 1935 that forty-six tons of ore had been processed and twenty-three ounces of gold and about nine of silver recovered.[245] Because of this mine's proximity to the main monument road, the open shafts presented a

245. Paul H. Knowles, mining engineer, Office of Mining and Minerals, WRO, NPS, to Supt., JTNM, Mar. 7, 1973, file L3023, WRO, NPS, San Francisco, Ca.

potential safety hazard. One shaft opening was grated and other workings filled in. This site possesses no historical significance or integrity.

(2) Rich Gold (Gold Crown #2) Mine (Blue Bell Mine)

This property is about four miles southeast of White Tank and about ¼ mile south of the West Pinto Basin Road. Development work consisted of three shafts--15, 25, and 100 feet deep--and a shallow open cut.[246] As stated earlier, this claim was once part of the Blue Bell Mine, a property occasionally mentioned in the early mining records.

According to Bob Michels, an early miner in the area, the old Blue Bell Mine workings lie on the same ridge but on the opposite (south-facing) slope from the two wooden ore bins visible from the West Pinto Basin Road. These workings were inspected from the top of the ridge. Visible are a shaft or tunnel, some dumps, and possibly some structural ruins. The LCS crew visited the site in 1976. Their sketch map of the area shows a vertical shaft with a dry washer, a collapsed house, and another vertical shaft with a cyanide tank nearby. (See Golden Bell Mine.)

The property does not appear to have been significant in the mining history of the area. The 1976 LCS team determined that the site did not merit inclusion on the National Register. The site should be left to natural deterioration.

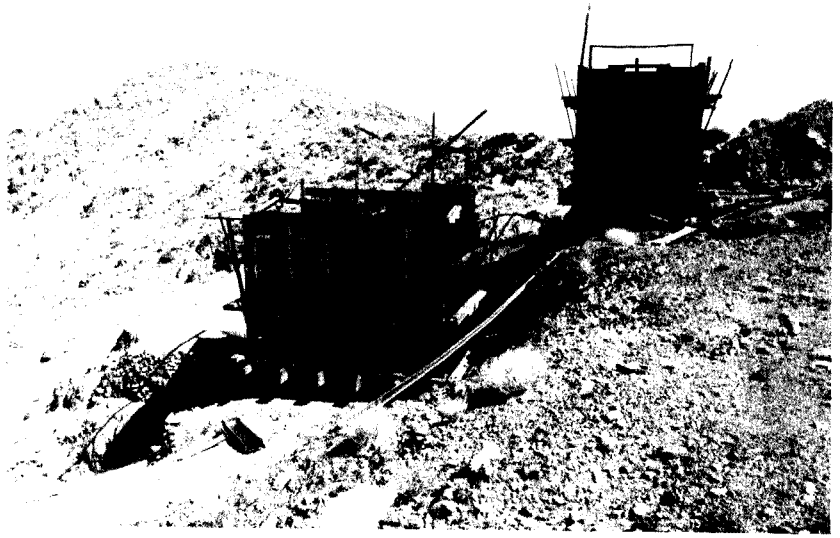
(3) Unidentified Mine

This property about 4½ miles southeast of White Tank and about ½ mile south of the West Pinto Basin Road was developed by a 100-foot-long drift adit. A 20-foot vertical shaft was also sunk.

---

246. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.





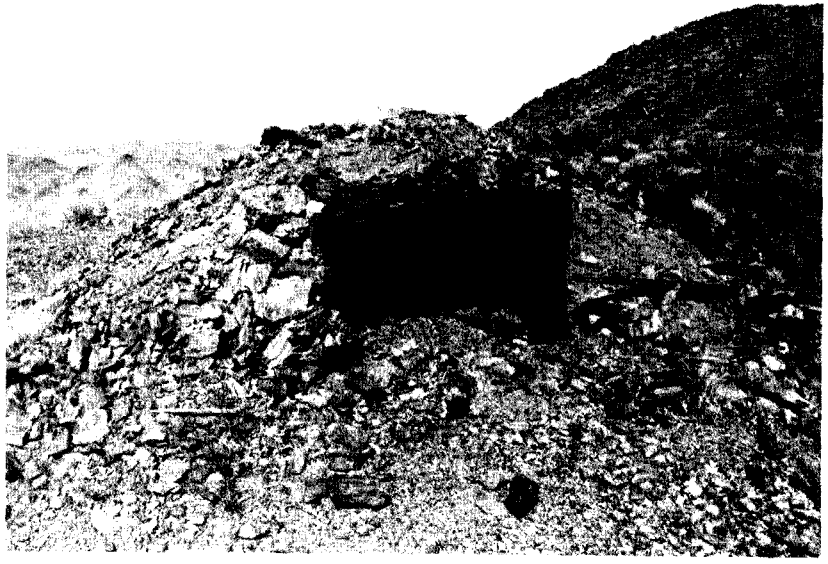


Illustration 92.

Structures in Silver Bell-Golden Bell mines area. Clockwise from left edge: building site on flat between main monument road and Silver Bell area, ore bins and loading dock, dynamite storage bunker. NPS photos by Linda W. Greene.

The property was not inspected by the writer. It has no apparent historical significance. There are some indications that this was another Kaiser Steel Corporation holding in the early 1970s.

(4) Silver Bell Mine

This property is about four miles southeast of White Tank and about ½ mile southwest of the West Pinto Basin Road. Early work there consisted of two shallow shafts. Mining for copper-bearing material involved shaving off the east slope of a small knob-like hill. This area of activity is probably the terraced slope just above (west of) the two wooden ore bins. Much copper-bearing rock is visible on the terraces formed by bulldozing activity. The two large ore bins visible from the monument road are probably associated with this operation. There is also a small semi-subterranean structure on top of the ridge that might have been used to store explosives. At the point where the rough road leading up to the ore bins hits the flat land west of the Pinto Basin Road were found what appeared to be the remains of a living site. Flagstone floors, wooden timbers, and stove parts were found there. The Silver Bell property has no historical significance.

(5) Golden Bell (Blue Bell) Mine

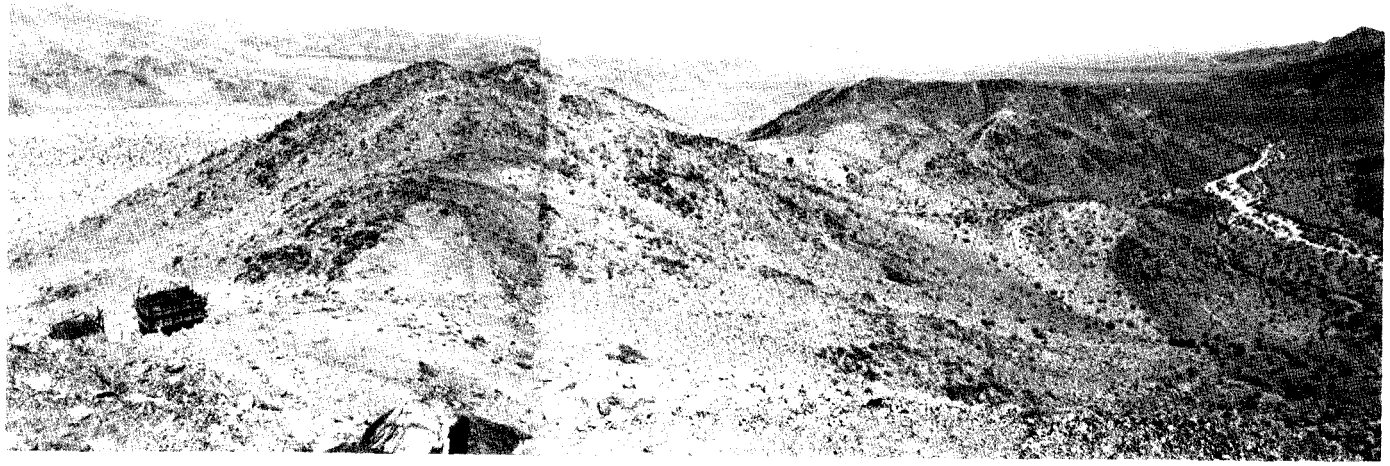
The Golden Bell claim is located near the center of Section 8, T3S, R10E. It is on the southeast side of a low mountain on the north flank of the Hexie Mountains, at the extreme west end of Pinto Basin, about ½ mile south of the Pinto Basin Road.

The Golden Bell lode patented mining claim includes the shaft and adit originally on the unpatented Golden Trumpet claim and the shaft and mine workings on the unpatented Golden Bell claim. Mine workings consisted of a steeply dipping one-compartment shaft, a drift, and an inclined untimbered shaft. Open stopes extend to the surface irregularly between the two shafts. A small mill once operated near the vertical shaft.



Illustration 93 (left).
Hillside at upper left has been bulldozed in connection with Silver Bell mining activity. Powder storage shed is to right, built into ridge.

Illustration 94 (below).
View down hill from Silver Bell Mine toward Golden Bell (Blue Bell) and Rich Gold mining areas. NPS photos by Linda W. Greene.



In 1975 no improvements were in place on site except for the timbered collar of the vertical shaft. A small steel bin had fallen downslope. A steel trommel and pan conveyor deck lay at the bottom of the draw near the inclined shaft.[247]

In the northeast quarter of Section 8 is an open shaft near the Golden Bell that is the Margaret Mine.

The Golden Bell has no apparent historical significance in the mining history of the monument. It was determined to be not eligible for the National Register after its inspection by the LCS crew in 1976.

(6) Eldorado (New El Dorado) Mine

This property is on the north wall of a small canyon at the southeast corner of the Hexie Mountains in the northeast quarter of Section 17. In 1959 the workings consisted of 2,000 feet of drifts, shafts, and minor crosscuts. A very faint jeep road led west about five miles into Pleasant Valley and then turned southeast about four miles to the Pinyon Well mill site. The mine site is best reached by veering southwest around the next ridge from the jeep trail to the Golden Bell Mine. About one-half mile west up this canyon, mill ruins are visible on the north slope and the remains of a mine camp on the south side of the wash. At the latter, remains of at least three buildings can be seen--only one is still standing but it is on the verge of collapse. A fallen outhouse and a dump were found, as well as some stone foundations. Across the wash and near a large cyanide tailings pile are two double-compartmented metal and concrete vats.

On the hillside above the mill ruins are a shaft and a caved prospect hole or tunnel. West of the shaft are some stone

247. Weiler, "Appraisal of Mineral Interests Inherent in the Golden Bell Lode Mining Claim," 1975, pp. 6-9.

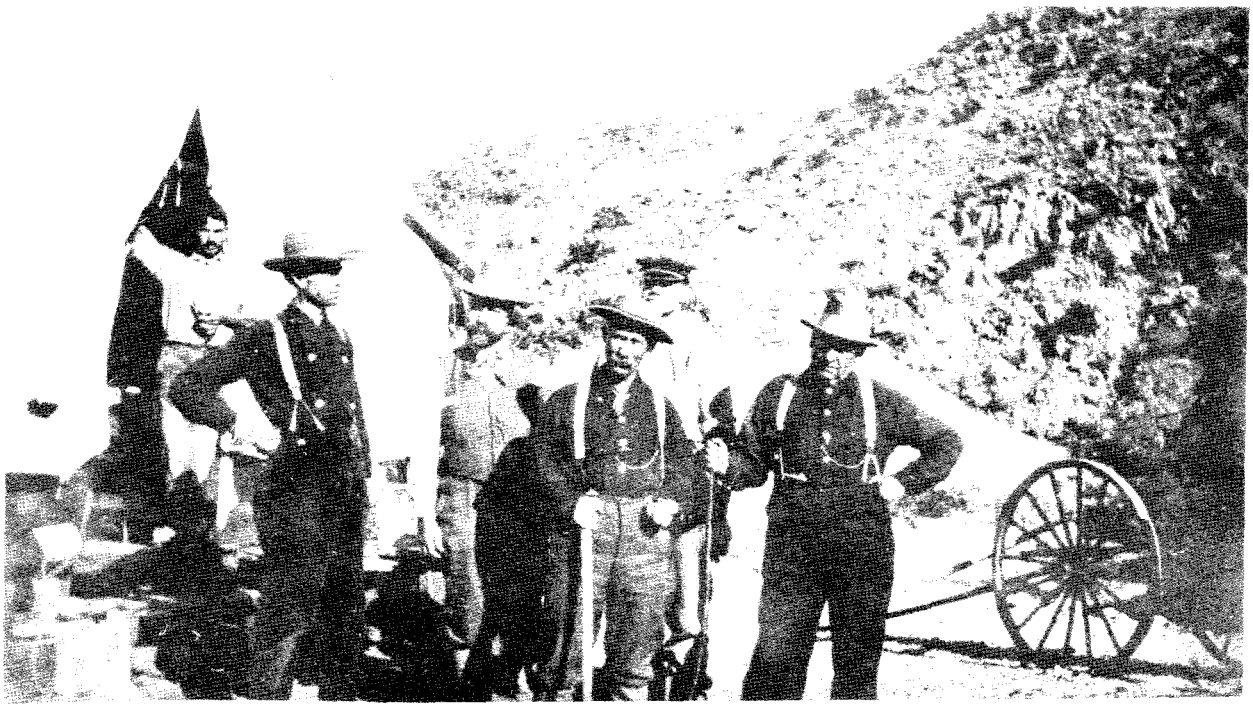


Illustration 95.
Board of Directors, New Eldorado Mine, 1908. Photo from Fred Vaile. Harold and Lucile Weight Collection, Courtesy JTNM.



Illustration 96.
New Eldorado Mine, 1913. Photo from Fred Vaile. Harold and Lucile Weight Collection. Courtesy JTNM.

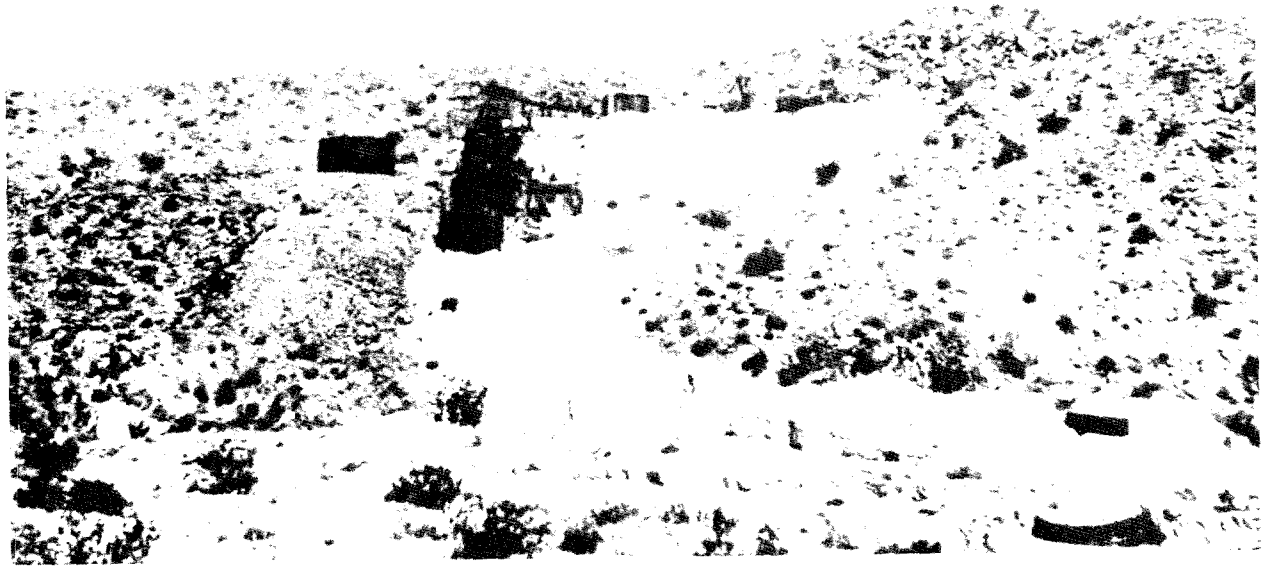


Illustration 97.
New Eldorado Mine, 1928. Photo from Fred Vaile. Harold and Lucile Weight Collection. Courtesy JTNM.



Illustration 98.
New Eldorado Mine, 1983. NPS photo by Linda W. Greene.

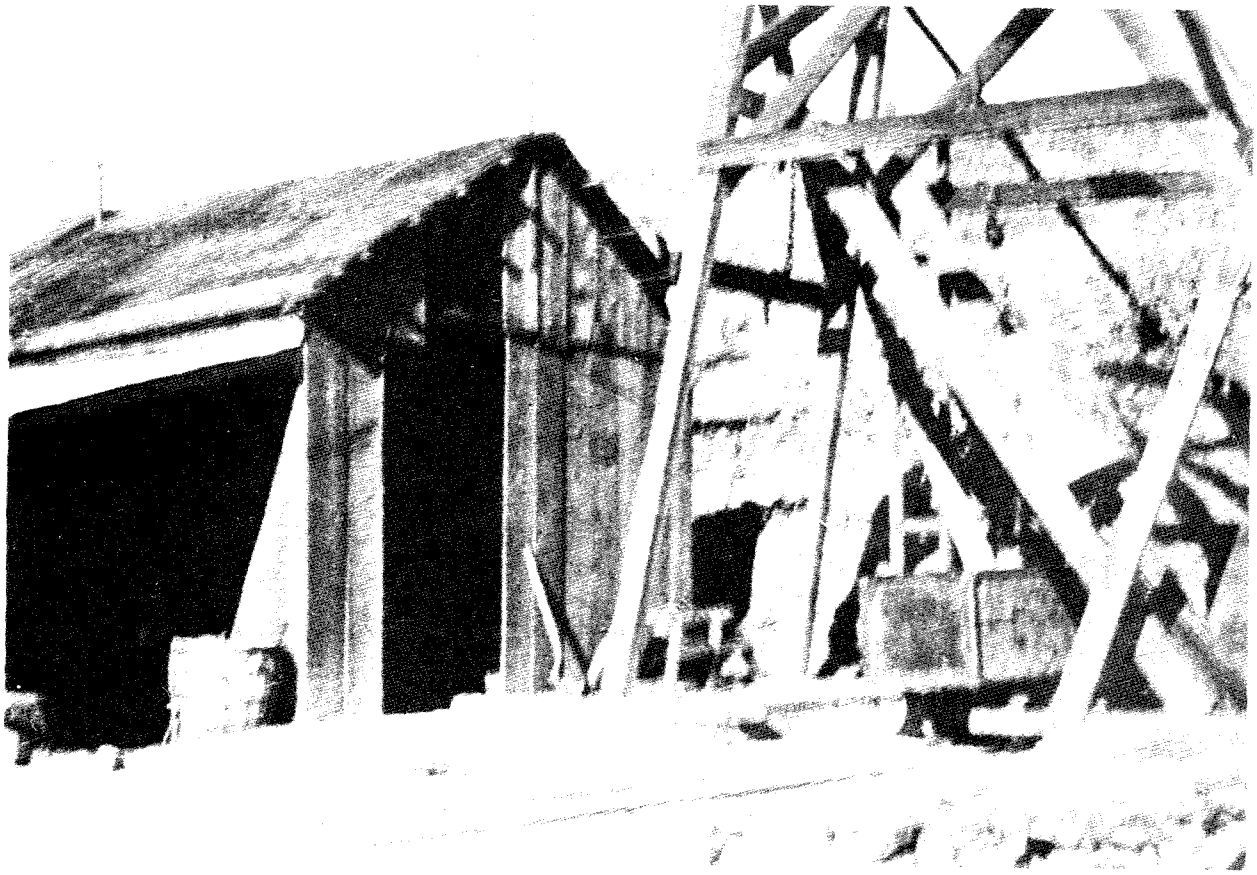


Illustration 99.
New Eldorado hoist house, 1911. Photo from Fred Vaile. Harold and Lucile Weight Collection. Courtesy JTNM.

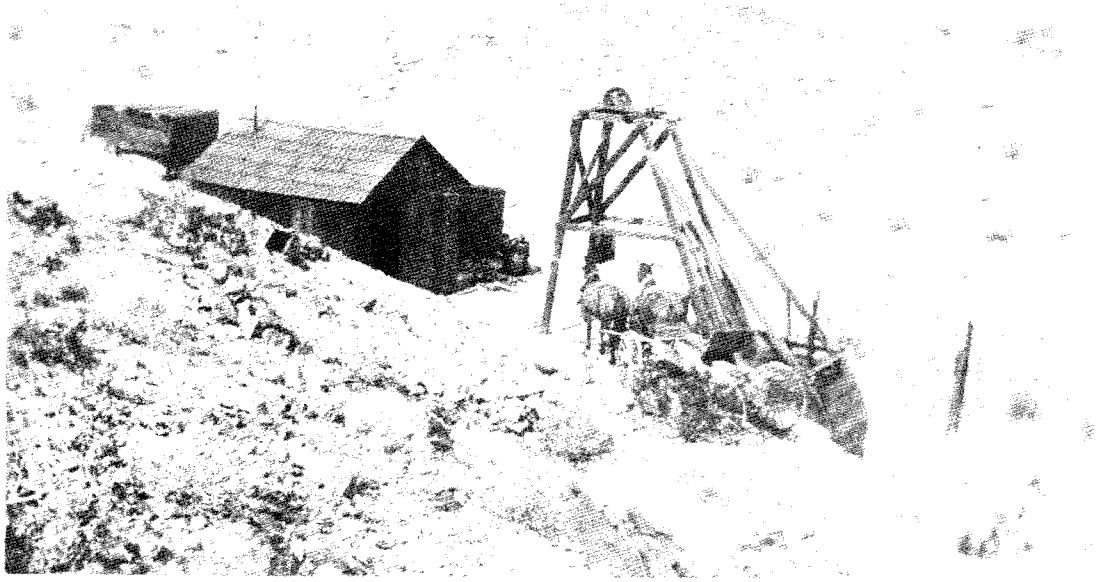
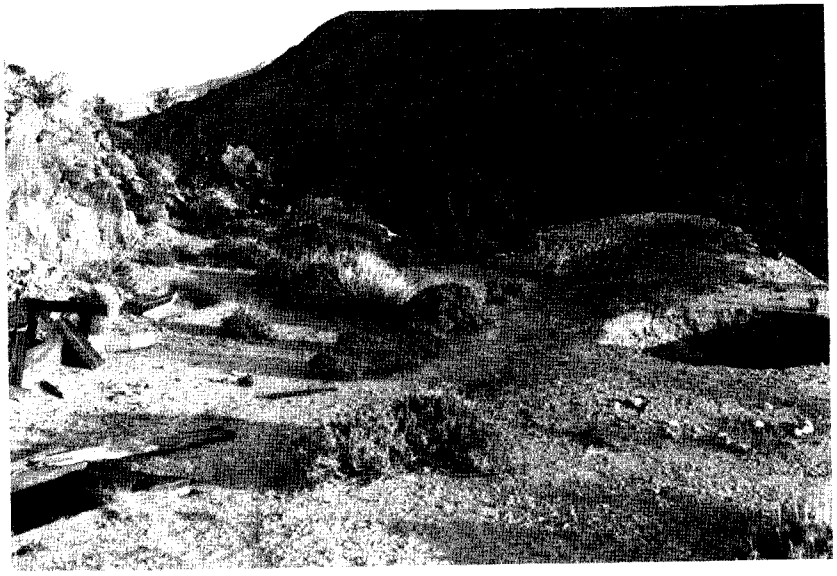


Illustration 100.
"At the El Dorado. One of the other claims--1908." Photo from Fred Vaile. Harold and Lucile Weight Collection. Courtesy JTNM.



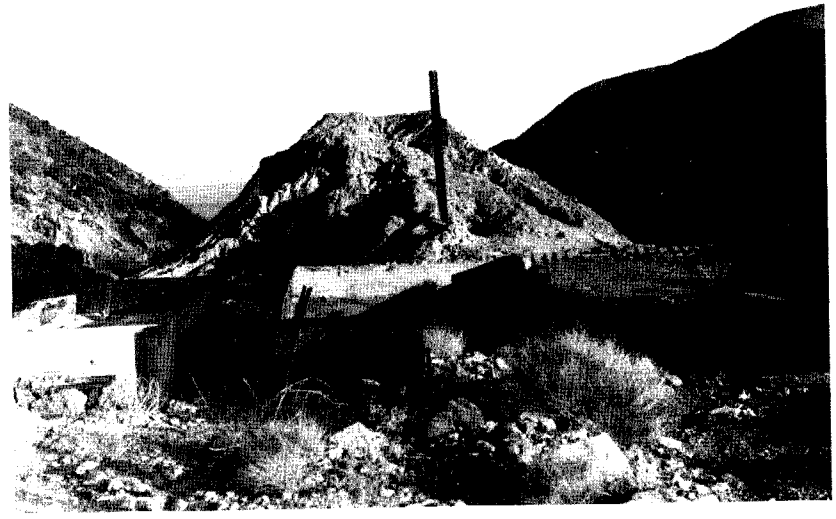




Illustration 101.

Views of the Eldorado Mine today. Clockwise from left edge: top level of mine workings, cast-iron and concrete vats and slag pile in bed of wash below mine, and the only remaining standing building. NPS photos by Linda W. Greene.

platform walls that look like part of some aerial tram framework to transport ore down to a large circular tank on the mill level. Only two corrugated-metal circular tanks, some concrete pilings, and one large tank foundation remain from the mill.

The Eldorado Mine functioned basically during the same time period as the Lost Horse and Desert Queen mines, although it was discovered about seven years later. Not only was its production high, at more than $100,000, but it also supplied a wider variety of minerals than any other mine in the monument--gold, galena, wulfenite, vanadium, vanadanite, and molybdenite. Production of several of these ores was especially critical during the First World War and special shipments of them were made. The Eldorado was also important locally because it performed custom milling for smaller mining operations in the area up until the late 1930s. By providing a nearby custom milling plant and thus enabling savings on haulage costs, it probably enabled many small operations, such as the Blue Bell, to survive during that time. Because it contained both a stamp and cyanide operation, the Eldorado mill undoubtedly could get good returns on its milling jobs. Although most of the mill was removed in 1941-42, enough machinery is left on site to indicate the positions of its various components. The entire site, including the mine, mill, and camp, is considered locally significant and will be nominated to the National Register.

Adding to the site's historical and interpretive significance are several pictures in the monument files copied from the Harold and Lucile Weight Collection. These photos by Fred Vaile, manager and part owner of the mine, show the mill, mine workings, housing area, and teamsters hauling to the mine. It is recommended that the monument interpretive staff try to secure copies of other photos in the Fred Vaile Collection pertinent to mining at that site and in the general area of the monument.

(7) Golden Bee Mine

This property of two claims is on the north slope of the Hexie Mountains in Sections 15 and 16, T3S, R10E, at



Illustration 102.

Lower level of workings, Golden Bee Mine, 1983.

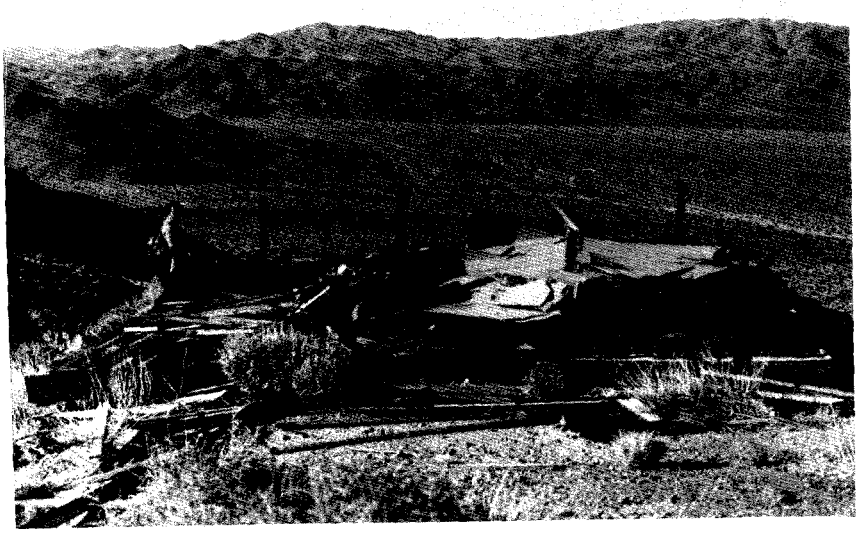


Illustration 103.

Remains of mining office, upper level of workings, Golden Bee Mine. NPS photos by Linda W. Greene.

an elevation of 3,500 feet. A rough trail leads to the mine area from the West Pinto Basin Road. Just before the road enters the canyon it forms a circle drive, around which are scattered the remains of the Golden Bee mining camp. Foundations of at least five frame buildings, all collapsed, can be seen there. About one-quarter mile up the road are the lower mine workings, distinguished by a corrugated-metal ore bin and a short wooden headframe. Several holes and tunnels are visible along the ridge where miners followed the quartz vein. They are supported by shoddy wooden timbering. The upper workings consist of a large one-chute ore bin and a timbered vertical shaft. The entire hillside there has been prospected, but the workings have caved in. Stone foundations and wooden debris indicate where other mine buildings and equipment stood. Out on a point overlooking the valley is debris from a collapsed building--wooden with a corrugated-metal roof. This might have been the mining office. Visible from there to the west are some tunnels into another ridge across a ravine. According to Daniel Leahy, who worked with Frenchie(y) Auclair in the mine, equipment was sparse, consisting only of a hoist and compressor.[248]

Evans states that production at the Golden Bee consisted of only about 800 tons of ore between 1935 and 1942, from which 0.6 to 0.7 of an ounce of gold per ton and about 0.1 of an ounce of silver per ton were recovered.[249]

The Golden Bee Mine was one of the later mines to operate in the monument but was not one of the most productive. Little has been found out about its owner Frenchy Auclair or about other people involved in operations there. The entire Golden Bee Mine complex

---

248. From interview with Daniel Leahy, Jan. 6, 1975, in JTNM Fact File. Leahy also stated that honey bees almost drove him and Auclair out. They were attracted by a big tank of water near the mine. They were all killed when someone dropped a cyanide tablet in the water. This may be the origin of the mine's name.

249. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

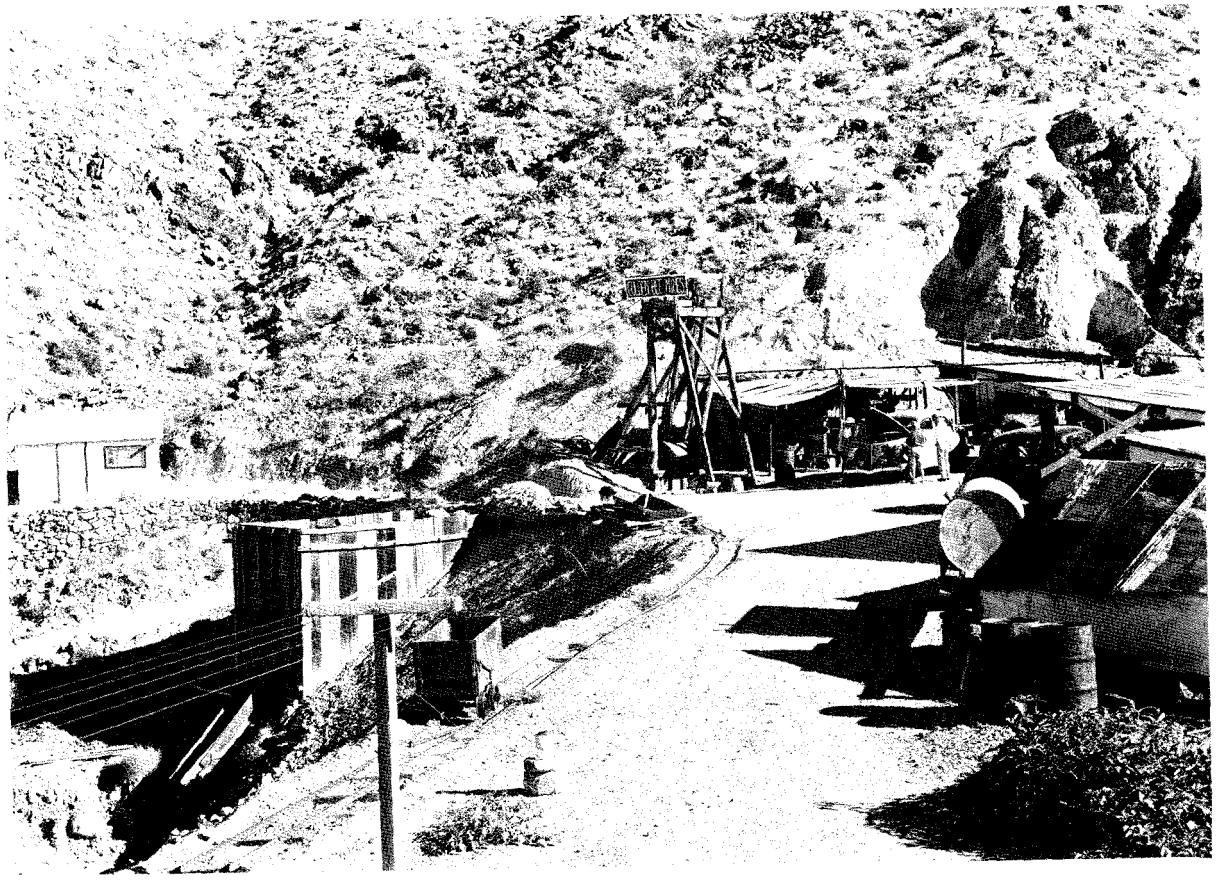


Illustration 104.

Golden Bee Mine and mill, Eloge (Frenchy) Auclair, proprietor, October 6, 1941. Courtesy JTNM.



Illustration 105.

Golden Bee Mine and mill, 1983. NPS photo by Linda W. Greene.

area contains several hazardous shafts and tunnels. Because of its poor production record, relatively short period of operation, and lack of associative or historical significance, the Golden Bee Mine is not considered eligible for the National Register. It is recommended that the site be left to natural deterioration.

(8) Paymaster Mine

The specific location of this property in Section 15, T3S, R10E, was not found by the writer. The mine is not deemed important in the mining history of the monument.

(9) Goldfields of America (Sandra K[ay] #1)Mine

In 1959 James Evans stated that this mine was in Section 5, T3S, R10E. He also said that two shafts, approximately 45 and 100 feet deep, had been sunk one-quarter mile northeast of the Gold Point Mine in the millsite area. Another deep shaft and an intersecting adit were found elsewhere on the property. Production of the mine was undetermined.[250]

This property is possibly the same one designated the Sandra Kay #1 by the mine inspection crew in the 1970s. They located that site in the southwest quarter of the southwest quarter of Section 4, about one mile north of Cholla Garden and about ¼ mile east of the West Pinto Basin Road. Before the access road was closed, the site was easily reached by a dirt road going to within 400 yards of the mine. The mine has two entrances, one at the top of a vertical shaft on the top of a ridge where there is a large slag pile. About thirty feet below the surface the vertical shaft intersects a horizontal one before continuing down for at least 100 more feet. This was one of the most dangerous sites visited by the inspection team and was one of the sites selected for closure.

---

250. Ibid.

The Goldfields of America (Sandra Kay?) Mine is not considered significant in the mining history of the monument. Now that the shafts have been closed off, it is recommended that the site be left to benign neglect.

(10) Ruby Lee Mine

The Ruby Lee Mine was not visited by this writer. It lies about five air miles northwest of the Ruby Lee Mill Site in Section 2, T4S, R10E. There is no water on the claim. The property contains only two small, shallow open cuts. Of the approximately seventy-five tons of selected mineralized rock piled at the mill site, only a portion came from the Ruby Lee claim. There is no record of any production at the mine. It appears that only a few tons of ore have ever been removed. A poor dirt road, sometimes lost in Porcupine Wash, extends west from the mill site to the lode claim. By the 1970s the owner, A.A. Dietemann, had not visited the claim in several years.[251]

This site is not considered significant in the mining history of Joshua Tree National Monument but is recommended for field examination by a qualified historian before any action affecting it is implemented.

(11) Combination Quartz Mining Claim No. 1

This site was not visited by the writer. It is not considered historically significant.

(12) Captain Jinks (Jenks) Mine (Phyllis Silver Mine)

This site was not visited by the writer. All of the mining properties located along Porcupine Wash are extremely difficult to reach. They are only accessible via an old jeep road, now closed to vehicles, that passes through the Ruby Lee Mill Site at Ruby Well. Development at this mine consisted of several deep, steeply inclined

---

251. Paul H. Knowles, "Report on Validity of the Ruby Lee Lode Claim and Millsite Claim, Joshua Tree National Monument, Riverside County, California," Jan. 18, 1974, file L3023, Division of Mines and Minerals, WRO, NPS, San Francisco, Ca., pp. 7, 9, 17.

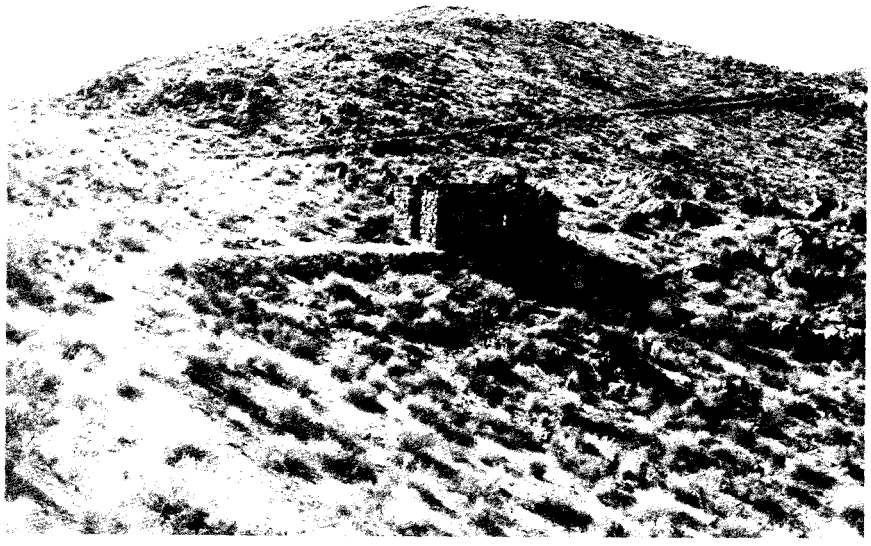


Illustration 106.

Road into Hexahedron Mine and cabin ruin, 1983.



Illustration 107.

Rock cabin in foreground. Visible in background on slope are two levels of mine workings. NPS photos by Linda W. Greene.

shafts, a caved drift adit, several pits, trenches, an open cut, and two vertical shafts.[252]

Nothing more is known about Captain Jinks (Jenks?) or his purported early discovery of this mine. No structures were ever reported on site. The property is recommended for on-site evaluation by a qualified historian prior to any action affecting it.

(13) Hexahedron (Hexie) Mine

This mine is in the southeast quarter of the northeast quarter of Section 11, T3S, R9E, near the crest of the Hexie Mountains and about 4¼ air miles east of Squaw Tank. The Geology Tour Road can be followed south, past Squaw Tank, to the ruins of the Gold Galena (Gold Coin) Mine and Mill. Beyond this point south vehicular traffic is prohibited. About three miles further along this road that hugs the southern base of the Hexie Mountains, a wagon road is visible zigzagging north up over the top of a high ridge. A further 1.5-mile hike into the Hexie Mountains leads to the Hexahedron Mine.

Principal working at the mine was a 300-foot drift adit with one 30-foot crosscut. Above the adit level were three open cuts. Several shallow prospect pits were also opened in the area. Gray states that although no written description of the mill has been found, tailing debris and old foundations in the north half of the northeast quarter of Section 14, T3S, R9E, mark a former mill site.[253]

This writer found on the mine site the ruins of an old rock house diagonally northwest of the mine workings. Constructed of dry stone masonry and wooden timbers, the structure had

---

251. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

253. Ibid.



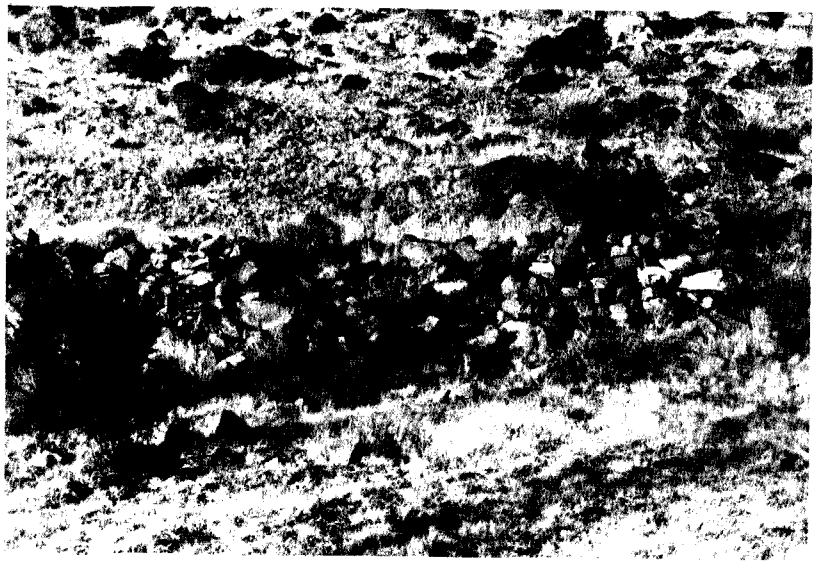




Illustration 108 (top left).
Mine workings on hillside in Pleasant Valley, Gold Galena (Gold Coin) Mine.

Illustration 109 (top right).
Junction in Pleasant Valley. Road goes straight to Berdoo Canyon and Pinyon Well, right to Queen Valley, and left to the Hexahedron and Eldorado mines and Cottonwood Spring. Gold Coin mill ruin is at bottom of picture.

Illustration 110 (bottom).
House foundations east of mill ruin. NPS photos by Linda W. Greene.

six-foot-high walls and measured about twelve by fourteen feet. Inside were remains of a wooden cot and much wood and metal debris. Some of the rocks were chinked with earth and gravel. (A picture of this cabin can be seen on p. 56 of Miller, Mines of the High Desert.) The mine diggings are on several levels. Of the two adits on the upper level, only one goes back into the hillside any appreciable distance. The adit on the lower level that opens onto a sizeable dump and in which there are wooden tram tracks appears to be the main tunnel.

The U.S. Bureau of Mines lists placer production from the Hexahedron of 116.68 ounces of gold in 1893 by H. E. Fallant of Indio. Otherwise no record of production is known. The Hexahedron is not considered to be significant in the mining history of the monument. Although the mill was reportedly a good-sized, active operation, the dearth of information on it in mining journals and other documentary sources would indicate that this aspect of the Hexahedron operations was only of minor importance. It is recommended that the Hexahedron rock house be left to natural deterioration.

(14) Gold Galena (Gold Coin) Mine

The Gold Coin Mine workings are primarily in Section 9, T3S, R9E. They are reached by taking the Geology Tour Road into Pleasant Valley. The road farther east along the north edge of Pleasant Valley toward the El Dorado Mine is barricaded at the Gold Coin mill site. From the mill the road turns south and then southwest toward Pinyon Well about three miles away.

When Gray examined the mine site in 1957 he found workings stretching about half a mile east-west. They consisted of eight inclined shafts, several shallow pits and cuts, and two vertical shafts.

When this writer visited the site, workings consisted of cuts, prospect holes, and a filled-in adit. At the base of the hills where the road to Pinyon Well turns south from the Pleasant Valley Road are mill foundations. A shored road heads northeast from

here up the hillside toward various exploratory holes. East of the mill ruins on some level ground near the base of the hills are what appear to be the remains of man-made stone walls and possible building sites. Metal can refuse indicates habitation here over a period of time.

The Gold Coin Mine is not considered significant in the mining history of the monument. The property evidently was worked primarily in the early 1900s and then again in the 1930s. The lack of production information indicates little ore was taken out. No hazardous mine workings were found at the site. It is recommended that it be left to natural decay.

15) Gold Standard Mine

The Gold Standard Mine workings are thought to be in the southeast quarter of Section 9 and the southwest quarter of Section 10, T3S, R8E, on the southwest edge of Lost Horse Mountain. In 1957 Gray noted that the quartz veins had been explored primarily by a forty-foot vertical shaft with a windlass, by six open cuts, and by several shallow pits and trenches.

The mine safing crew identified workings in the northeast quarter of the southeast quarter of Section 9, T3S, R8E, as belonging to the Gold Standard. It was 2.15 miles by dirt road southeast of the Lost Horse Mine road junction, then about ¼ mile down a wash on an old jeep road past a Joshua Tree log cabin. At the site was a thirty-five-foot-deep shaft with a tunnel possibly leading away at the bottom. A caved-in tunnel was also found on site. No mention was made of a mill site.

The Gold Standard does not appear to be a significant property. It was apparently never commercially profitable, and even its exact location is somewhat uncertain. The origin or condition of the log cabin mentioned by the mine safety crew and its relationship to the mine site is not known at this time. It is recommended that if the log cabin is extant, it be photographed and recorded by a professional historian to resolve questions of architectural significance

before any action affecting it is taken. The mine site is recommended for natural deterioration.

(16) Optimist Mine

The Optimist is in the northeast quarter of the northwest quarter of Section 10, T3S, R8E, near the crest of Lost Horse Mountain. It is about 3.5 miles southeast of the Lost Horse Mine road junction via a dirt and then four-wheel-drive road. In 1957 Gray found a vertical shaft 100± feet deep, an adit, and shallow pits and trenches. The mine safety crew found a 60-foot tunnel and a 45-foot-deep shaft.

The Optimist Mine is not considered historically significant. The shaft and tunnel on the site are especially hazardous because of the unstable rock in the tunnel and lack of shoring in the shaft.

(17) Lang Mine

This property is in the northeast quarter of the southwest quarter of Section 3, T3S, R8E, and is reached by jeep road about one-half mile southeast of the Lost Horse Mine. On site are a ten-foot-long tunnel and a fifty-foot-deep inclined shaft. The site was not visited by this writer and therefore its current condition is not known. The property holds no significance on its own but is undoubtedly part of early exploration activities at the Lost Horse Mine. It is included within the Lost Horse Mine National Register boundary as significant in association with that mine.

(18) Unidentified Mine

This mine in the northeast quarter of the northeast quarter of Section 4, T3S, R8E, was not visited by the writer. It is assumed that development there was performed in connection with exploratory work at the Lost Horse Mine in the 1890s. In the late 1950s development work consisted of a caved adit and an inclined shaft. The nearby Lost Horse Mine is of National Register significance. This small exploration area does not have enough importance to warrant inclusion

within the National Register boundary. The site should be left to natural deterioration.

(19) Lost Horse Mine

This mine site is in the south half of the northwest quarter of Section 3, T3S, R8E, SBM. It comprises eighty acres and is three miles southeast of the Ryan Campground and Lost Horse Well, on the east slope of a small valley high in the central part of Lost Horse Mountain.

A survey of the development work at the mine about 1945 found that it consisted mainly of a 500-foot vertical shaft wth minor drifting along the vein on the 100-, 200-, 300-, and 400-foot levels. About 100 feet west of the main shaft was an adit, probably the 80-foot-long one described in 1917. The vein had also been explored by two shallow shafts and by several pits. In 1957 a vertical headframe, several partially collapsed wood and stone buildings, and a partly dismantled ten-stamp mill remained on site.[254]

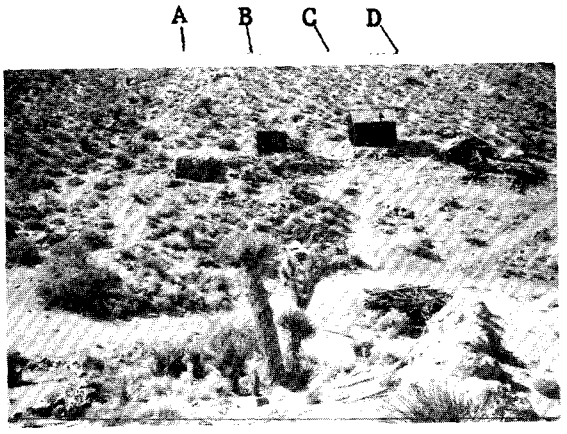
When the Ryans erected the ten-stamp mill at the mine, they laid a two-inch pipeline from Lost Horse Spring and pumped the water to the mill by steam engines that raised the water 750 vertical feet into an earth and stone reservoir--an engineering feat for that time and place. Levy states that by 1905 the steam apparatus had been replaced and a three-cylinder high-pressure Gould pump was driven by a twenty-five-horsepower gasoline engine. Also in 1905 a seventy-foot-deep well was dug at Lost Horse Spring and much later two more wells, forty and forty-five feet deep, were added.[255]

---

254. Ibid.

255. Levy, Historic Structures Report, Lost Horse Mine, p. 12.

Illustration 111.
Information on Ruins of Structures near Lost Horse Mine.

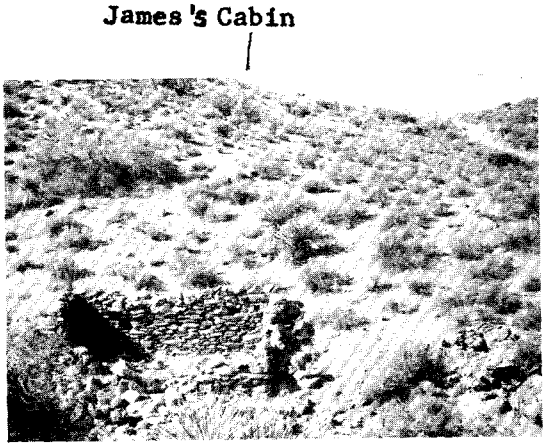


Building A: Stone construction; used as bunk house; construction during 1890's.

Building B: Frame construction; used as assay office; constructed during 1894.

Building C: Frame construction; used as sleeping quarters and for a short time for cook house, also used by Johnny Lang as temporary quarters during his visits 1915-1925; constructed during 1890's.

Building D: Frame construction; used as cook house, constructed during 1890's.



Stone construction; built by James about 1893.

Bill Keys visited the mine site in 1966 and made several interesting comments about remaining structures, which may be found in Levy's report in some detail. Support facilities he discussed were the mill, containing an amalgamation room; the remains of a steam hoist for raising skips loaded with ore for the crusher; two concrete and stone reservoirs in the ground above the mill for storing water pumped from Lost Horse Springs; three concrete troughs or settling basins remaining from the later cyanide leaching operation; and several corrugated-metal tanks.

In addition to the tunnels and shafts of the mining work area, the Lost Horse Mine had a camp associated with it. Four structures remaining in the late 1960s on the side of a hill across a wash and facing the millsite were identified as a stone bunkhouse built in the 1890s, a frame assay office built about 1894, a frame building used for sleeping and briefly as a cookhouse (later used by Johnny Lang, 1917-26), built during the 1890s, and a frame cookhouse also built in the 1890s. About three-fourths of a mile below the mine was the stone cabin built by James, discoverer of the Desert Queen Mine, about 1893. Also once on site were a corral and another large bunkhouse. Keys stated that twenty-five men worked the mine and ran the mill, while ten more were employed at the well and in cutting wood.[256] These structures have decayed to the point now that there is little evidence of their existence.

After taking over the Lost Horse Mine property, J.D. Ryan improved the access road and rerouted it from the older, shorter route followed by Lang. The present entrance trail, taking off from the Salton View Road, approximates the Ryan road route. The road to the mine is rough and winds up and down through narrow mountain washes. The last 1.8 miles are open only to foot traffic.

---

256. Ibid., p. 15.

The Lost Horse Mine property has been credited with the only production of bismuth in California. Twenty tons of bismuth ore produced in 1904 were listed as being from the Lost Horse, formerly the Lang Copper Mine. Bill Keys stated that this ore came instead from the Sulphide Bismuth Mine, when that property was known as the Lang Copper Mine. The total value of gold from the Lost Horse Mine is reported as $350,000.

The Lost Horse Mine and mill site has been determined to be of local significance as the most successful mining operation within the monument boundaries and as a monument to a significant activity (mining) in the area's history. The mine and its complex of structures comprise an excellent exhibit of a small western gold mining and milling operation. It is now the best-preserved mine complex within the National Park System and as such is a major interpretive showcase.

(20) Hidden Gold (Ensperation, Lost Mine Parallel) Mine

This property was not visited by the writer due to its extreme inaccessibility. Although only about one air mile southwest of Keys View, access is via a five-mile-long four-wheel-drive road beginning outside the monument boundary to the south. Development in the late 1950s consisted of numerous prospect pits, shallow shafts, and short adits.

On the basis of archival data, the Hidden Gold is thought to be ineligible for the National Register. If any action affecting the site is proposed, an on-site inspection by a historian should be made.

b. Mill Sites

(1) Eldorado (New El Dorado) Mill

Mill equipment at the New El Dorado Mine in 1929 consisted of ten 1,000-pound stamps and a Wilfley concentrator driven by

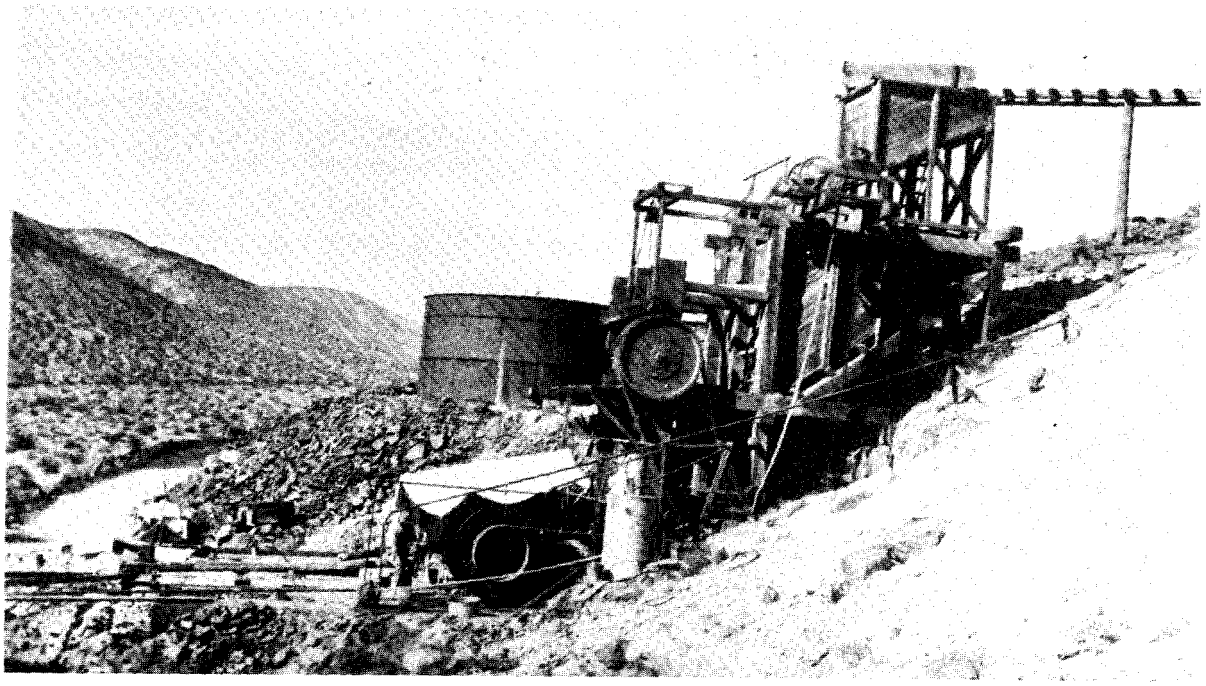


Illustration 112.
Close-up view of mill machinery, New Eldorado Mine, between 1911 and 1914. Photo from Fred Vaile. Harold and Lucile Weight Collection. Courtesy JTNM.

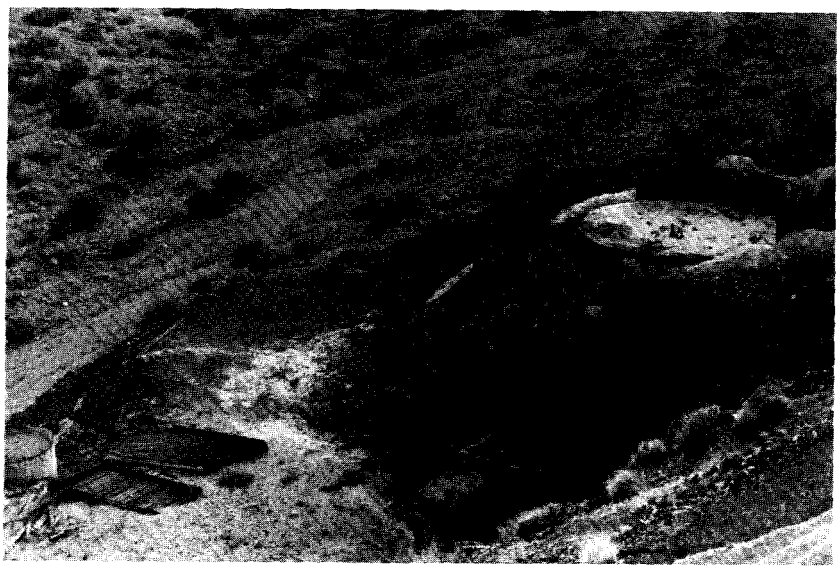


Illustration 113.
Close-up view of mill ruin, 1983. NPS photo by Linda W. Greene.

a twenty-five-horsepower gas engine.[257] In the mid-1930s the H.W. Campbell family lived at the Eldorado. Robert Saunders sent the ore he extracted from the Blue Bell Mine over to Campbell's mill, where custom milling was performed for any of the small mines in the area. Saunders remembered the mill as having about four or five stamps, with mercury plates. He did not think Campbell was also working the mine.[258]

The ten-stamp mill and cyanide plant were being operated in the late 1930s as a custom mill, working ores from adjacent mining properties.[259] The mill was operating in 1937, but was removed in 1941-42.

The Eldorado mill no doubt enabled many small miners in the western portion of the monument to work their claims with at least minimal profit. The duration of Campbell's enterprise there is not known, but the writer suspects it probably lasted three or four years. Not much detailed information is available on the mill layout, except what can be gleaned from the Vaile photographs. It is not known when the cyanide tanks were added or by whom, although it was sometime prior to 1923. The mill will be included in the Eldorado Mine and Mill National Register nomination. It is recommended that because of the detailed photographic record of mining operations there, the site be regarded as being of importance in the monument's interpretive program.

---

257. Report XXV of the State Mineralogist, 1929, p. 486. The monument Fact File contains a comment by Bill Keys, made in 1959, that the mine had a ten-stamp mill frame with only five stamps. A Milton Knapp moved a Joshua Hendy five-stamp mill over from Pinyon Wells that he had obtained from Mr. Sherwood. The only mill at Pinyon Well this writer knows about was the two-stamp one that ended up at the Wall Street Mill. It might actually have been the five-stamp mill from the Hexahedron Mine operation that was moved to the Eldorado.

258. Saunders interview, Feb. 27, 1975, pp. 13-14.

259. Guthrey to Dir. of Investig., May 6, 1937, p. 20.

(2) Ruby Lee Millsite

The Ruby Lee unpatented millsite claim is located at the Ruby Water Well on unsurveyed land in the northeast quarter of Section 10, T4S, R11E. The claim is reached via the West Pinto Basin Road, approximately thirty-one miles south of Twentynine Palms. A dirt access road, now closed, leads west from the paved road for three miles to the millsite.

At the site is a small one-room wood frame desert cabin painted white. Two storage sheds are appended. In the yard is a pile of selected mineralized rock collected, according to the owner, from various sources in addition to the Ruby Lee claim. A well about thirty-five feet deep is just north of the house in the lee of a rocky ridge. It is dry now, reportedly drained by an earthquake.[260] Inscribed on a rock face above the well are the words. "Ruby Lee Millsite 1935." Also nearby are an outhouse site and a low stone retaining wall. Much wood and metal debris lies around the house and well area. The cabin is locked. A notice on the front door states that all assessment work for the Ruby Lee Mine and Mill Site had been completed and recorded for September 1976 to September 1977.

The Ruby Lee Millsite is not considered significant. The five-foot-diameter masonry well was dug evidently around 1935 and was never a prolific water source. (See section on "Wells.") It is about twenty feet deep, rock-lined, and dry. The cabin on site possesses no architectural significance. None of the furniture or packaged foods inside are of historical or interpretive interest. There is thin pine paneling on the inside walls. The wood-roofed shed on the northwest corner of the house is built against a wall of rocks and contains a masonry storeroom in the southwest corner. The main house and the shed on the south have tin roofs.

---

260. Knowles, "Report on Validity of the Ruby Lee Lode Claim and Millsite Claim,", 1974, pp. 7, 17.

The Ruby Lee Millsite has no historical significance, nor does the house and associated debris on site from sheds. Because the house is furnished, it may present a temptation to transients. The monument staff has been considering removing the house and naturalizing the landscape. Such an action would not interfere with or compromise any significant historical values. The well is not visually obtrusive and could serve as a repository for some of the debris on site. It could then be cemented over.

(3) Hexahedron (Hexie) Mill

The existence of a mill at the Hexahedron Mine is implied in several sources, but no description of it other than as a five-stamp mill has been found. Gray states that there are old foundations in Section 14, presumably near where the mine road heads north into the mountains, that indicate an early mill site. Those were not seen by the writer, but their presence should be determined. Gray states that the mill is said to have been the largest in the area. If so, it would surely have been mentioned more descriptively in the sources. This writer further wonders whether the five-stamp Joshua Hendy mill Bill Keys stated was moved by Milton Knapp to the El Dorado Mine from Pinyon Wells (?) might not have been instead moved to (or from) this location. A Mr. Price of Los Angeles stated in 1958 that an old rock ruin at the end of the mine road was said to be the bunkhouse and mill for the Hexahedron.[261] Whether he meant a structure on the flatlands in Section 14 where the mine road joins the Pleasant Valley Road or the rock structure at the mine is not clear.

It would be extremely interesting to find a mill ruin in Section 14 to substantiate these vague references. It is recommended that any monument staff who have the opportunity try to locate, photograph, and record the site. Because of the dearth of documentary data, the mill there probably did not operate over a long period or produce much gold.

---

261. JTNM Fact File.

(4) Gold Galena (Gold Coin) Mill

No information was found on the history of this mill. Mining records indicate that it had not been erected by 1916. This writer assumes the mill was a later addition, possibly in the 1930s when several attempts were being made to reprocess old tailings in the monument. The mill ruins now consist of concrete foundations and two shallow cylindrical sheet-iron water or cyanide tanks about eight feet across. The mill is not considered to have been a significant ore-treatment plant. The ruins are recommended for natural deterioration.

(5) Lost Horse Mill

The ten-stamp mill at the Lost Horse Mine was reported to be new when secured by J. D. Ryan at the Colorado River and moved to the Lost Horse property about 1895. It came from the Sterling Mine in the Chuckawalla Mining District.[262] The mill was remodeled several times thereafter. Minor alterations were made to the stamp blocks in 1915 and 1933. Situated on a steep slope, it consists of a framework of huge wooden timbers supporting an ore bin, an ore crusher, several ore chutes, and two five-stamp batteries. The stamp batteries are supported on two concrete footings inscribed "T.C. Ryan 1931." The mill was run by a steam engine and later a diesel engine. It was erected directly over the shaft supplying the raw ore. A mine headframe and ore tipple attached on the uphill end of the structure collapsed about 1970. The entire mill and headframe were enclosed by a frame structure that Keys recalled was referred to as the "Big House." The structure was acquired by the government in 1967.

In 1973 new wooden steps and a safety rail were added to the structure to aid visitation. Concrete foundations were also inserted under part of the structure. It is now in a maintenance state and is included within the Lost Horse Mine National Register boundary. The mill is significant because of the efficiency of its operation. Because of the mill's location over the shaft being mined, ore could be raised from

---

262. Report XV of the State Mineralogist, 1919, p. 539.

the mine and fed into the crusher and stamps in one continuous motion. Usually ore was transported by ore cars to a central collection point for processing if a mine had its own mill, or, in smaller operations, was hauled by burro, truck, or other conveyance to a nearby mill for custom treatment. This sort of compact operation cut down markedly on operating costs and increased efficiency and profit. The mill is a prime interpretive exhibit of early western gold-mining practices.[263]

5. Miscellaneous Mines Filed on in the Pinon District

1895: Messenger Mine

1912: Golden Rod Mine; Louise Mine--David B. Wolf
(These were actually in the Dale Mining District)
Yellow Hills Mine--W.F. Keys
Planet and Planet No. 1--W.A. Fraser

1913: Side Winder Mine--William McVey et al.
Hornblende Mine--Addie Tingman
Coffee Pot and Tea Pot Mines--A. G. Tingman
Gypsum, Gypsum Nos. 5 and 6; Swan mines--
George J. Burris et al.
Dolly B.; Kentucky Belle; Red Raven mines--
F.C. Longnecker
City Hall and Quail mines--John Lang
Copper Cliff; Encinitas; Horseshoe; Claim No. 3; Horseshoe North Extension; Horseshoe No. 4, Lenora Bell mines--William Rush and A.G. Tingman
Marion Nos. 1-4 and Old Windlass mines--Fred Vaile

---

263. William Tweed, Classified Structure Field Inventory Report, Stamp Mill: Lost Horse Mine, Structure No. H.S. 7-A, Feb. 6, 1976, WRO, NPS. See United States, Department of the Interior, National Park Service, Robert V. Simmonds, Historic Structure Report, Lost Horse Mine Complex, Joshua Tree National Monument, California (Denver: Denver Service Center, 1970), rev. 1972, pp. 6-9.

H. Gold Park Mining District

1. History

As early as 1874 several claims were being discovered just a few miles south of Twentynine Palms. Charles and A. Hoff and Paul Pfefferle located the Last Chance seven miles south and the Little Giant six miles south of Twentynine Palms Springs. Other claims filed on in this general area, stretching anywhere from four to eight miles south, were the Little Joker, the Shoo Fly, and the Drummer Boy.[264] This area was generally part of the Twentynine Palms Mining District but parts of it took on a strong new identity in the early twentieth century.

Hazel Spell suggests that Bill McHaney might have been originally responsible for leading gold seekers in this general direction. Hearing that the oasis Indians were finding gold ore, McHaney decided to investigate their source for himself. Following directions given him by his Indian friends, McHaney headed for the hills southeast of the oasis.[265] As early as 1903 there was talk of erecting a stamp mill and cyanide plant in the Gold Park District.[266] Important development started in 1905 when John Edward Schweng and Associates (W.C. Winnie), known as the Gold Park Consolidated Mines Company, planned extensive operations on a group of mines about eight miles south of Twentynine Palms.

In 1906 George Wharton James visited Gold Park where a number of mining claims belonging to Los Angeles capitalists were being operated. Phil Sullivan was in charge of the camp.[267]

---

264. O'Neal, Peculiar Piece of Desert, p. 54.

265. Hazel M. Spell, The Twentynine Palms Story (n.p., 1953), p. 4.

266. Engineering and Mining Journal 76, no. 11 (Sept. 12, 1903): 404.

267. Wonders of the Colorado Desert, II:482.

The people who developed Gold Park were speculators rather than miners and were trying to realize a profit by developing these new mine properties. The Gold Park Company employed eighteen men and added power drills to its equipment as soon as possible.[268] A post office briefly served the small mining community of several frame buildings from January to July 1908. By 1910 the Gold Park Consolidated Mines Company was operating fifty-two claims in three groups. C.W. Roach, superintendent, reported that three sets of leasers had started work on the middle claim group, already developed by six shafts and about 4,000 feet of workings. The Gold Park Group No. 2 consisted of ten claims and had a one-stamp test mill driven by a five-horsepower gas engine at the mine. Ore was sent to Twentynine Palms to be run through two Nissen stamps and a Bryan roller mill (the Anaconda mill).[269]

The Gold Park District was considered sufficiently promising in 1910 to warrant a one-page writeup in the Engineering and Mining Journal. The area of activity was described as lying a few miles south of Twentynine Palms near the boundary line between San Bernardino and Riverside counties. The Gold Park Consolidated Mines camp was accessible by wagon roads from various places. From Palm Springs on the Southern Pacific or Bagdad on the Santa Fe Railroad, the distance was forty-five miles. From Indio on the Southern Pacific it was about thirty-five miles. The three groups of the Gold Park Company were the Warrior, No. 2, and Main. For the present, ore was being hauled to the Twentynine Palms mill for treatment. Total development on the Gold Park Company property consisted of nine shafts from 65 to 320 feet deep and about 4,000 feet of drifts. Also there were many shallow shafts and cuts.[270]

---

268. Engineering and Mining Journal 84, no. 4 (July 27, 1907): 182.

269. Ibid. 90, n. 8 (Aug. 20, 1910): 380; State of California, Report XVII of the State Mineralogist. Mining in California During 1920 (Sacramento: State Printing Office, 1921), p. 347.

270. "Gold Park District, California," Engineering and Mining Journal 90, no. 13 (Sept. 24, 1910): 600.

In 1907 the Taylor-Sullivan Mining Company had been organized by Robert H. Swinney, C.W. Roach, Anna B. Marian, Phil T. Sullivan, and Charles T. Taylor.[271] The company's properties were described as being in the Twentynine Palms District. Whether some of their activities extended into Gold Park is uncertain, although they appear to have been situated west of Gold Park and centered around the Anaconda Mine area. Bill McHaney stated that C.W. Roach had claims in Gold Park.[272] O'Neal states that in the 1920s the Gold Park mines were being developed by Walter G. Maloney and Louis Jacobs for C.W. Roach.[273] Another firm mentioned in connection with the Gold Park District was the Consuela Mines Company of Los Angeles. It also had claims in the Twentynine Palms District.[274]

2. Mine Sites

The Gold Park area's greatest activity occurred between 1905 and about 1915 or 1916. It at one time reportedly supported forty to fifty claims. Roads and machinery arrived in 1905 and a year or so later the miners built a road through to New Dale. Although this area has been excluded from the monument, some of the mines are mentioned here because of their close association with people and mining activity in the monument:

---

271. "Mining Company Incorporated Here," San Bernardino (Ca.) Daily Sun, Jan. 30, 1907.

272. McHaney interview, March 1933, p. 2. In 1920 McHaney and Keys helped Roach build Ivanpah Tank. From it Roach intended to pipe water to his claims in Gold Park. Roach left the area in 1921. Because Keys had not been paid, he tore down some of the Gold Park houses for scrap. Ibid, pp. 2-3.

273. Peculiar Piece of Desert, p. 155.

274. "Consuela Mines Property Bonded," San Bernardino (Ca.) Daily Sun, Nov. 5, 1907.

Gold Park Consolidated Mines Company. W.C. Winnie, president; J.E. Schweng, secretary; C.W. Roach, manager; offices: Los Angeles, California. This company owned fifty-two claims in the Twentynine Palms District, four miles south of the oasis. Some of the holdings were in San Bernardino County, others were just south of the line in Riverside County. Major groups developed were the Atlanta, Black Warrior, Boss, Caladonia, Gold Park No. 1, No. 2, and No. 27, and Oro Copio.[275]

a) Atlanta (North Star Group) Mine

This property was located in Section 1, T2S, R9E. In 1920 the workings consisted of a shaft and three tunnels. It contained short shoots of high-grade gold ore. By 1929 the property had been relocated as the North Star Group by J. Klugh of Pasadena, Ca.,[276] in Section 6, T2S, R10E. By 1945 the North Star Group comprised five claims: North Star, North Extension, South Extension, Extension No. 4, and Extension No. 5. It was owned by the Floyd Mining and Milling Company of Norco, California, and was idle.[277]

b) Black Warrior (Gold Master?, Paymaster?) Mine

This property is in the center of the northwest quarter of Section 20, T2S, R10E, although it has been reported as being in Section 16, T2S, R9E. Bill Keys has stated the mine was discovered before 1900 by Bill McHaney. The Paymaster Mine, which this may then be, was a center of activity in the Gold Park area and a good producer. By 1920 it was the most southerly mine of the Gold Park Consolidated Mines Company group, lying about 3½ miles south of the camp. Workings consisted of a 200-foot shaft, drifts, and crosscuts.[278] In 1929 W.F.

---

275. Report XVII of the State Mineralogist, 1921, p. 347.

276. Ibid.; Report XXV of the State Mineralogist, 1929, pp. 472-73.

277. California Journal of Mines and Geology, 1945, p. 140.

278. Report XVII of the State Mineralogist, 1921, p. 348.

Keys owned the mine, which was idle. During the 1930s the property was leased and much of the dump material was hauled away by truck and milled. Since that time the mine has been idle, renamed the Gold Master in later years.[279]

c) Boss (Goat Basin) Mine

In 1920 development at this mine, in Section 1, T2S, R9E, consisted of 100- and 122-foot-deep vertical shafts, crosscuts, and drifts. By 1929 it had been located as the Goat Basin. Its one claim was owned by W.F. Keys. It was idle.[280]

In 1948 it was reported that a fifty-ton ball mill was slated for erection in Twentynine Palms to replace the ten-ton ball mill then in use. Ore for the mill came from the Goat Basin Mine in the Gold Park District.[281]

Caladonia Mine. In 1920 workings at this property consisted of two shafts, 50 and 100 feet deep.[282]

d) California Boy Claim

This was another property of the Gold Park Consolidated Mines Company. Vanadium was reportedly found here in 1918. A shaft was down 335 feet and 200 feet of crosscutting had been done.[283]

---

279. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.d.

280. Report XVII of the State Mineralogist, 1921, p. 347; Report XXV of the State Mineralogist, 1929, p. 476.

281. Superintendent's Monthly Narrative Report, Mar. 5, 1948, RG 79, NA.

282. Report XVII of the State Mineralogist, 1921, p. 348.

283. Engineering and Mining Journal 105, no. 26 (June 29, 1918): 1193.

e) Oro Copio Mine

This property is in Section 6, T2S, R10E, and Section 12, T2S, R9E. By 1920 shafts had been sunk to depths of 50 and 100 feet. By 1929 the mine belonged to a private individual, had a third shaft 75 feet deep, and was idle.[284]

f) Gold Park Consolidated Mines Nos. 1-5

These properties, extending through Sections 1, 2, and 12, T2S, R9E, and Section 6, T2S, R10E, were developed by shafts, trenches, adits, pits, and cuts. An arrastra had been constructed on a flat downslope from a shaft on the Mine No. 5 property to pulverize quartz material.[285]

Properties not run by the Gold Park Consolidated Mines Company included:

g) Anaheim Group

This property in Section 5, T2S, R10E, was reported as being in the Washington Mining District. Development of the four claims consisted of several shafts from 50 to 100 feet deep in 1929. The property was idle in 1945.[286]

h) Golden Rule Group

These two claims in the Washington Mining District supported a 75-foot-deep shaft in 1929.[287]

---

284. Report XVII of the State Mineralogist, 1921, p. 348; Report XXV of the State Mineralogist, 1929, p. 486.

285. Gray et al., "Mines and Mineral Resources of Riverside County California," [1961], n.p.

286. Report XXV of the State Mineralogist, 1929, p. 472; California Journal of Mines and Geology, 1945, p. 128.

287. Report XXV of the State Mineralogist, 1929, p. 480.

i) Golden Star Lode Mining Claim

This claim was filed September 28, 1963, by J.V. Rys.[288]

j) Gold Park Mine

This property eight miles southeast of Twentynine Palms and one-half mile southwest of the Number Nine Mine (?) was located February 21, 1886, by J.S. Moore, F. McConkey, C.L. Metzgar, and C.F. Karns.[289]

k) Hornet Group

This property in Section 1, T2S, R9E, was located in May 1956. Development entailed pits, trenches, bulldozer scrapes, and a vertical shaft.[290]

l) Mildred-Ellen Group

These four claims in the Washington Mining District had been developed by a tunnel and shaft.[291]

m) Silver Scorpion Mine (Carlos Jr. Mine?)

This property in Section 1, T2S, R9E, was located in October 1953.[292]

---

288. District Ranger, Central District, to Chief Park Ranger, JTNM, Jan. 7, 1964, FARC, Laguna Niguel, Ca.

289. Book B, Mining Records, San Bernardino County, Hall of Records, San Bernardino, Ca., p. 479.

290. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

291. Report XXV of the State Mineralogist, 1929, pp. 484-85.

292. Gray et al., "Mines and Mineral Resources of Riverside County, California," [1961], n.p.

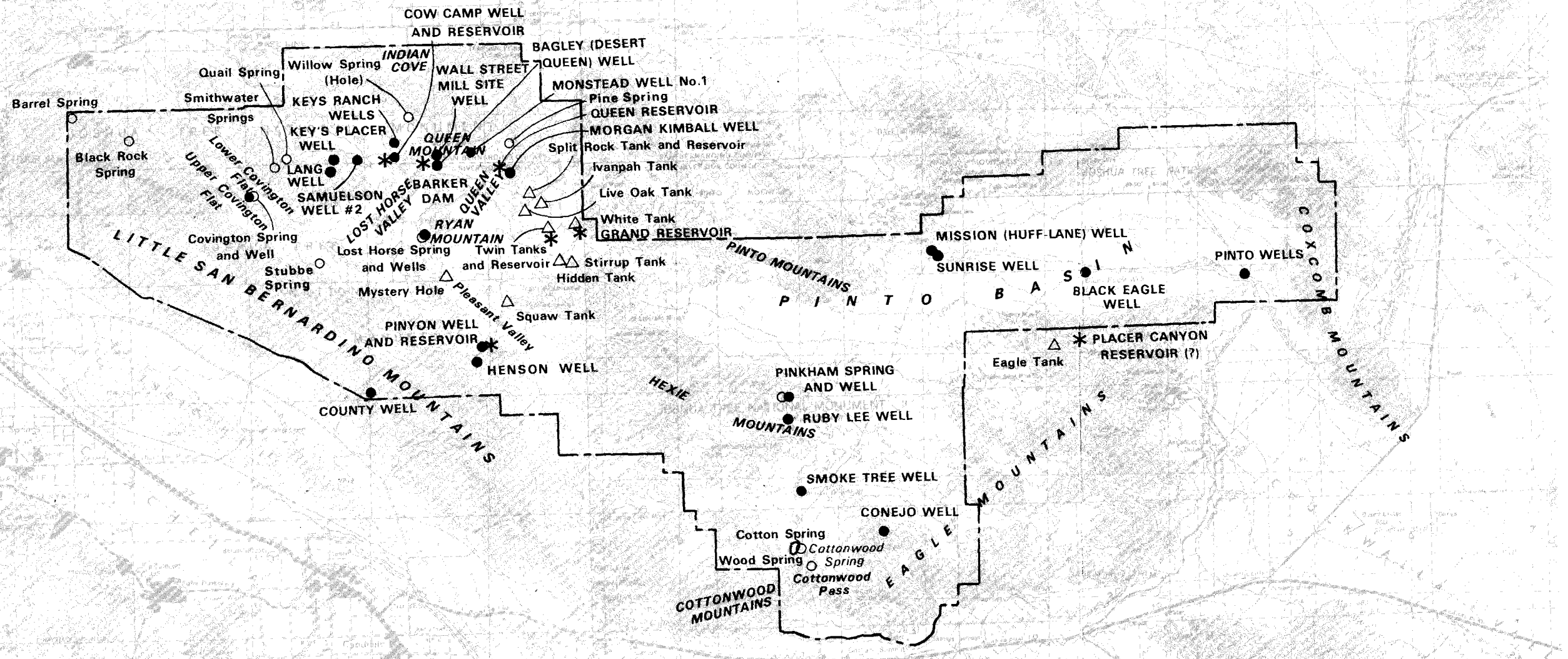
n) Miscellaneous

Other Gold Park properties were the Tarantula and Walled Flower mines filed on by W.S. McHaney in 1912, and the Fullerton and Elizabeth mines filed on by J.A. Stull in 1913.[293]

Whether the Italie (Little Italy) Mine run by the Italie Mining Company was in the Gold Park District is unclear, although it probably was. It was reported on in 1908, which was during the years of activity in Gold Park, but was said to be in the Twentynine Palms Mining District. It appears to be shown on the 1908 Twentynine Palms Indian reservation plat as being located in Section 34, T1N, R9E, or thereabouts. Another early map shows it in Section 24, T1S, R9E. No surveys or site investigations were carried out by this writer in the Gold Park area because it is not within the present boundaries of Joshua Tree National Monument.

---

293. Riverside (Ca.) Daily Press, Aug. 12, 1912, and July 1, 1913.



ON MICROFILM

HISTORICAL WATER SOURCES

JOSHUA TREE NATIONAL MONUMENT

CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25016

V. Historical Water Sources in Joshua Tree National Monument

A. Development of Dependable Water Sources Opens Desert

To the first Anglo visitors in the monument area, the desert surrounding the Twentynine Palms oasis seemed an arid, waterless expanse. Because of this they clustered first around the open springs shaded by towering palms, turning the oasis into a small pioneer outpost, a center of cattle and mining activity, and eventually a thriving community. The fact was, however, that within the seemingly dry and therefore terrifying desert basins around the oasis, there were several semipermanent supplies of water in the form of springs, various natural reservoirs, and some canyons and washes in which water ran for short distances during the rainy season and for a short time after.

Development of water within the monument area became necessary for the pursuance of cattle ranching and mining activities. To furnish a drinking supply for their herds, cattlemen utilized existing reliable waterholes such as Quail Spring, which they might develop slightly, and provided catchment basins whereby winter runoff and periodic rains were contained by small dams. Interspersed throughout the monument's high valleys, these proved sufficient to support large roving herds of grazing cattle. Miners, on the other hand, needing dependable and abundant water sources close to their operations, had to develop waterholes more thoroughly and sank numerous wells, such as Pinyon Well, not all of which proved either sufficient or dependable. Some mining operations therefore required the hauling of water great distances and its storage in mortar-walled reservoirs or metal tanks.

The dearth or abundance of water in the desert has always controlled the use that can be made of the land: "Water is the panacea for the desert. Where water has been found or can be made available to people, the waste lands have lost their terror."[1]

---

1. "Early Residents Believed in Stories of Perils of Desert," Barstow (Ca.) Printer-Review, June 13, 1946.

The first survey of watering places in the Mojave Desert was made between September 1917 and March 1918. David G. Thompson compiled the results from this first reconnaissance of the desert region in a volume that was finally published in 1929. On this first survey trip, detailed logs were made of roads and maps drawn to show the roads and watering places. Samples of water were taken from every well and spring and sent to laboratories for analysis. The identification of safe drinking spots and the advent of automobiles made desert travel seem less risky. The principal permanent springs and Barker Dam became public watering places. By the 1920s the focal points of roads in the monument were the well-known mines and the numerous wells and tanks maintained by homesteaders, miners, and cattlemen. Pipelines from mine pumping plants crossed the roads at intervals and mining companies often provided faucets for the use of thirsty travelers and their cars. Whenever springs, tanks, or wells existed within two to three miles of the road, directional signs were erected providing information on the quality of the water and the condition of the trail leading to it. The road logs listed even secondary turnoffs in tenths of miles. The U.S. Geological Survey posted watering places, and the counties and the Automobile Club of Southern California maintained desert signposts.[2]

The historical water sources of Joshua Tree National Monument will be discussed here under four headings: "Springs," "Tanks," "Wells," and "Dams (Reservoirs)."

B. Springs

1. Barrel Spring (Dry)

This spring was in the extreme northwestern edge of the monument, in Section 22, T1S, R5E, either just inside or just outside the monument. From the northwest tip of Section 22, it was necessary to follow the electrical lines access road down the wash in a southwest

---

2. L. Burr Belden, "High Desert Had Many Roads Prior to Monument," History in the Making series, San Bernardino (Ca.) Sun-Telegram, Dec. 26, 1954.

direction for about three-fourths of a mile. A narrow side road to the left was then followed for one-third of a mile to a small path leading up a small ravine in a northeast direction. The spring was located very near the monument boundary. It was developed by Bill Royal of Yucca Valley for sheep use by two small (half-gallon size) basins. The better of the two refilled in fifteen to twenty minutes. Royal claimed water ran in a stream there during the 1930s but dried up in the 1940s. The name came from barrels of an old still that once were stored there.[3]

2. Black Rock Spring (Dry)

This spring, in Section 30, T1S, R6E, is now dry. It was an early watering spot for cattle grazing in the Covington Flat areas.

3. Cotton Spring (Hulsey Mill Site, Winona Mill Site)

This spring in the northwest quarter of Section 14, T5S, R11E, north over the hill from Cottonwood Spring, was developed by an artificial covered tank or dam about thirty feet long and up to twenty feet wide. There was a pumphouse on site and several pipes conveyed water to a house and a reservoir. The pumphouse was still standing in 1944.[4]

4. Cottonwood Spring

Since the mid-1880s Cottonwood Spring has been a primary water source for mines on the north and east sides of Pinto Basin and for freighters, cattlemen, and travelers. The dependability of the water supply and the presence nearby of mineralized rock led naturally to the growth of homesteading, cattle grazing, and mining in the area. In 1906 George Wharton James described the spot as

---

3. JTNM Fact File.

4. Ibid.

> a beautiful little oasis, shut in by hills, and where half a dozen glorious old cottonwoods, dignified, hoary, and majestic, give gentle seclusion. Close by, seeping out of the rocks, is a steady though small supply of water, hence this has become one of the most noted resting places of the region.[5]

The Iron Chief Mine in the Eagle Mountains Mining District depended on Cottonwood Spring for water to sustain its mining operations and went to some expense to conserve it. They built two stone and cement reservoirs holding about 15,000 gallons, piped the water into troughs in large feed corrals, and also built a pumping plant to force the water about eighteen miles to their mine.[6] An early USGS water survey noted that the Cottonwood Spring site in Cottonwood Pass on the main road to Dale was marked by a concrete reservoir and by a corral, watering troughs, and the engine house of the Iron Chief Mining Company. The water was determined to be of good quality and usually flowing. Water also always stood exposed or near the surface in canyons about 3½ miles east by a trail on the south slope of the Cottonwood Mountains under several large native palms (Lost Palms oasis).[7]

Jerry Wolford, Sr., of Blythe, California, ran cattle in the Cottonwood Spring area in 1916 and 1917. He remembered a mining cabin and two apple trees nearby during those years. The cabin was deserted and possibly twenty years old then. Wolford rounded up his free-roaming cattle when they came to water at the spring.[8] J. Smeaton Chase stopped at Cottonwood on his trip through the monument in 1919. He found a caretaker for the Iron Chief pumping plant machinery living there in a doorless cabin. He also mentions apple trees and a garden patch

---

5. Wonders of the Colorado Desert, II: 430.

6. Ibid., I: 266.

7. United States, Department of the Interior, Geological Survey, Some Desert Watering Places in Southeastern California and Southwestern Nevada, Water-Supply Paper 224, by Walter C. Mendenhall (Washington: Government Printing Office, 1909), p. 78.

8. Data obtained by Bruce W. Black in 1958, JTNM Fact File.

where the caretaker grew radishes, beans, and tomatoes. Chase also noted an old arrastra and samples of mineralized rock near the cabin.[9]

Another water survey in 1918 noted that Cottonwood Spring supplied the only easily accessible water within a radius of ten or twenty miles. At the spring site were a prospector's cabin and the pumping plant, said to have been abandoned in 1917. No one had lived at the spring recently. The oasis consisted of two springs a few feet apart issuing from the base of a twenty-foot cliff cutting across the course of a small canyon. The springs had been developed by tunneling a few feet into the granite. A one-inch pipe joint conducted the flow from one of the tunnels. Total flow of the two springs was about twenty gallons per minute. The water sank into the sand within 200 feet. The canyon above the springs was shallow and rocky and contained local deposits of gravelly soil along its bed. These little local reservoirs, or blind tanks (granite bowls that held water but had filled with gravel), along the canyon presumably stored water during floods and then slowly fed it down through crevices in the granite to supply the springs. At one of these soil-covered areas about half a mile from the springs was a small dug well (Wood Spring?).[10]

Cottonwood Spring is located in the southeastern part of the monument in Section 14, T5S, R11E. The site was protected as a public water reserve.

5. Covington Spring (Dry)

This spring is located in the northwest quarter of section 7, T2S, R7E, and was developed by a tunnel or adit sunk at least eighty feet horizontally into a hill. A concrete dam about two feet high built at the mouth of the tunnel was observed in September 1945. A pipe fed a concrete watering trough. The spring could be reached from an

---

9. California Desert Trails, pp. 162-63.

10. USGS Water-Supply Paper 497, 1923, p. 265.

old campground site by walking east. The trough was south of a wash and east of a rock pile about one-quarter mile from the campground.[11]

Covington Spring and Well are the only known attempts to develop water in the valley proper. The eighty-foot tunnel was reportedly dug into the valley wall by cattlemen around 1900. By 1961 no evidence of the adit or spring could be found.[12]

Willis Keys stated that one of his mother's brothers homesteaded up in Covington Flats during the late 1920s and 1930s. His homestead was marked by a small well and windmill at the head of Smith Water Canyon in Lower Covington Flat (see Covington Well).

6. Dove Spring

This spring, somewhere in T1S, R5E, was developed and used by cattle interests.

7. Lost Horse Spring

The land embracing Lost Horse Spring consists of a tract in Section 21, T2S, R8E. The area containing this small spring (earlier known as Witch Springs) was occupied possibly as early as 1890 and was used intermittently through the years to 1935 for the milling and reduction of ores from the Lost Horse Mine. The land containing the spring was occupied and claimed originally by James McHaney who transferred his rights to George Lang in 1895 by a quitclaim deed. Later in 1895 Lang transferred his right to the land to the Lost Horse Mining Company. The Lost Horse quartz mine was located in December 1893 and the Lost Horse Mining Company organized in 1895.

Prior to the transfer of the interests of the original locators of the mine, a two-stamp quartz mill had been erected (about 1894) on the land containing Lost Horse Spring and several thousand

---

11. JTNM Fact File.

12. J.E. Weir, Jr., and J.S. Bader, "Ground-water and related geology of Joshua Tree National Monument, California," July 15, 1963, USGS open-file report.

dollars recovered from the Lost Horse Mine ores. Subsequent to J.D. Ryan's purchase of the mining claim, the Lost Horse Mining Company erected a ten-stamp quartz mill at the mine and expended an appreciable amount of money in developing additional water by sinking a well on the land containing Lost Horse Spring. The Lost Horse wells will be discussed further in the section on "Wells."

The land within one-quarter mile of Lost Horse Spring and wells was withdrawn as a public water reserve on February 28, 1914, by the General Land Office.[13] A U.S. patent to the land containing Lost Horse Spring and wells was issued in 1924 to the Southern Pacific Land Company. J.D. Ryan transferred all his interest and claim in and to the Lost Horse Mining Company and the spring and wells to Daniel Stafford and Sam Ryan in 1930, who formed the General Mining and Development Company.

8. Pine Spring

The Pine Springs Lode Claim in Section 32, T1S, R9E, was filed on by W.F. Keys and his wife on July 1, 1923. On the claim was a spring developed by excavating a tunnel 2½ feet long by 2½ feet wide by 3 feet high in a granite formation. The water was primarily used to water Keys's livestock and was evidently never used for the milling or reduction of ores.

In 1965 it was reported that the spring, which had been running for nearly fifty years, had been dried up by drought.[14]

Willis Keys stated that his father around 1928-29 leased this mill site claim for a couple of years to some men who built a little cabin there and set up a still.[15]

---

13. S.E. Guthrey, Special Agent, Div. of Investig., Dept. of Int., to Dale B. Whiteside, Dir. of Investig., Apr. 15, 1941, Central Files, 1907-49, RG 79, NA.

14. JTNM Fact File.

15. Willis Keys interview, March 1975, n.p.

9. Quail Spring

This natural waterhole in Section 33, T1S, R7E, was used for many years to water livestock and as a public watering and camping place prior to estabishment of the monument. The water was developed by driving a tunnel through the granite formation and piping it one-quarter mile to a stone or cement reservoir ten feet by ten feet by six feet deep, where it was used to water cattle and other livestock. This work was reportedly done by J.A. Myers (George Meyers?) who grazed cattle in the area. Various other stockmen subsequently used the spring and reservoir.[16] Although from the early 1900s through at least 1923 the Quail Spring water was reported to be excellent, by 1934 it was reported that a succession of arid years had caused a virtual drying up of this water hole.[17] The spring was designated a public water-hole withdrawal. In 1938 a small quantity of water could be obtained from a 100-foot tunnel sunk at the base of a small ravine. One informant stated at the time that the water was used by homesteaders in the area.[18] The spring was dry in 1957-58. For several years the remains of an old ocotillo cattle corral could be found near the spring site.

10. Smithwater (Smith's Water) Springs

These springs in Section 32, T1S, R7E, about one mile west of Quail Spring, were used in the early years by James McHaney and others in connection with cattle grazing. Improvements placed on the land during these years consisted of several sections of two-inch iron pipe and a small concrete reservoir.

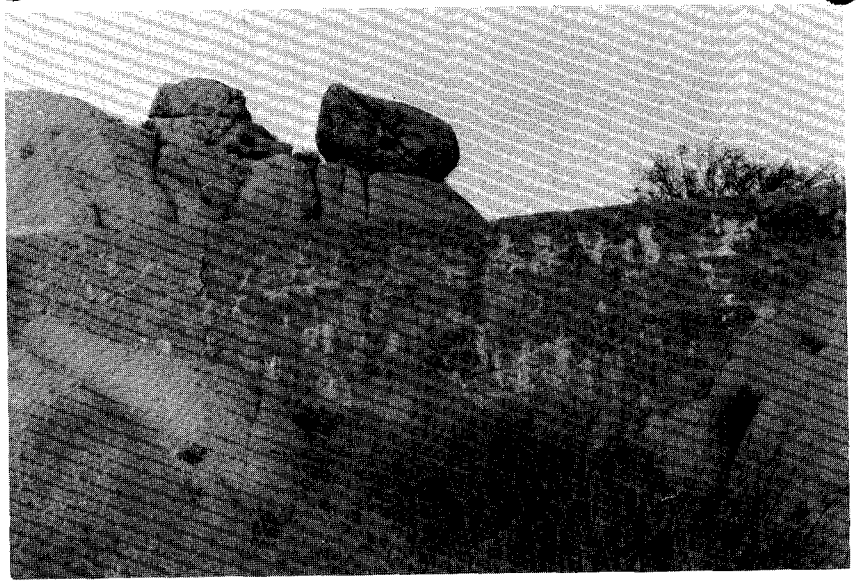
---

16. JTNM Fact File. J.D. Ryan stated that the cattleman Barker built the Quail Spring tank and tunnel as well as Barker Dam, White Tank, Squaw Tank, and Ivanpah Tank. "Stubby Springs," JTNM Fact File.

17. Johnston, "California's Garden of the Gods," p. 36.

18. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," p. 43.





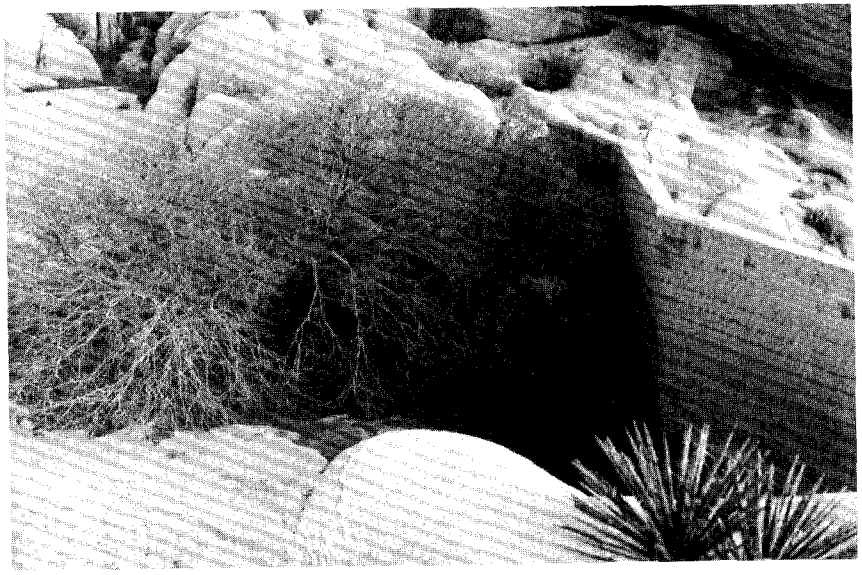


Illustration 114 (top left).
Wood Spring, improved water hole near Cottonwood Spring oasis.

Illustration 115 (top right and bottom right).
Squaw Tank, near Pleasant Valley. NPS photos by Linda W. Greene.

11. Stubbe Spring

This spring in the southeast corner of Section 27, T2S, R7E, was named for Henry Stubbe, a freighter who pioneered the trail into the canyon around 1900.[19] Later J.D. Ryan tunneled into the spring about 100 feet trying to obtain water to pump to the Lost Horse Mine six miles east-southeast. This effort was unsuccessful. Ryan said that Barker built the cement tank at the spring. The cattle firm of Carpenter and Hamilton ran cattle near Stubbe Spring from 1896 to about 1899 when they sold their interests to J.D. Ryan. One informant stated that this hand-dug spring was stone lined. Water was near the surface and could be dipped out by pail. Prospectors from Gold Park used it.[20] As recently as 1950 Stubbe Spring was held by claim as a potential mill site for the Black Butte quartz lode claim and the Gold Standard Mine.[21]

12. Willow Spring (Hole)

This temporary watering place, in Section 21, T1S, R8E, about two miles north of Keys Ranch, was used by the early cattle interests. The water hole held about twelve acre-feet of water but was often dry in late summer.

13. Wood Spring

From the top of Little Chilcoot Pass, looking east, a small group of cottonwoods can be seen designating Wood Spring. It was probably developed by miners or freighters.

C. Tanks

Desert tanks are natural pools of water that collect in depressions or catchments in granite rocks that are of such a shape that

---

19. The teamster's name was given by one informant as W.B. (Stubby) de Crevecoeur, born in Morongo Valley. According to the monument superintendent in 1960, the correct spelling and history of the spring were thoroughly investigated and it was determined that the spring was named for H.C. Stubbe, prospector and miner in the area. Wm. R. Supernaugh, Supt. JTNM, to Regional Director, Region Four, January 18, 1960, files, JTNM. Bill McHaney said he was aware of the spring around 1891-92, and that "Keyes barrel" was one mile north of Stubbe Spring. McHaney interview, March 1933.

20. Reino Clark interview with Eve Violette, 1975, on file at JTNM, p. 4.

21. JTNM Fact File.

they hold water after a rain. Man-made tanks exist where earthen or concrete dams have been built across a natural water course or where water has been piped into a container. Some large, shaded tanks hold water year-round, others hold their supply only a few days or months after a rain. There are several tanks scattered throughout the monument. Most of them are too small to hold water for any length of time and are of little significance except historically when they provided water for livestock grazing. The reservoir behind Barker Dam is an exception because of its size and the fact that it normally contained water all year.

1. Eagle Tank

Eagle Tank is in T3S, R13E. The U.S. Geological Survey noted that

> Eagle Tank is a natural rock basin about 20 feet in diameter and 10 to 15 feet deep in the bed of a gorge tributary to Placer Canyon, in the northwestern part of the Eagle Mountains. The gorge is the third large one entering Placer Canyon from the south below the old Placer Canyon reservoir, a distance of about half a mile, and the tank is several hundred yards from its mouth. It is at the base of a vertical cliff about 20 feet high in the gorge bottom. The tank is said to contain water all the year round, but during the dry season the water is stale and dirty, and even during the torrential rains it is filled with green algae and animal life, such as crustaceans, larvae, and tadpoles. When fresh the water is very good, and even during the dry season it is used by prospectors, for it is the only place within a radius of 15 or 20 miles where water can be procured, unless the pipe line from Cottonwood Spring to the Iron Chief mine is in order. Several other tanks in the Eagle Mountains hold water for several weeks or a month after the rains.[22]

---

22. USGS Water-Supply Paper 497, 1923, p. 272.

2. Ivanpah Tank

This tank is in Section 16, T2S, R9E. A concrete and stone dam twenty-four feet long, eight feet wide on top, and thirteen feet high forms a reservoir approximately two acres in extent. It was used to trap rainwater for watering livestock. It has been reported as being built by C.O. Barker. Bill McHaney once stated that in 1920 he and Bill Keys helped C.W. Roach build Ivanpah Tank, water from which Roach intended to pipe to his claims in Gold Park. The Talmadge Brothers firm of San Bernardino that bought Barker's interests used the reservoir for several years but abandoned it and the area in the 1930s. Ivanpah is one of the largest of the manmade reservoirs in the monument.[23]

3. Live Oak Tank

This tank is in the northwest quarter of Section 16, T2S, R9E. A one-acre reservoir was created behind a dam fourteen feet long and eight inches wide on top, constructed of rubble masonry and concrete. It was used periodically to water livestock and reportedly was built by C.O. Barker of Banning who grazed cattle in the vicinity. The tank is in a wash about fifty yards below a live oak tree.[24]

4. Mystery Hole

This natural tank is in Section 34, T2S, R8E, near the east section line about 0.3 mile north of the township line. It may even be in Section 35. It could be reached by walking west from Malapai Hill or south from Rox Triangulation Station in Section 23. Mystery Hole was in the first wash south of the ridge below an old miner's cabin. The water hole was a narrow crack in the granitic rock.[25]

5. Rattlesnake Tank

The only information found on this tank was that it was built by cattlemen.[26]

---

23. JTNM Fact File; McHaney interview, March 1933, pp. 2-3.

24. JTNM Fact File.

25. Ibid.

26. McHaney interview, March 1933, p. 3.

6. Split Rock Tank

This tank is in Section 8, T2S, R9E. Split Rock is a large granite boulder upturned at an angle of forty-five degrees. The lower face of the boulder is approximately fifty by twenty-five feet and comprises the roof of a cavern formed by the tilted rock and adjoining rocks. Rainwater accumulates in a basin or tank near this cavern. There is some evidence that the cavern was utilized by Indians. The tank is a small depression that could contain only a very limited supply of water. This site will be discussed further under "Reservoirs."

7. Squaw Tank

This tank is in Section 7, T3S, R9E, about one-eighth of a mile north of the junction of the Pleasant Valley-Pinyon Well road. W.F. Keys claimed to have located the property on September 8, 1934, and to have built the concrete dam, which measures forty-two feet long on top, fifteen feet long on the bottom, eleven feet high, and eight inches wide on top. The dam forms a reservoir of approximately two acres. Water was piped to a 16½-foot-long concrete watering trough for the use of livestock. J.D. Ryan once stated that Barker built this dam.

J. Smeaton Chase described his introduction to this watering place:

> In a pile of rock that I skirted I had been told I should find one of those natural tanks of water . . . on which the desert traveler often has to place precarious trust--precarious because they are mere rain catchments. This one is known as Squaw Tanks. I easily found the place, being led to it by my nose. A small quantity of slimy liquid remained, nauseous with putrefying bodies of birds, rats, and lizards. A man perishing of thirst might have brought himself to drink it, but would probably not have survived the draught.[27]

---

27. California Desert Trails, p. 145.

8. Stirrup Tank

Stirrup Tank is located 2½ miles south and a little west of White Tank on the north edge of the Hexie Mountains. It is a natural rock tank that occasionally held water. It was little visited and used only by prospectors.[28]

9. White Tank

This tank is located in Section 23, T2S, R9E. The tank is a natural depression from which a reservoir has been made by constructing a concrete dam across a gorge walled by granite. The dam is fourteen to fifteen feet high and the reservoir, if filled, would be about one acre in extent. It usually contained rainwater most of the year, but sometimes was dry. Cattle had open access to the pond, often fouling the water, but it was used by prospectors.[29]

Bill Keys stated that he took the first load of cement to White Tank in 1912 for Jep Whitney, who built the dam for C.O. Barker.[30] The tank was supposedly named after a Captain White who operated the Goldfields of America Mine nearby. White Tank was included in the Grand Reservoir Site.

D. Wells

1. Ate (Ake, Mission, Huff and Lane) Well

The Mission Well was referred to in the 1930s as Ate's Well. Ate operated the Mission Mine for a while.[31] See Huff and Lane Well.

2. Bagley Well

This well was in the northwest quarter of Section 3, T2S, R8E, and was reached by a road leading to Ohlson's property. The well

---

28. USGS Water-Supply Paper 497, 1923, p. 278.

29. Ibid., p. 269.

30. R.D. Miller interview with Bill Keys, 1959, JTNM Fact File.

31. d'Autremont, West of Dawn, p. 91.

was about forty feet deep, unlined, with a wooden cover. The Bagley house covered about one-third of the well.

3. Black Eagle Well

This well was located in Section 9, T3S, R13E. Water was pumped from it to the Black Eagle Mine. When the mine was operating, both a transmission and water line extended from the well to the mine. By 1944 both lines and a pump had been removed.

4. Carnara (Caneras, Carnero, Conejo) Well

This old well was located within Section 4, T5S, R12E. It was reached by leaving the monument highway one-half mile south of Smoke Tree Wash, cutting across country in a southeast direction. The well was in a clump of mesquite in a canyon draining north from Eagle Mountain. A branch line led from the well to the main water line leading from Cottonwood Spring to the Iron Chief Mine.[32]

The well was about sixteen feet deep and ten inches in diameter. There was also an old cabin on the site. By 1938 the well had been abandoned for many years and was protected under a mill site location.

5. County Well

This well, in Section 31, T3S, R8E, was a watering place for freight teams transporting supplies from Mecca in the Coachella Valley to the Dale Mining District. According to a monument water source report, the well could be reached by driving about four miles up from the mouth of Pushawalla Canyon. It could also be reached by taking the Indio road past Pinyon Well. At the canyon fork where a road took off to the left to Henson Well, one took the right canyon and road to the divide, a distance of about one mile. County Well was then about one mile farther down the south slope, about 7.7 miles from Pinyon Well. County Well was reportedly forty feet deep. It later filled with sand, probably in the late 1930s.[33]

---

32. JTNM Fact File.

33. Ibid.

Chase halted for the day at the County Well around 1919 and graphically described what he found there:

> A well is maintained here, after a fashion, by the county authorities. There was the usual camp litter. . . . The place was literally alive with bees. The air was like a swarm in flight, and the well itself resounded with the buzzing of thousands down there in the dark. However, water must be got. . . . bucket after bucket came up covered with dead bees, and the liquid had a fetid smell from the myriads of decaying insects. So we hauled and skimmed and ladled till the animals had got their fill.[34]

The Geological Survey inventory of watering places published in 1923 mentions this well and notes that it was dug several years previously on the wagon road northeast of Indio and was used considerably for freighting to mines in the Piñon Mining District. In 1918 "it was neatly curbed and fitted with an iron pump (which would not work) and also provided with rope and bucket. There is a horse trough beside the well. The water contained some boards and other trash."[35]

6. Covington Well

This well in Section 6, T2S, R7E, was dug in a wash bottom by either Barker or Covington. It is about twenty-five feet deep and six feet in diameter with a wooden cover. In September 1944 Stocker had a windmill (erected by Willis Keys's uncle?) and a twenty-five-foot tower holding a galvanized iron tank on the site, along with a small watering trough. The well was at the end of the Covington Flat road. In 1942 an "old well at Upper Covington Flat" was described as dry.[36]

---

34. California Desert Trails, pp. 136-37.

35. USGS Water-Supply Paper 497, 1923, p. 268.

36. JTNM Fact File.

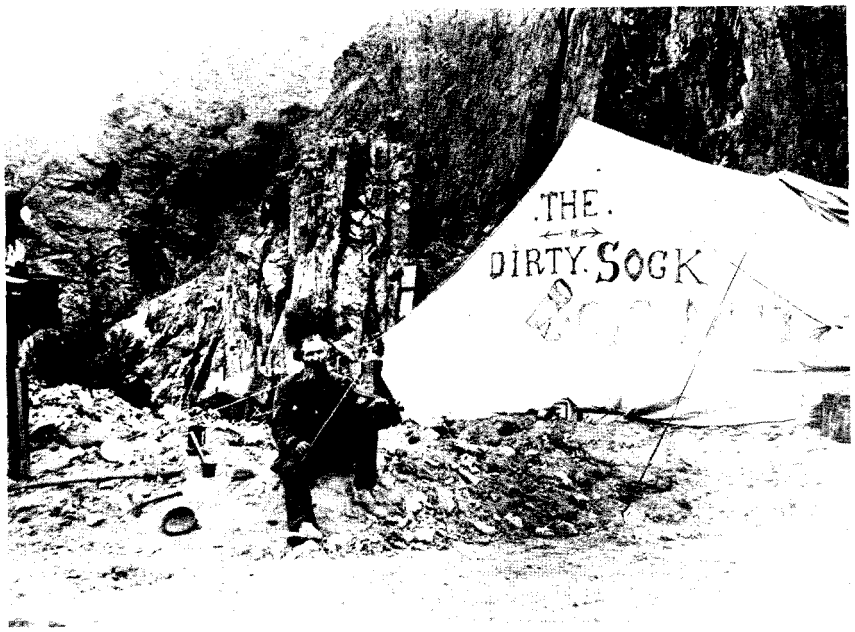


Illustration 116.
"Eagle Eye" McFarland at County Well on the Indio-Twentynine Palms road, about 1912. Courtesy JTNM.



Illustration 117.
Old Cow Camp Well. Courtesy JTNM.

7. Cow Camp Well

The well at Cow Camp is located in Section 32, T1S, R8E, and can be reached by a dirt road leading east off the Keys Ranch road. It was twelve feet deep, rock lined, and located about one hundred yards in front of Cow Camp reservoir, west of the cabin remains. It was supposedly dug and developed in the 1880s by the McHaney gang.

8. Desert Queen Well

The remains of this well are found in Section 3, T2S, R8E. The land on which it is situated was located and developed between 1905 and 1908 by William Morgan, presumably under the name of the Desert Queen Millsite. There is no spring or flowing water on the land. The well was excavated in 1908 to a depth of 116 feet. Morgan also erected a windmill and tank. The water was developed in connection with the Desert Queen Mine operation. The well was used principally for domestic purposes, and was hauled to the Desert Queen and other mines in the vicinity. It was used as a public watering place for many years. Among those who used it were J.D. Ryan and Phillip Sullivan of Twentynine Palms, Roy Bolster of Whitewater, Fred Vaile of the New Eldorado Mining Company, and Fred Pollard of Imperial Valley. It was also used for watering livestock by C.O. Barker, William F. Keys, and others. In 1912 about thirty surveyors camped at the well and used the water. Mules were also watered there, probably by Keys.

Although the Desert Queen Millsite was located originally to mill and reduce ore for the Desert Queen Mine, there is no evidence any milling machinery was ever placed on the site. On January 2, 1917, the land containing the Desert Queen Well was located by Keys under the name Treasure Queen Millsite. He once stated that a stone and concrete arrastra used to reduce Desert Queen Mine ore had been erected there. There is presently no evidence of this. Water was not obtainable at the Desert Queen Well in January 1918. The land containing the well was patented to the Southern Pacific Land Company in 1924. Subsequently Section 3, which contained the Queen Well, was sold by that company to

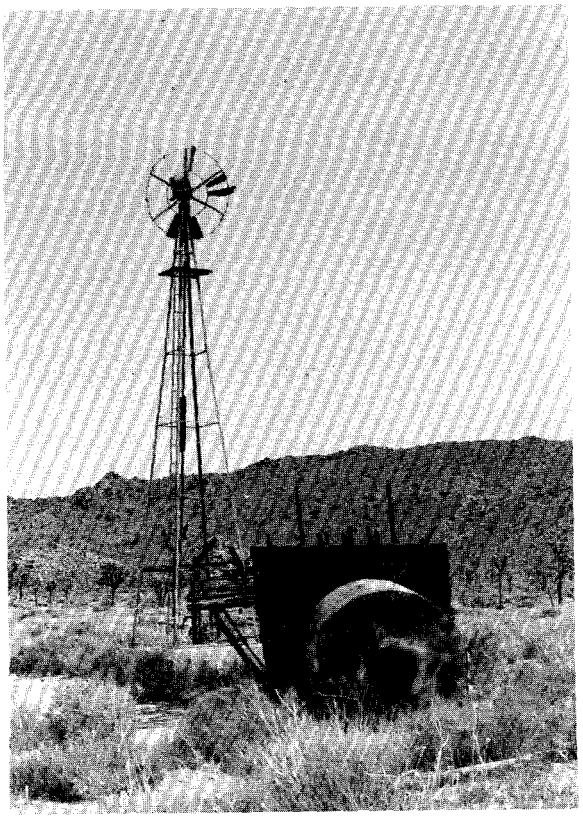
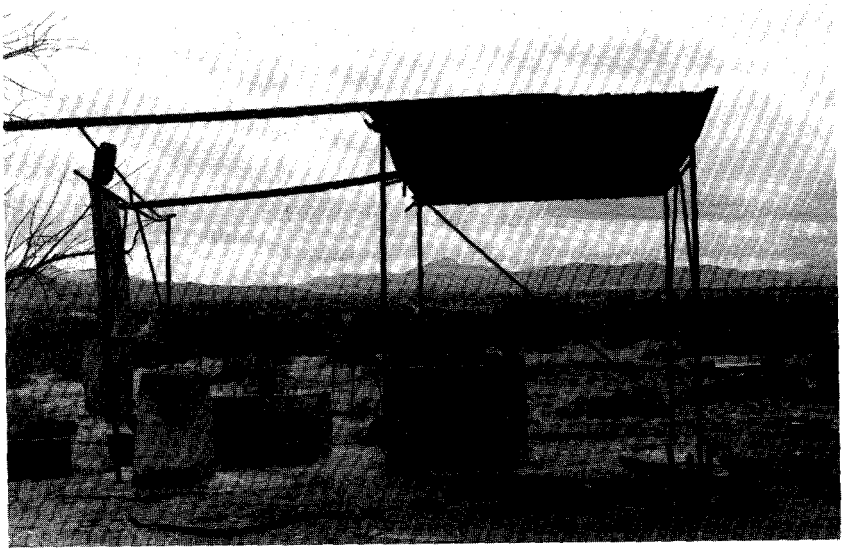


Illustration 118 (top).
Desert Queen Mill Site well.

Illustration 119 (bottom).
Gold Rose Well in Pinto Basin.
NPS photos by Linda W. Greene.



Worth Bagley of Twentynine Palms.[37] It was sometimes referred to as Bagley Well. On site today are a windmill, a fallen platform for a water tank, and the collapsed framework of a building (pumphouse?).

9. Gold Rose Well

The Gold Rose Well is reached by the Old Dale Road, then east on Gold Rose Mill Road past the Mission and Sunrise wells. In 1965 existing development consisted of a well 450 feet deep with a pump and a 2,000-gallon storage tank. The property was privately owned and the house inhabited by a caretaker, Walt Rose. Water from the well was used domestically on the site and also hauled to other residents in the area.[38] It is assumed the well was built in the late 1930s or 1940s.

10. Henson (Hansen, Hensen, Hanson) Well

Henson Well was another watering place for freight teams coming from the Coachella Valley into the Piñon and Dale mining districts. It was also important to miners. Near it in 1918 were the ruins of an arrastra and several small stone buildings. Its water was siphoned to the Eldorado Mine along with that of Pinyon Well. A historical photograph exists showing the old revolving grinding stone of a Chilean mill that operated at the well site about 1914. Ruins of this can be seen today. The exact site of the well has been hard to find in recent years. It is located in Section 26, T3S, R8E, about three-quarters of a mile south of the old road, long abandoned, from Pinyon Well to Indio, and was accessible only by trail. In 1918 it was described as "a dug hole about 4 feet square and reaches water at about 10 feet. It is curbed with boards and in January, 1918, was provided with a rope and bucket but needed cleaning."[39]

---

37. Guthrey to Dale B. Whiteside, Dir. of Investig., Apr. 15, 1941, Central Files, 1907-49, RG 79, NA.

38. Observation card on Gold Rose Well; Observer, Alsen Inman, Park Ranger, Dec. 18, 1965, in JTNM Fact File.

39. USGS Water-Supply Paper 497, 1923, p. 273.

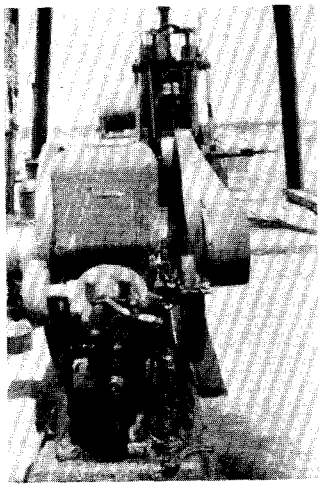
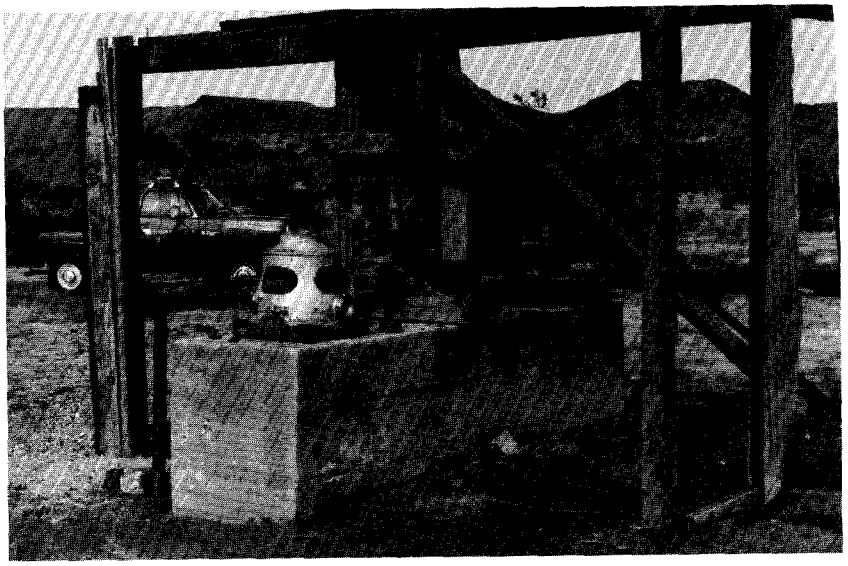


Illustration 120 (top).
Huff and Lane (Mission) Well pump engine. Foundation of this still bears date. Tom Ake, Jr., Collection. Courtesy JTNM.

Illustration 121 (bottom).
Remains of pump house. Once covered by corrugated-metal superstructure. NPS photo by Linda W. Greene.



11. Huff and Lane (Ake, Ate, Mission) Well

This well in the northwest quarter of Section 35, T2S, R12E, supplied water for the Huff and Lane (Mission) Mine. In the late 1930s it was said to be owned by C.W. Ake who was engaged in working the Mission Mine. The well was about 450 feet deep. Pump equipment at the site was capable of lifting about 400 gallons of water in twenty-four hours.[40]

By 1941 T.J. Ake, operator of the Mission Mine, was rebuilding a mill on the Lone Star mill site (location unknown), which was filed on about 1927. He planned to pipe water from the Huff and Lane Well, on the Water Well Mill Site, which was located about 1930 by E.C. Huff. The land embraced in this mill site was used for many years to mill and reduce ore from the Mission Mine two miles north. The Huff and Lane Well on the Dale-Cottonwood Spring road in Pinto Basin was a well-known watering place in the eastern part of the monument because it was the only water available to the public in Pinto Basin.[41] Evidently when Ake took over ownership of the well, it was closed to the general public.

The Mission Well is about fifty yards east of the Old Dale Road. The well was measured by mine safety personnel in the early 1970s and found to be 449 feet deep. In the 1970s the Mission Well site contained a corrugated-metal pump house and machinery over the well. Today the corrugated-metal walls of the building have either blown off or been pulled off and are scattered around the site. Visible is a circular masonry-walled vat next to a small concrete settling basin, a steel water tank that has fallen off its wooden framework, and the remains of what is possibly the old arrastra--a twenty-five-foot-diameter circular structure with a metal pipe (the old pivot?) protruding in the center. The masonry

---

40. Guthrey to Smith, June 16, 1938, Central Files, 1907-49, RG 79, NA, pp. 35-36.

41. James E. Cole, Supt., JTNM, Memorandum for the Regional Director, Region IV, Mar. 27, 1941, Central Files, 1907-49, RG 79, NA.



Illustration 122.

Huff and Lane (Mission) Well. Pump house in background.

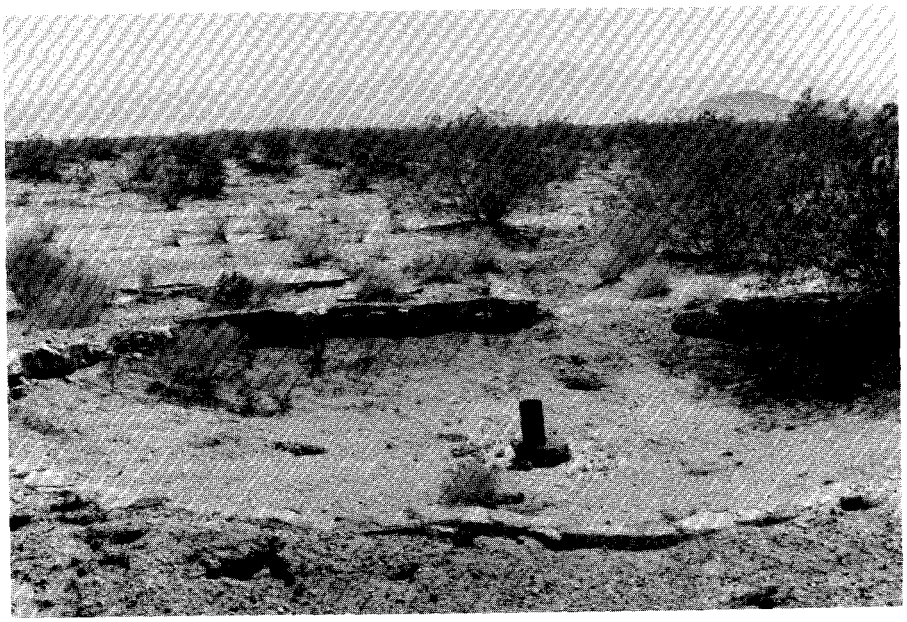


Illustration 123.

Huff and Lane (Mission) Well. Remains of old arrastra? NPS photos by Linda W. Greene.

walls, chinked with cement, are about two feet high. The floor is dirt. Other cement floor foundations were seen in the vicinity. A date of "3-29-34" was scratched into a cement slab. Original structures on the site of this drilled well consisted of a pump, tank, and two shacks.

12. Keys's Placer Well

Located in the southwest quarter of Section 35, T1S, R7E, the well can be reached by traveling on a jeep road south in Johnny Lang Canyon about two-thirds of a mile and then going east about one-quarter of a mile on foot. The well is about five feet deep and rock lined. The cover is mostly collapsed. Its construction date is unknown.

13. Keys's Ranch Wells

Three wells are at the Keys Ranch in Section 32, T1S, R8E. One is twenty-five feet deep, brick lined, and covered by a windlass and wooden cover; another is thirty feet deep, unlined, with a windlass and wooden cover; the third is twenty-five feet deep, cement lined, with a working windmill. These supplied sufficient water for Keys's family and stock.

14. Morgan Kimball Well

The Kimball Well was near the Desert Queen Mine in Section 5, T2S, R9E. Its depth was eighty-five feet.

15. Lang Well (Lang Millsite)

The Lang Millsite is situated 2½ miles west of Keys's Desert Queen Ranch, three miles east of Quail Spring, and five miles northwest of Lost Horse Well at Lang's Camp in Section 2, T2S, R7E. Lang lived there in an old cabin that had previously been inhabited by people mining gold in Milner Canyon (John Law and Chase?). The well was located by William and Frances Keys on April 2, 1926. The well on the property was twelve feet deep in 1939, rock lined, and partially wood covered. Keys claimed that there used to be an arrastra in the area that milled ores from the Sulphide Bismuth mining claim. Possibly some ores were milled there by John Lang, who formerly claimed the land.

16. Lost Horse Well (Millsite)

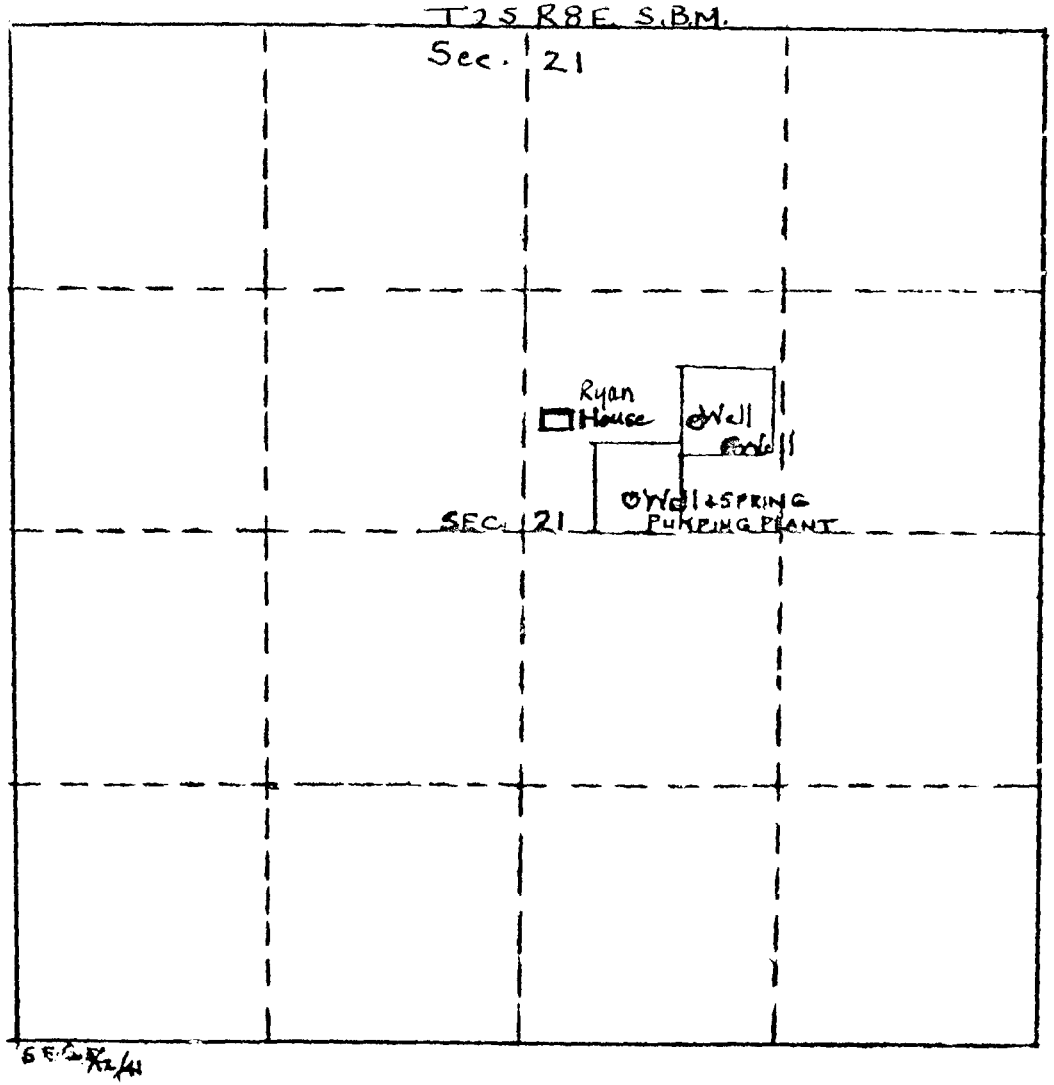
There are actually several wells in Section 21, T2S, R8E. The earliest of them was sunk by the Lost Horse Mining Company after it erected a ten-stamp quartz mill on the Lost Horse Mine property. Water from the well was pumped to the claim through a two-inch pipeline, 3½ miles long, and was stored there in an earth and stone reservoir sixteen feet by sixteen feet by twelve feet deep for use in milling ore. Pumping equipment consisted of a three-cylinder high-pressure Gould pump connected to a twenty-five-horsepower gas engine. The well to which the pumping equipment was attached was seventy feet deep and was excavated about 1905. Pipeline and pumping machinery were installed about this time also.

Later two more wells were excavated, to depths of forty and forty-five feet. These are a few hundred feet east of Lost Horse Spring and of the first well, and were used in conjunction with the original well when additional water for milling was needed. J.D. Ryan stated that he filed a mill site notice on the land containing the wells and spring in 1905 under the name Lost Horse Wells. The two wells excavated on lands adjoining the original Lost Horse Spring and wells were included in a mill site location of June 14, 1915, by Ryan.[42]

According to Ryan, the wells had a capacity of 5,000 gallons per day. Although private wells, water was available to other parties. These were the principal water supplies in Lost Horse Valley. Lost Horse Well later served the Lost Horse ranger station and residence. Ryan erected a substantial house at the well site in the early days and others reportedly built cabins and various shop buildings there, giving the site the air of a small "town." This Lost Horse Well complex was the nearest thing to a settlement in the park for several years.

---

42. Report on water hole locations, Lost Horse Wells (DI 49157), Millsite (DI 35346), DSC history files.



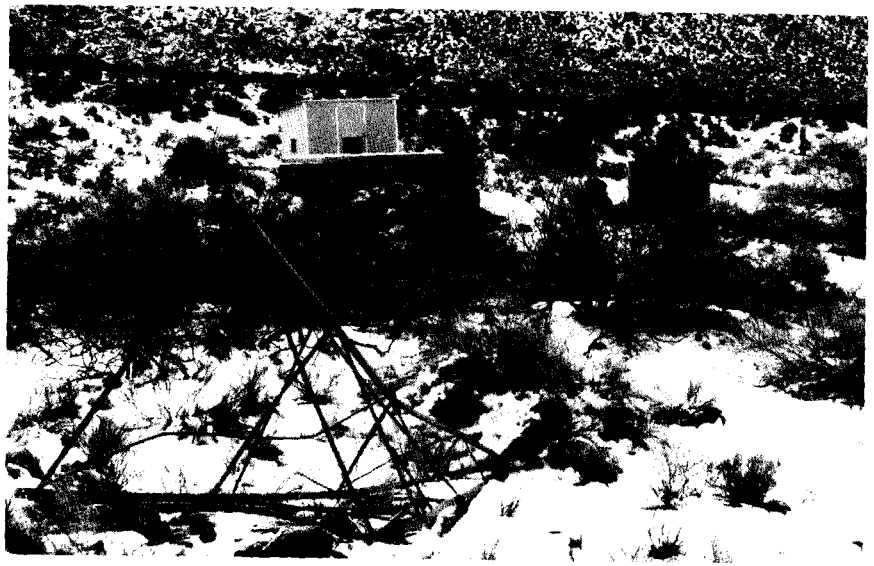


Illustration 124.

Location of Lost Horse Mine wells and view of new pump house at Lost Horse Well. NPS photo by Linda W. Greene.

Location of Lost Horse Wells

T2S R8E Section 21, S.B.M.

The water survey of 1918 noted at Lost Horse Well, or Spring,

> a good adobe house, several outbuildings housing various kinds of machinery, and two dilapidated windmills. The place was abandoned in December, 1917, but is used as a mining camp when the Lost Horse mine . . . is being operated. The original spring consisted of an open hole dug . . . along a small arroyo. . . . A well [Ryan?] has been sunk near this spot on the south, and as a result the spring has gone dry. This well was 39 feet deep. . . . It has a board curb in bad condition, and the water appeared dirty and full of trash. The windmill was not in order, and no bucket or rope was provided. . . . North of this well is another on the opposite side of the little arroyo, also equipped with a windmill that was out of repair. This well was an open shaft 4 feet square. . . . The first well is 4 by 6 feet. . . . The total supply of water available is evidently small.[43]

Lost Horse Well No. 1 had a cement apron surrounding the well opening, with a windmill above it. The windmill was replaced by a metal pumphouse. Nearby are a stone and concrete water storage tank and a steel storage tank. The original Lost Horse Well is on the National Register as being of local significance. It is considered part of the Ryan Ranch complex that is associated significantly with the early history of the monument and is also considered a significant component of the Lost Horse Mine milling process.

17. Monstead Well No. 1

This well was dug in the southeast quarter of Section 35, T1S, R8E, and reached by a dirt road, about two miles north of the back road connecting Hidden Valley Campground and Queen Valley. It consisted of a twelve-inch-diameter pipe supposedly 800 feet deep. It was later used as a privy.

---

43. USGS Water-Supply Paper 497, 1923, p. 275.



Illustration 125.
Pinyon Well, 1939. Windmill is at site of patented El Dorado Mine Millsite claim. Courtesy JTNM.

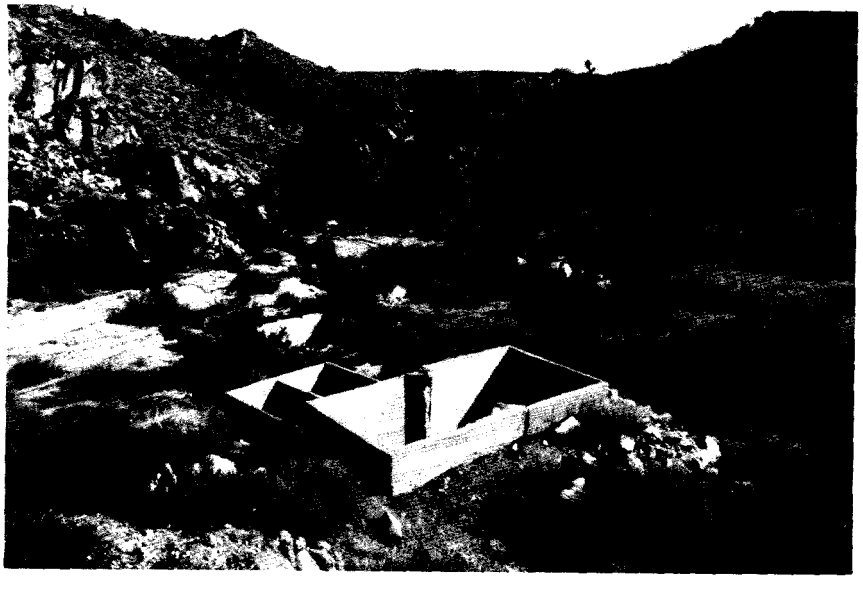


Illustration 126.
Pinyon Well, 1982. Concrete tanks used as water storage reservoirs. NPS photo by Linda W. Greene.

18. Pinkham Well

The Pinkham Well in Section 3(?), T4S, R11E, was developed by C.A. Pinkham of Mecca who had many claims in the monument area. It was located in an arroyo drainage on the southwest edge of Pinto Basin northwest of the Ruby Lee Well. It was twenty-five feet deep and water stood within five feet of the top when it was dug. A tank stood above the well, which is now caved in. It was said to be reliable and used by prospectors.[44]

19. Pinto (Wash) Wells

This well is in the northwest quarter of Section 4, T3S, R15E, and was dug and used by the Metropolitan Water District. It was evidently used in the 1940s by the Henry J. Kaiser Company. The Environmental Assessment for the monument (1974) stated that Kaiser Steel Corporation leased wells at the east end of Pinto Basin from the Metropolitan Water District of Los Angeles for use at its Eagle Mountain Mine.

20. Pinyon (Pine) Well

This well is in Section 24, T3S, R8E, and was the only water source for several mines operated in this vicinity. A small community grew up there south of the wagon road between Indio and Twentynine Palms near a small spring. A two-stamp mill was erected there by Tingman and Holland and a well was sunk to aid in milling ores. By 1918 the camp had been abandoned. On site were the wreck of the mill, two deserted cabins, and some abandoned shafts (possibly efforts to dig wells rather than mining activity). At least two wells remained at that time:

---

44. Ibid., p. 277; JTNM Fact File.



Illustration 127.
Cabin at Ruby Lee Well site.



Illustration 128.
Ruby Lee Well. Note inscription on rock in background. NPS photos by Linda W. Greene.

> One is in front of the cabins about 20 feet from the road and was covered in January, 1918, by a low curb about 1 foot high. A rope and bucket were provided for obtaining water. This well is 3 to 4 feet in size, and was walled with plank. It measured 27.7 feet in depth. . . . The second well is 200 feet south of the other. . . . It is dug in the mountain side beside the canyon. . . . Its depth . . . was 41 feet. . . . It is walled with 2-inch plank.[45]

Water was piped from Pinyon Well to the Eldorado Mine for milling purposes. By Executive Order of January 24, 1914, all lands within one-quarter mile of Pinyon Well were withdrawn as a Public Water Reserve.

21. Ruby Lee Well

This well in Section 10, T4S, R11E, was described earlier in connection with the Ruby Lee lode claim. Water was brought to the surface by a hand pump and was sufficient only for domestic use. This might earlier have been referred to as Landford's Mill Site.[46]

22. Samuelson Well #2

This well is in the southeast quarter of Section 36, T1S, R7E, and is reached by a dirt road about two miles north of the Lost Horse ranger station generator house. It is thirty to thirty-five feet deep. Its construction date is unknown.

---

45. USGS Water-Supply Paper 497, 1923, p. 267.

46. Guthrey to Smith, June 16, 1938, Central Files, 1907-49, RG 79, NA, p. 19.



Illustration 129.

Sunrise Well in Pinto Basin, 1983. NPS photo by Linda W. Greene.

23. Sunrise Well

Sunrise Well is located in the northwest quarter of Section 35, T2S, R12E, about one-quarter mile east of the Old Dale Road and the Mission Well. The well was found to be 480 feet deep in 1973, reached from a cement platform, and with a 16-inch-diameter casing. The well is covered by an easily moved thin square metal cover. Nothing remains on site except a cement slab and some imbedded timbers.

24. Wall Street Millsite Well (Keys Well #3)

This well is in Section 34, T1S, R8E, and is reached by the Wall Street mill road. It was supposedly dug in the summer of 1896 by Bill McHaney for watering cattle. George Meyers took it over from McHaney and also used it for livestock. Meyers also constructed a corral on a site referred to as "Little Reservoir" to the west. The well was later used in connection with milling operations at the Wall Street mill, several yards to the northwest. The well was 31 feet deep. Its top 2½ feet are rock lined and the rest unlined earth walls. It has a wooden cover and windlass and was fitted with an early model gas engine pump. The water was used in later years for both domestic and milling operations. The Wall Street Mill National Register boundary includes the well and pump.

E. Dams and Reservoirs

Artificial reservoirs within the monument were made by damming canyons or ravines to impound streams or catch rainwater or were built to catch and hold the product of a spring or well.

1. Barker Dam

This sizable reservoir in Section 4, T2S, R8E, was created during the livestock grazing days of the monument and served many cattlemen over the years. A low earth and stone wall upstream from the concrete dam may have been an earlier dam on the site. Built only a few feet high across the water channel, it is usually submerged under the reservoir formed by the later dam. C.O. Barker probably built the later



Illustration 130.
Barker Dam. In foreground, almost covered by water, is the rubble wall that functioned as the original dam on the site. NPS photo.



Illustration 131.
Lake created by Barker Dam (dam is to left outside picture). NPS photo by Linda W. Greene.

dam, because Bill Keys once stated that George Meyers and William McHaney built the original structure.[47] The purpose of the dams was to increase the size of an already existing pool or natural tank of water to make it a permanent water hole that would support large herds of cattle. Stacey declared that Barker and Shay sold such interest as they had in the dam to Talmadge, another cattleman, from whom Stacey later secured the rights. The lower portion of the concrete dam was built about 1902 when the surrounding land was all public domain. Its construction required several long trips of hauling cement, wooden forms, and other material from Banning. Evidently it was not formally located as a reservoir site. The structure originally measured about 150 feet long by 9 feet high.

On December 12, 1914, the north half of the northeast quarter of Section 4, including the Barker Dam, was withdrawn as Public Water Reserve No. 14. On September 13, 1932, Bill Keys located the Big Chief Millsite claim that included Barker Dam. This was later declared null and void because the land was part of a public water reserve. When full, the lake impounded behind the dam in a narrow canyon comprises approximately twenty acre-feet, covering nearly six surface acres. It is reached by a one-quarter-mile trail from the Hidden Valley Campground.

Barker Dam became a source of conflict between Bill Keys, a homesteader, and cattlemen in the area. After Keys and various members of his family obtained homestead titles to the land surrounding the dam, on all but the inaccessible north side, Keys fenced the land and threatened to deny access to the dam to the public. Keys stated that the land was originally assessed to Bill McHaney, who had willed the property

---

47. W.F. Keys to Major O.A. Tomlinson, July 18, 1942, FARC, San Bruno, Ca.

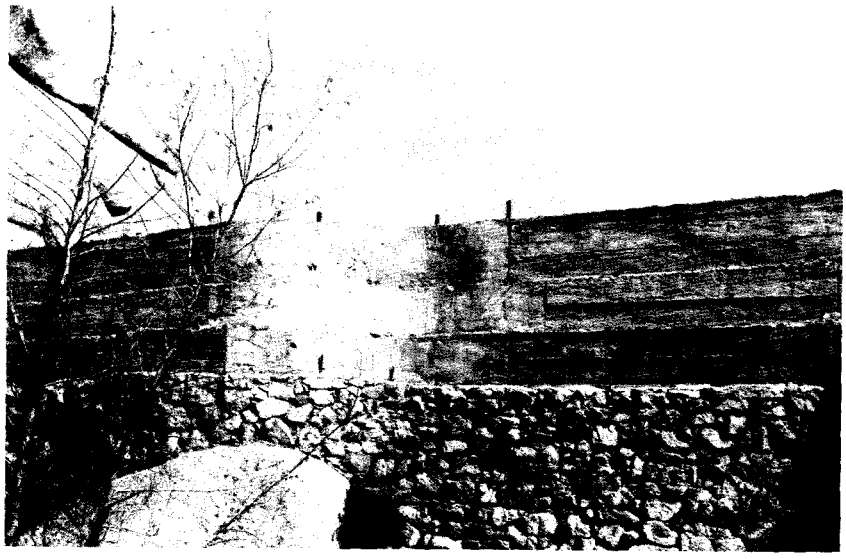




Illustration 132 (top).
Barker Dam. Lower portion is that built by Barker. Top is later addition by Keys. NPS photo.

Illustration 133 (bottom).
View of dam from south. NPS photo by Linda W. Greene.

to him.[48] This threat of closure caused considerable friction between Keys and the Stocker-Shay interests. Keys then proceeded to further improve the dam. The lower nine-foot portion of the present structure that was built in the early part of the century is of cement faced with native stone. Keys later raised the dam three feet with concrete forms. There is another lower retaining dam below this large one, to the west. On the end of the main dam is inscribed "Bighorn Dam, Built by Willis Keys & Wm. F. Keys - Phyllis Ann Keys - F.M. Keys, 1949-50."

A corral by the dam was sometimes used by Keys for branding. Bill McHaney lived at the back end of Bighorn Dam, but his cabin is long gone. Another corral that Keys used was located on that McHaney homestead. Two drinking troughs fed by a 1½-inch pipe were set out on the flat wash below Barker Dam, one a wooden wagon box and one of cement. The latter, a double-ring watering trough that Keys built in 1939, is an unusual item. Willis Keys stated that the pipe from the dam fed into the center part where there were float valves to regulate the flow of water into the trough. The inner wall prevented the cattle from damaging the valves. The big wooden box nearby used as a trough was placed by Keys before he built the rock circle one. The original watering situation on the site consisted of a small concrete trough below the dam that caught and impounded leakage.

Barker Dam is considered locally significant under the category of Agriculture as a vitally important permanent water hole in Joshua Tree National Monument. By impounding rainwater, it permitted

---

48. According to Willis Keys, his father had bought a relinquishment in the area from a man named Smith, who had never proven up on his homestead. Bill Keys had Bill McHaney homestead the property, which contained a couple of buildings, in order to ensure that he kept the title. This homestead was at the back entrance to Barker Dam, where the parking lot is today. There was an old corral right at the mouth of the narrow canyon there. McHaney later supposedly willed the property to Keys, but the will was never probated.

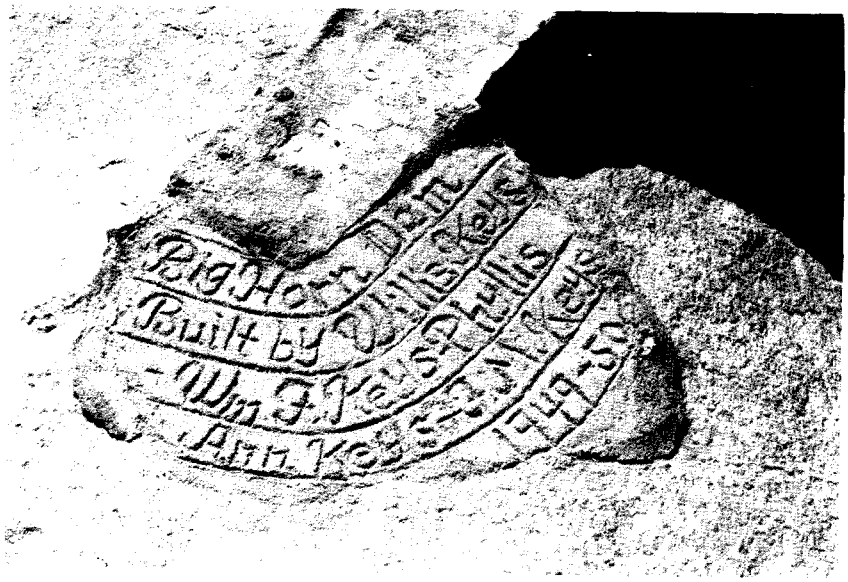


Illustration 134.

Keys family marker commemorating "Big Horn Dam" construction, 1949-50. Located on top wall of dam.



Illustration 135.

Concrete stock-watering trough built by Keys below Barker Dam. NPS photos by Linda W. Greene.

extensive livestock raising, which is an important theme in the development of the area. The site was entered on the National Register on October 29, 1975.

2. Cow Camp Reservoir

On July 1, 1921, Bill and Frances Keys located what they called the Cow Camp Reservoir for the purpose of catching and storing rainwater for irrigation, domestic, and other purposes. The site was located in Section 32, T1S, R8E. Keys built a dam there after he was released from prison in 1948. The reservoir later reverted to the monument.

3. Grand Reservoir Site

This site was located September 5, 1913, by Bill Keys in Section 34, T1S, R8E. It is actually in or near Section 23, T2S, R9E, below White Tank and including it. In 1939 Keys transferred by quitclaim his interest in this site and in several mining claims in the Paymaster Group to O.L. (P.O.?) Murphy.[49]

4. Keys Ranch Reservoir

Associated with Keys Ranch are three dams. The large concrete one near the house is in good condition. The wooden catwalk used during its construction is still in place. A concrete secondary dam lying upstream from that one prevents water seepage from the reservoir. A third smaller concrete dam is also in good condition.

5. Pinyon Well Reservoir

This site has been covered in detail in previous sections. It will only be noted here that concrete tanks, one of them roofed, were built at some time at the well site and pipes installed so that they could be used as reservoirs. Field inventory reports compiled by the National Park Service in 1976 referred to the three rectangular concrete tanks on site as cyanide tanks, but no data supporting this statement were found.

---

49. James E. Cole, Supt., JTNM, Memorandum for the Director, Feb. 11, 1941, Central Files, 1907-49, RG 79, NA, pp. 1-2.

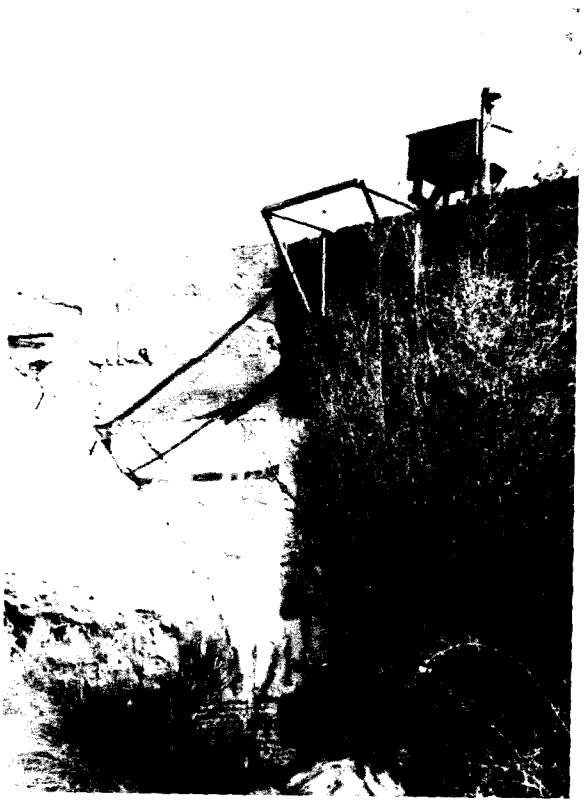


Illustration 136.

Cow Camp dam. Photo by Lynn Loetterle. Courtesy JTNM.

6. Placer Canyon Reservoir

A cement and stone dam eight to ten feet high was built around 1900 across the Placer Canyon gorge two or three miles from its mouth, in T3S, R13E. Part of the dam was later torn down because it obstructed the passage of pack animals up the canyon. Several natural tanks above and below the dam held water for a month or more during rainy seasons.[50]

7. Queen Reservoir

The Queen Reservoir site was in Section 6, T2S, R9E, and was recorded on August 27, 1921. Bill Keys presumably constructed the dam, fifty feet wide by five feet high. The reservoir was on lands included within the Desert Queen Mine group. The reservoir created by the dam later filled in with sand.

8. Split Rock Reservoir

Although there is no legal evidence that the land there has ever been included in a reservoir or mill site location, a small concrete dam was installed at some time. Keys stated that it was built by a Roy Lowe to collect water. A small reservoir has been formed by the dam and by a small depression in the rocks and measures 35 feet long, from 3 to 6 feet wide, and 2½ feet deep. The 3-foot-high dam was built at the north end of the reservoir and northwest of Split Rock.

9. Twin Reservoir Site

The Twin Reservoir Site No. 1 was located August 26, 1915, by Wm. F. Keys. It is situated approximately one-quarter mile west of the Grand Reservoir Site.

F. Public Water Reserves in the Monument

In 1945 Custodian James E. Cole compiled a list of Public Water Reserves within the monument. These included:

1. No Name [Barrel Spring?]--"T.1S., R.5E., S.B.M., Sec. 22." Withdrawn for Public Water Reserve No. 14 by Executive Order of January 24, 1914.

---

50. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," p. 48.

2. Quail Spring--"T.1S., R.7E., S.B.M., all land within one-quarter mile of Quail Spring. . . ." Section 33. Withdrawn for P.W.R. No. 14 by E.O. of January 24, 1914.

3. Stubbe Spring--"T.3S., R.7E., S.B.M., Unsurveyed. All land within one-quarter mile of Stubby Springs. . . ." Actually located in T.2S., Sec. 34. Withdrawn for P.W.R. No. 14 by E.O. of January 24, 1914.

4. Lost Horse Spring--"T.2S., R.8E., S.B.M., Unsurveyed. All land within one-quarter mile of Lost Horse Spring. . . ." The Lost Horse Wells, one of which was the old Lost Horse Spring, are located in Section 21. Withdrawn for P.W.R. No. 14 by E.O. of January 24, 1914.

5. Stirrup Tanks--"T.2S., R.10E., S.B.M., Unsurveyed. All land within one-quarter mile of Stirrup Tanks. . . ." Stirrup Tank is located in T.2S., R.9E. Withdrawn for P.W.R. NO. 14 by E.O. of January 24, 1914.

6. Cottonwood Spring--"T.5S., R.11E., S.B.M., Unsurveyed. All land within one-quarter mile of Cottonwood Springs. . . ." Section 14. The northwest and southwest quarters of Section 11 were withdrawn as Public Water Reserve No. 14 by Executive Order of December 12, 1914. This reserve did not include Cottonwood Spring but might include a spring to the west known locally as Hulsey [Cotton?] Spring. The northeast quarter of Section 14 was withdrawn as P.W.R. No. 65 by E.O. of July 10, 1919, and the southeast quarter was withdrawn as P.W.R. No. 107 by E.O. of September 14, 1936. Parts of the southwest quarter and of the southeast quarter of Section 11 were withdrawn as P.W.R. No. 65 by E.O. of August 12, 1919.

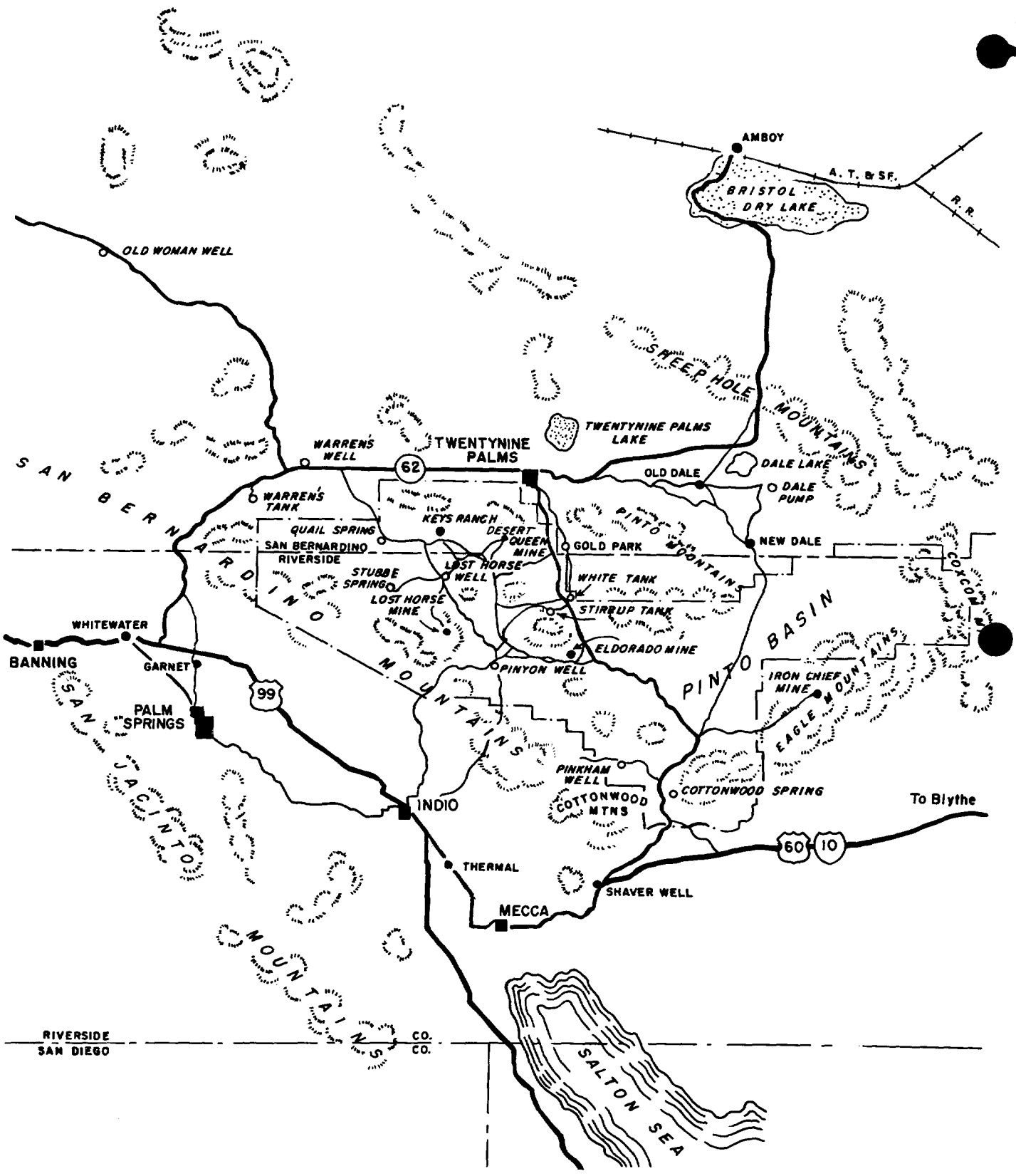
7. No Name--"T.5S., R.13E., S.B.M., Sec. 28 and 30." Withdrawn as P.W.R. No. 145 by E.O. of August 18, 1932.[51]

G. Recommendations and Evaluations

All of the monument's water sources were important locally in the early days of livestock raising, mining, and freighting. Without their presence, even these limited industries would have been impossible. Several watering places and associated structures such as wells and dams are considered significant enough to be included within National Register boundaries. These are Lost Horse Well or Spring (Ryan House and Lost Horse Well or Spring nomination), Wall Street Millsite Well (Wall Street Mill nomination), Keys Ranch reservoir (Keys Ranch nomination), and the Cow Camp Well and Reservoir (Cow Camp nomination). Henson Well and Pinyon Well will be included within the Piñon Mountain Historic Mining District National Register nomination because they provided water for early milling operations there. Barker Dam is already on the National Register. Cottonwood Spring was nominated, but deemed ineligible.

---

51. "List of Public Water Reserves in Joshua Tree National Monument Submitted by Custodian James E. Cole, April 19, 1945," Central Files, 1907-49, RG 79, NA.



ROADS AND TRAILS IN THE PRE-MONUMENT PERIOD: MAP A

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25006

ON MICROFILM

VI. Roads and Trails in the Pre-Monument Period

A. Establishment of Trails and Wagon Roads

1. Development of Mines Leads to Freighting Activity

The earliest routes of travel within the monument area were Indian trails leading from campgrounds to water holes and eventually to trading and village sites in other areas. It is doubtful that cattlemen utilized these early paths to any great degree, but prospectors undoubtedly did in their search for promising mineral locations. Wandering slowly and leading their burros, they were dependent on Indian trails that would lead them to lifesaving water supplies. As mines were located and developed, trails became roads that were forged indelibly by heavy freight wagon wheels. By the late 1890s and early 1900s large wagons were hauling supplies and ore for miners in the area. According to one old teamster, as many as sixteen horses were sometimes harnessed to two wagons pulled in tandem, with a lighter feed wagon hitched behind. Within the monument area smaller teams were probably used because of the steep grades and tight curves often encountered. Oxen were not used to pull wagons because they were slow and could not pull as much weight as a horse. The trip from Banning to Twentynine Palms with a full load took three days or longer. Some of the early freight roads within the national monument were the following:

a) Pleasant Valley Via The Blue Cut

The Blue Cut was a teamster's highway that supplied several mines in Pleasant Valley from the railhead at Indio. On their way north after loading up at the Indio freight depot, teamsters in caravans passed the Berdoo Canyon turnoff and the major route to Pinyon Well via Pushawalla Canyon and then in another four miles cut sharply up a broad canyon leading east into the easy grade of The Blue Cut.

b) Eldorado Mine from Mecca Via Cottonwood Spring

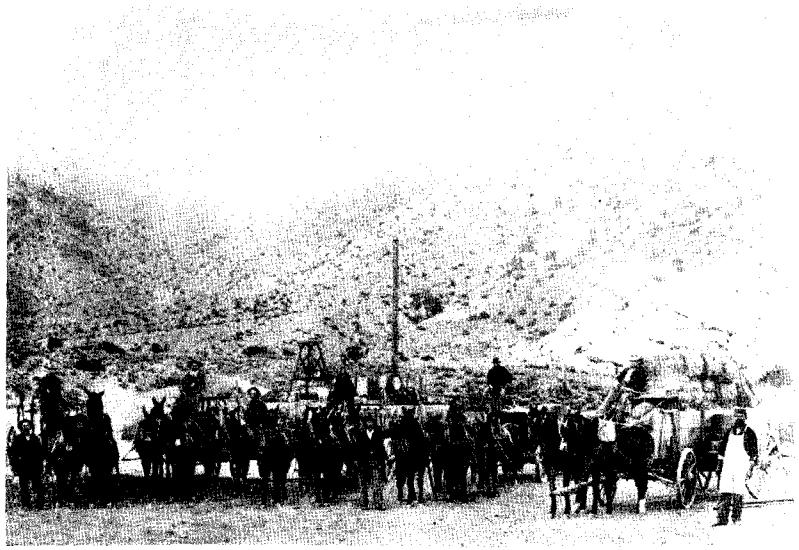
Herman Price, who hauled from Mecca to the Eldorado Mine, recalled stopping at the end of the first day at Schaeffer's (Shaver's) Well. About 2:00 P.M. on the second day he would stop at Cottonwood Spring for water and then continue north to the vicinity of Old Dale junction for the night. Via Fried Liver Wash, it was about

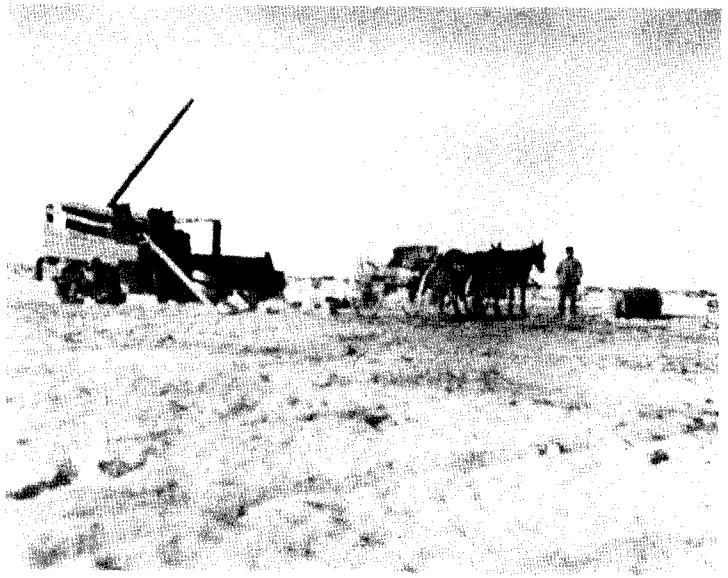


Illustration 137 (top left).
Freight wagon, Amboy to Dale mines.

Illustration 138 (bottom left).
Freight wagons at Lost Horse Well, 1893?

Illustration 139 (bottom right).
Dale-Amboy stage, 1911 or 1912.
Photos courtesy JTNM.





another half day trip to the Eldorado. Price usually used six mules and hauled three tons at ten dollars a ton.[1]

c) Eldorado Mine from Indio Via Pushawalla Canyon

Price recalls spending the first night up Pushawalla Canyon (then called Dirty Sock Canyon because of the Dirty Sock Mine there) at the county well, sixteen miles from Indio. Six head of horses were used to pull two tons of freight. The second night was spent at the Hexahedron Mine mill site. Each trip cost twenty dollars per ton of freight.[2]

d) Other Routes to the Eldorado Mine

L. Burr Belden outlines several routes by which freight was brought in to the Eldorado Mine during its heyday. These are outlined below:

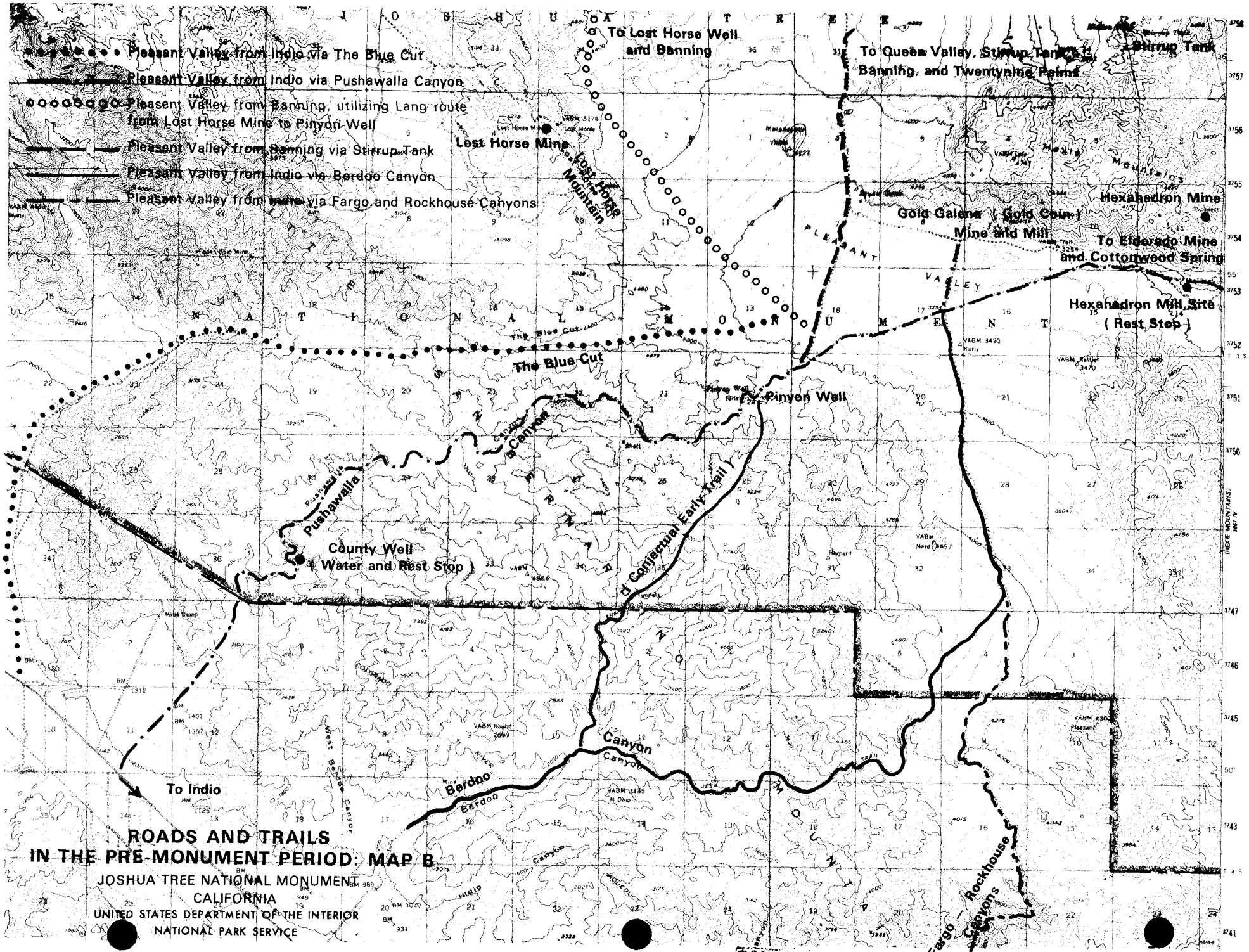
1) A six-day trip from Banning to the mine involved Banning to Whitewater up to the Morongo Valley, over to Warren's Well, south to Quail Spring, and then to Lost Horse Well and the Lost Horse Mine and over a sharp ridge to Pinyon Well (Lang route). That route was not feasible for heavy freight wagons, which usually went by way of Stirrup Tank and south to Pleasant Valley.

2) A four-day route from Indio ascended Berdoo Canyon, continued up a steep side canyon, crossed a ridge, and descended into Pinyon Well. This could only be used by light wagons and four-horse teams. Later the northern portion was rerouted to eliminate crossing the steep hogback above Pinyon Well. In the early 1920s the Berdoo Canyon road followed a wider draw and entered Pleasant Valley two miles east of Pinyon Well.

---

1. JTNM Fact File.

2. Ibid.



ROADS AND TRAILS IN THE PRE-MONUMENT PERIOD: MAP B

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ON MICROFILM / SEPTEMBER 1983 / 100-25005


Approximate route
MORONGO VALLEY
LITTLE MORONGO CANYON
SAN BERNARDINO CO.
RIVERSIDE CO.
Morongo Valley
Yucca Valley
Joshua Tree
Twentynine Palms
Indio
Blythe
Parker
Needles
Barstow
Victorville
San Bernardino
Riverside
Los Angeles
Santa Ana
Pomona
Long Beach
Pasadena
Glendale
Hollywood
Santa Monica
Oxnard
Ventura
Bakersfield
Fresno
Visalia
Tulare
Hanford
Lemoore
Coalinga
Avenal
Taft
Maricopa
Santa Maria
Lompoc
Santa Barbara
Mojave
Tehachapi
Lancaster
Palmdale
Gorman
Frazier Park
Pine Mountain
Ojai
Simi
Chatsworth
Van Nuys
Burbank
Alhambra
Whittier
Anaheim
Fullerton
Orange
Santa Ana
Laguna Beach
Huntington Beach
Newport Beach
Costa Mesa
Irvine
Tustin
Riverside
Corona
Norco
Chino
Ontario
Upland
Claremont
Pomona
Walnut
Diamond Bar
Brea
La Habra
Whittier
Downey
Norwalk
Bellflower
Lakewood
Long Beach
Compton
Inglewood
Culver City
Beverly Hills
Hollywood
Burbank
Glendale
Pasadena
San Fernando
Van Nuys
Chatsworth
Simi
Thousand Oaks
Camarillo
Oxnard
Ventura
Santa Paula
Fillmore
Piru
Santa Clarita
Saugus
Newhall
Valencia
Castaic
Lancaster
Palmdale
Gorman
Frazier Park
Pine Mountain
Ojai
Santa Barbara
Lompoc
Santa Maria
Guadalupe
Arroyo Grande
Pismo Beach
Grover City
Oceano
Nipomo
Los Alamos
Solvang
Buellton
Santa Ynez
Los Olivos
Ballard
Sisquoc
Garey
Orcutt
Casmalia
Maricopa
Taft
Wasco
Shafter
Delano
McFarland
Wasco
Arvin
Lamont
Weedpatch
Edison
Bakersfield
Oildale
Rosedale
Greenfield
Kern River
Kern River Oil Field
Kern River Gas Field
Mount Poso
Poso Creek
Poso Creek Oil Field
Round Mountain
Round Mountain Oil Field
Buena Vista Hills
Buena Vista Oil Field
Buena Vista Lake
Elk Hills
Elk Hills Oil Field
Tupman
Tupman Oil Field
Midway-Sunset Oil Field
Midway-Sunset
Fellows
Maricopa Flat
Maricopa Flat Oil Field
Temblor Range
Temblor
Carneros Creek
Carneros Creek Oil Field
Reef Ridge
Reef Ridge Oil Field
McKittrick
McKittrick Oil Field
McKittrick Summit
McKittrick Summit Oil Field
Devils Den
Devils Den Oil Field
Antelope Hills
Antelope Hills Oil Field
Lost Hills
Lost Hills Oil Field
Belridge
Belridge Oil Field
Belridge South
Belridge South Oil Field
Coalinga
Coalinga Oil Field
Coalinga Nose
Coalinga Nose Oil Field
Pleasant Valley
Pleasant Valley Oil Field
Guijarral Hills
Guijarral Hills Oil Field
Kettleman Hills
Kettleman Hills Oil Field
Kettleman North Dome
Kettleman North Dome Oil Field
Kettleman Middle Dome
Kettleman Middle Dome Oil Field
Kettleman South Dome
Kettleman South Dome Oil Field
Lemoore
Lemoore Oil Field
Stratford
Stratford Oil Field
Kreyenhagen
Kreyenhagen Oil Field
Avenal
Avenal Oil Field
Antelope Valley
Antelope Valley Oil Field
Cuyama Valley
Cuyama Valley Oil Field
Russell Ranch
Russell Ranch Oil Field
Orcutt
Orcutt Oil Field
Casmalia
Casmalia Oil Field
Point Sal
Point Sal Oil Field
Santa Maria Valley
Santa Maria Valley Oil Field
Lompoc
Lompoc Oil Field
Gaviota
Gaviota Oil Field
Summerland
Summerland Oil Field
Carpinteria
Carpinteria Oil Field
Ventura
Ventura Oil Field
Santa Paula
Santa Paula Oil Field
Fillmore
Fillmore Oil Field
Piru
Piru Oil Field
Oak Ridge
Oak Ridge Oil Field
Castaic
Castaic Oil Field
Newhall
Newhall Oil Field
Saugus
Saugus Oil Field
Placerita
Placerita Oil Field
Santa Clarita
Santa Clarita Oil Field
Chatsworth
Chatsworth Oil Field
Simi
Simi Oil Field
Thousand Oaks
Thousand Oaks Oil Field
Camarillo
Camarillo Oil Field
Oxnard
Oxnard Oil Field
Mandalay
Mandalay Oil Field
Ormond Beach
Ormond Beach Oil Field
Huntington Beach
Huntington Beach Oil Field
Seal Beach
Seal Beach Oil Field
Long Beach
Long Beach Oil Field
Signal Hill
Signal Hill Oil Field
Wilmington
Wilmington Oil Field
Torrance
Torrance Oil Field
Dominguez
Dominguez Oil Field
Rosecrans
Rosecrans Oil Field
Inglewood
Inglewood Oil Field
Baldwin Hills
Baldwin Hills Oil Field
Beverly Hills
Beverly Hills Oil Field
Hollywood
Hollywood Oil Field
Los Angeles
Los Angeles Oil Field
Salt Lake
Salt Lake Oil Field
Playa del Rey
Playa del Rey Oil Field
Venice
Venice Oil Field
Santa Monica
Santa Monica Oil Field
Malibu
Malibu Oil Field
Topanga
Topanga Oil Field
Pacific Palisades
Pacific Palisades Oil Field
Brentwood
Brentwood Oil Field
Bel Air
Bel Air Oil Field
Sepulveda
Sepulveda Oil Field
Encino
Encino Oil Field
Sherman Oaks
Sherman Oaks Oil Field
Studio City
Studio City Oil Field
North Hollywood
North Hollywood Oil Field
Burbank
Burbank Oil Field
Glendale
Glendale Oil Field
Pasadena
Pasadena Oil Field
San Marino
San Marino Oil Field
South Pasadena
South Pasadena Oil Field
Alhambra
Alhambra Oil Field
San Gabriel
San Gabriel Oil Field
Monterey Park
Monterey Park Oil Field
Montebello
Montebello Oil Field
Whittier
Whittier Oil Field
Fullerton
Fullerton Oil Field
Brea
Brea Oil Field
Yorba Linda
Yorba Linda Oil Field
Placentia
Placentia Oil Field
Anaheim
Anaheim Oil Field
Orange
Orange Oil Field
Santa Ana
Santa Ana Oil Field
Tustin
Tustin Oil Field
Irvine
Irvine Oil Field
Laguna Beach
Laguna Beach Oil Field
Dana Point
Dana Point Oil Field
San Clemente
San Clemente Oil Field
Capistrano
Capistrano Oil Field
Mission Viejo
Mission Viejo Oil Field
Rancho Santa Margarita
Rancho Santa Margarita Oil Field
Trabuco Canyon
Trabuco Canyon Oil Field
Lake Elsinore
Lake Elsinore Oil Field
Elsinore
Elsinore Oil Field
Temescal Canyon
Temescal Canyon Oil Field
Corona
Corona Oil Field
Norco
Norco Oil Field
Chino
Chino Oil Field
Ontario
Ontario Oil Field
Upland
Upland Oil Field
Claremont
Claremont Oil Field
Pomona
Pomona Oil Field
Walnut
Walnut Oil Field
Diamond Bar
Diamond Bar Oil Field
La Habra
La Habra Oil Field
Whittier
Whittier Oil Field
Downey
Downey Oil Field
Norwalk
Norwalk Oil Field
Bellflower
Bellflower Oil Field
Lakewood
Lakewood Oil Field
Long Beach
Long Beach Oil Field
Compton
Compton Oil Field
Inglewood
Inglewood Oil Field
Culver City
Culver City Oil Field
Beverly Hills
Beverly Hills Oil Field
Hollywood
Hollywood Oil Field
Burbank
Burbank Oil Field
Glendale
Glendale Oil Field
Pasadena
Pasadena Oil Field
San Fernando
San Fernando Oil Field
Van Nuys
Van Nuys Oil Field
Chatsworth
Chatsworth Oil Field
Simi
Simi Oil Field
Thousand Oaks
Thousand Oaks Oil Field
Camarillo
Camarillo Oil Field
Oxnard
Oxnard Oil Field
Ventura
Ventura Oil Field
Santa Paula
Santa Paula Oil Field
Fillmore
Fillmore Oil Field
Piru
Piru Oil Field
Santa Clarita
Santa Clarita Oil Field
Saugus
Saugus Oil Field
Newhall
Newhall Oil Field
Castaic
Castaic Oil Field
Lancaster
Lancaster Oil Field
Palmdale
Palmdale Oil Field
Gorman
Gorman Oil Field
Frazier Park
Frazier Park Oil Field
Pine Mountain
Pine Mountain Oil Field
Ojai
Ojai Oil Field
Santa Barbara
Santa Barbara Oil Field
Lompoc
Lompoc Oil Field
Santa Maria
Santa Maria Oil Field
Guadalupe
Guadalupe Oil Field
Arroyo Grande
Arroyo Grande Oil Field
Pismo Beach
Pismo Beach Oil Field
Grover City
Grover City Oil Field
Oceano
Oceano Oil Field
Nipomo
Nipomo Oil Field
Los Alamos
Los Alamos Oil Field
Solvang
Solvang Oil Field
Buellton
Buellton Oil Field
Santa Ynez
Santa Ynez Oil Field
Los Olivos
Los Olivos Oil Field
Ballard
Ballard Oil Field
Sisquoc
Sisquoc Oil Field
Garey
Garey Oil Field
Orcutt
Orcutt Oil Field
Casmalia
Casmalia Oil Field
Maricopa
Maricopa Oil Field
Taft
Taft Oil Field
Wasco
Wasco Oil Field
Shafter
Shafter Oil Field
Delano
Delano Oil Field
McFarland
McFarland Oil Field
Wasco
Wasco Oil Field
Arvin
Arvin Oil Field
Lamont
Lamont Oil Field
Weedpatch
Weedpatch Oil Field
Edison
Edison Oil Field
Bakersfield
Bakersfield Oil Field
Oildale
Oildale Oil Field
Rosedale
Rosedale Oil Field
Greenfield
Greenfield Oil Field
Kern River
Kern River Oil Field
Kern River Gas Field
Mount Poso
Mount Poso Oil Field
Poso Creek
Poso Creek Oil Field
Round Mountain
Round Mountain Oil Field
Buena Vista Hills
Buena Vista Hills Oil Field
Buena Vista Lake
Buena Vista Lake Oil Field
Elk Hills
Elk Hills Oil Field
Tupman
Tupman Oil Field
Midway-Sunset Oil Field
Midway-Sunset
Fellows
Fellows Oil Field
Maricopa Flat
Maricopa Flat Oil Field
Temblor Range
Temblor Range Oil Field

3) Another route connecting the Eldorado Mine and Indio went south from Indio to Mecca, ascended Box Canyon, turned north at Shaver Summit, reached Cottonwood Spring oasis by way of a canyon east of the present highway (Little Chilcoot Pass?), veered up through Pinto Basin to the Blue Bell Mine, and then turned west to the Eldorado.[3]

e) Fargo Canyon

At one time this was also a freight road used by miners.

f) Fan Hill Canyon

This route, via Keys View, was sometimes used by Johnny Lang between the Lost Horse Mine and Thousand Palms.

During the pre-monument freighting days, Pleasant Valley and Pinyon Well were important parts of the road system. Pleasant Valley, the main travel route in the area, was an important desert crossroads. From the Gold Coin Mine and mill site, roads went south to Indio via Berdoo Canyon, north to Banning or southeast to Cottonwood Spring. Pinyon Well was also a triple fork. One sketchy trail went northwest to the Lost Horse Mine, one northeast to Squaw Tank and Banning, and one west to Indio via Pushawalla Canyon.

2. Signing the Desert

Not until about 1906 did Riverside County become businesslike about erecting signposts pointing to wells and water holes. William Covington was directed to determine where the signboards should be placed, to compute the distances to mines, water holes, and towns to be marked on the signs, and to set up the posts. These were of thick piping, anchored to the ground to iron crosspieces. The signs were of perforated zinc.[4] Although this was a step in the right direction, not

---

3. Belden, "Lizard Hunter Uncovers Rich Hoard of Gold," Jan. 15, 1961.

4. James, Wonders of the Colorado Desert, II: 333-34.

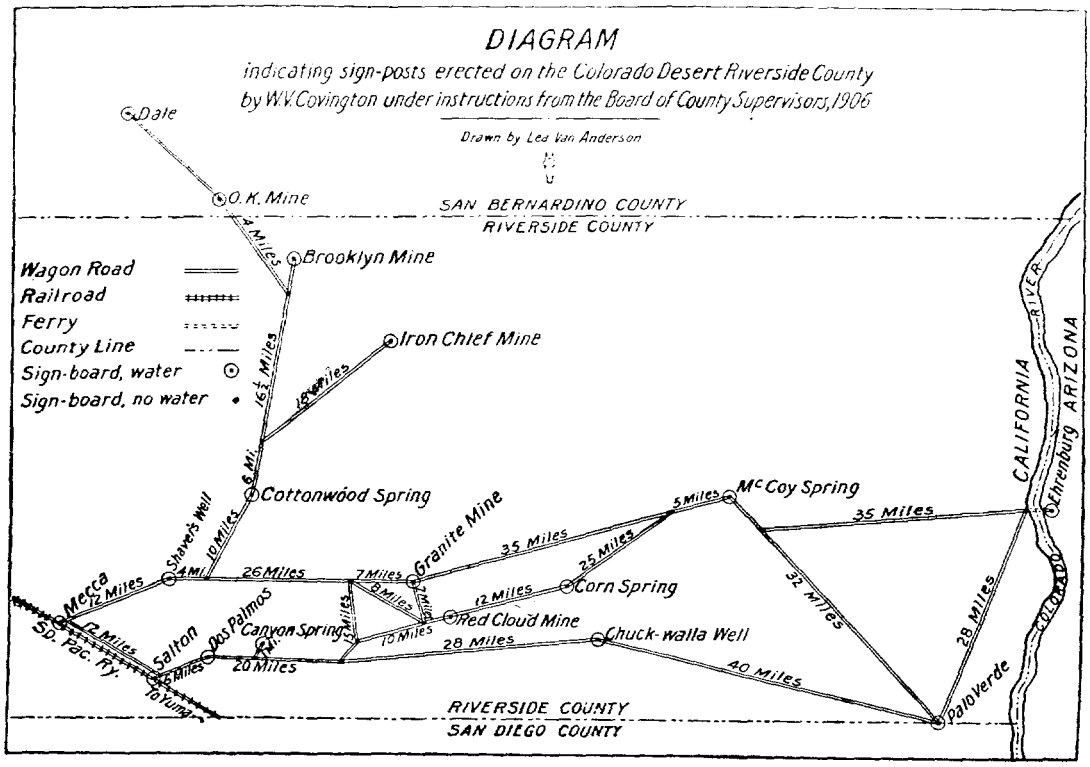


Illustration 140.

Sites in Joshua Tree National Monument and vicinity where signposts erected by W.V. Covington under orders of Riverside County Board of Supervisors, 1906. From James, Wonders of the Colorado Desert, II:330.

enough signs were erected. Those that were often became objects of vandalism, primarily being used as rifle targets. By 1912 the Automobile Club of Southern California, in conjunction with state authorities, began the work of making clearly defined pathways through those desert sections most likely to be traveled by motorists. This project consisted of placing adequate steel signs every five miles.

3. Condition of Roads

Despite this aid, traveling in the desert remained risky due primarily to inadequate "county" and "miner's" maps. The 1918 "Road Map of the State of California," for instance, showed only one route in the monument--the trail from Cottonwood Spring to Dale. Into the 1920s nearly all roads through the desert region were unimproved. Rather than being laid out along definite lines, they followed the course of least resistance, avoiding sandy spots and hills as much as possible. Generally they consisted of two wheel ruts with high centers, winding in every direction and connecting mines and homesteads with water holes and the outside world. Whenever an original set of tracks became too deep, a new pair was started around them. The only attractions off the main roads were mines or water sources. As mine camps were established and then abandoned, their access roads were made and then fell into disuse. Where wagons or cars could not go, pack animals were still used. Pioneer motorists had ingenious ways of improving their vehicles' traction and engine cooling abilities. An extra transmission and oversized tires could be of help in negotiating desert trails and treacherous sandy spots.

4. Banning-Twentynine Palms-Dale-Amboy Roads

By the early 1880s, when mining in the Twentynine Palms District was on the wane, a new field was being opened up farther east in what would later become the Dale District. Originally centered around placer claims, mining activity there soon turned to lodes in the surrounding mountain ranges. Because the mines there continued to be productive, miners settled in for a long stay and made plans to develop their operations. Such development depended on negotiable roads into the district and a steady supply schedule.

The first stage service in the area, in the late 1890s, operated from Twentynine Palms to Garnet. When there were no passengers, it hauled ore. Regular freight service from Banning to Dale through Twentynine Palms began in 1898 and continued until 1902.[5] The route from Twentynine Palms to Dale was long and tedious, interrupted occasionally by junctions with tracks leading off to nameless mines. It took about six hours by horseback to reach Old Virginia Dale, at the junction of three roads. One led forty miles northeast across the desert to Amboy on the Atchison, Topeka & Santa Fe Railway, one led east to the Dale pumping plant, and the other led southeast to New Dale, about six miles away.[6]

A Desert Map Miners' Guide dated 1905 shows a road leading across country from Banning to Warren's Well. From there to Twentynine Palms was another long journey over twenty miles of sandy road. Travel from Banning to the oasis required 2½ days for horses and a buckboard and at least 3 days for a freight wagon. The stage line between Banning and Dale stopped at Warren's Ranch and Well and at the Old Adobe at Twentynine Palms. This line was discontinued around 1912 and from then until 1916 a stage ran from Amboy to Dale, which was an easier trip for the teams. The fare was five dollars. The usual charge for freight to the Dale District was twenty dollars per ton.[7] During the era of mining activity in the section bordering the monument on the north, traffic from farther west came via the county road from Victorville, through Old Woman Springs, Mean's Well, Surprise Spring, Twentynine Palms, to Dale. Three roads led north from the Twentynine Palms area. One went from the oasis to Deadman Lake (now within the Marine Corps Base), Morgan's Well, the Bagdad Chase mines, and Ludlow. Another route, the Bagdad Road, headed north a few miles east of the

---

5. Parker, One Hundred Years, p. 47.

6. O'Neal, Peculiar Piece of Desert, p. 58.

7. Ibid., p. 60.

oasis and crossed the Bullion Mountains to Bagdad. East of this was the Amboy Road that took off from Old Dale. Other traffic came from the east via Clark's Pass on to Twentynine Palms.

In 1937 John Hastie started an auto stage line to Banning, hauling supplies and passengers from Dale to points west. The Twentynine Palms surfaced highway was opened that same year.

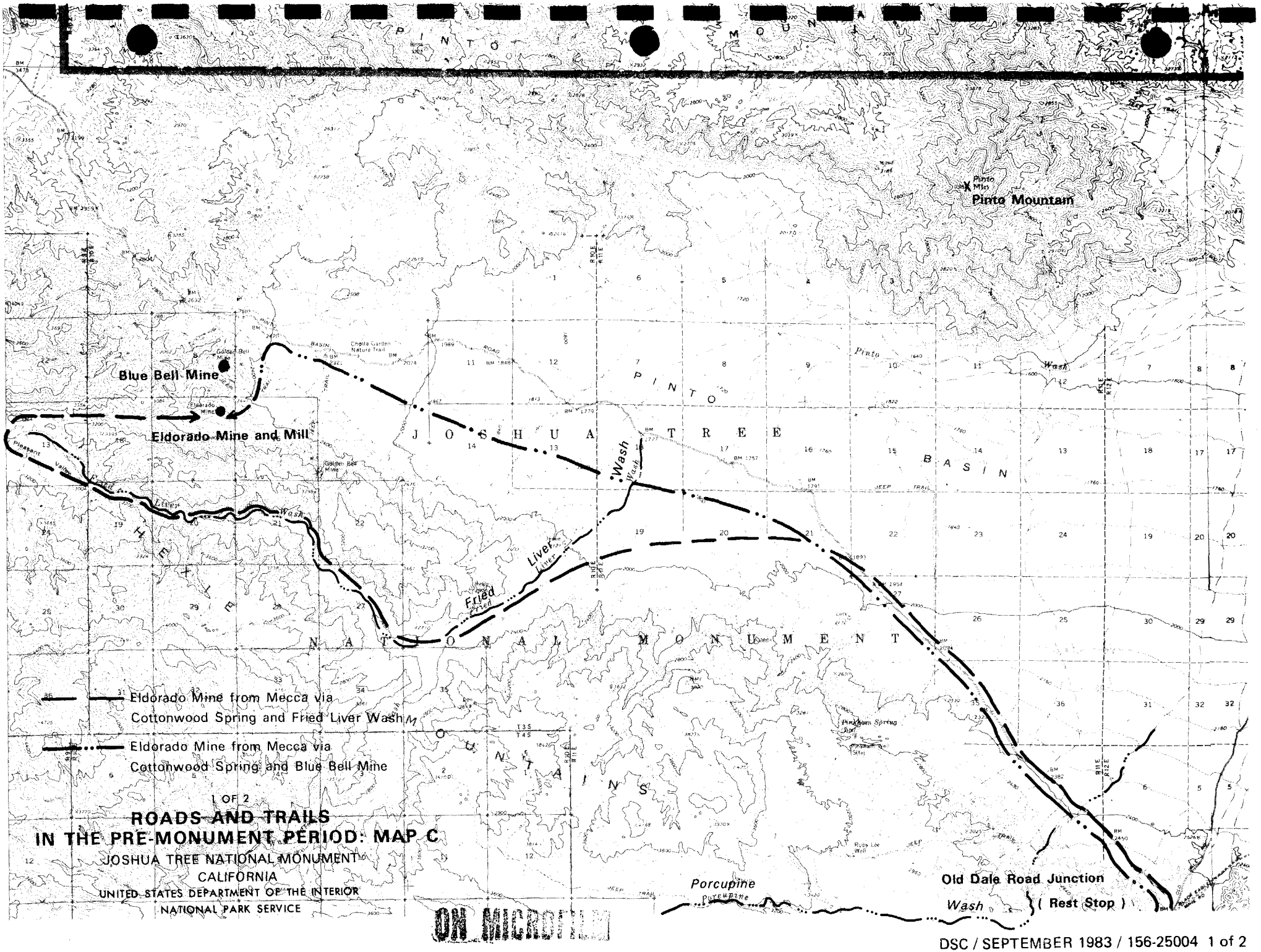
5. Banning to Quail Spring, Keys Ranch, Pinyon Well, and the Eldorado Mine

This road branched from the Banning-Dale route 43 miles east of Banning and 4.7 miles east of Warren's Well. At this junction a road turned south toward Quail Spring. The following excerpts from the 1918 Geological Survey road log describe this route and the various branch roads leading off of it. By following these logs on Illus. 141 and on the relevant USGS quadrangle maps, one can locate various old roads that no longer exist.

> 43.0 miles from Banning (4.7 miles east of Warren Well). Road forks. . . . Take the right-hand road to Quail Spring.
>
> 50.5 Geological Survey sign. Branch road goes south (right) to Quail Spring. Good water in a reservoir 0.1 mile away. For Keys ranch and Eldorado mine turn east (left) over main road.
>
> 51.5 A plain but little-used road leads south (right) to a cabin about 2 miles away. Continue east.
>
> 53.3 Geological Survey sign. A plain road leads to the right, going to Lost Horse Well and Lost Horse mine. Continue east (left).
>
> 55.7 A plain road branches to the left, going to Keys ranch, half a mile away. There is another branch a little farther on. Continue to the right.

Illustration 141.

Relief Map of Part of Mohave Desert Region, California, Showing Desert Watering Places (Sheet III). Plate XI from USGS Water-Supply Paper 490-B.



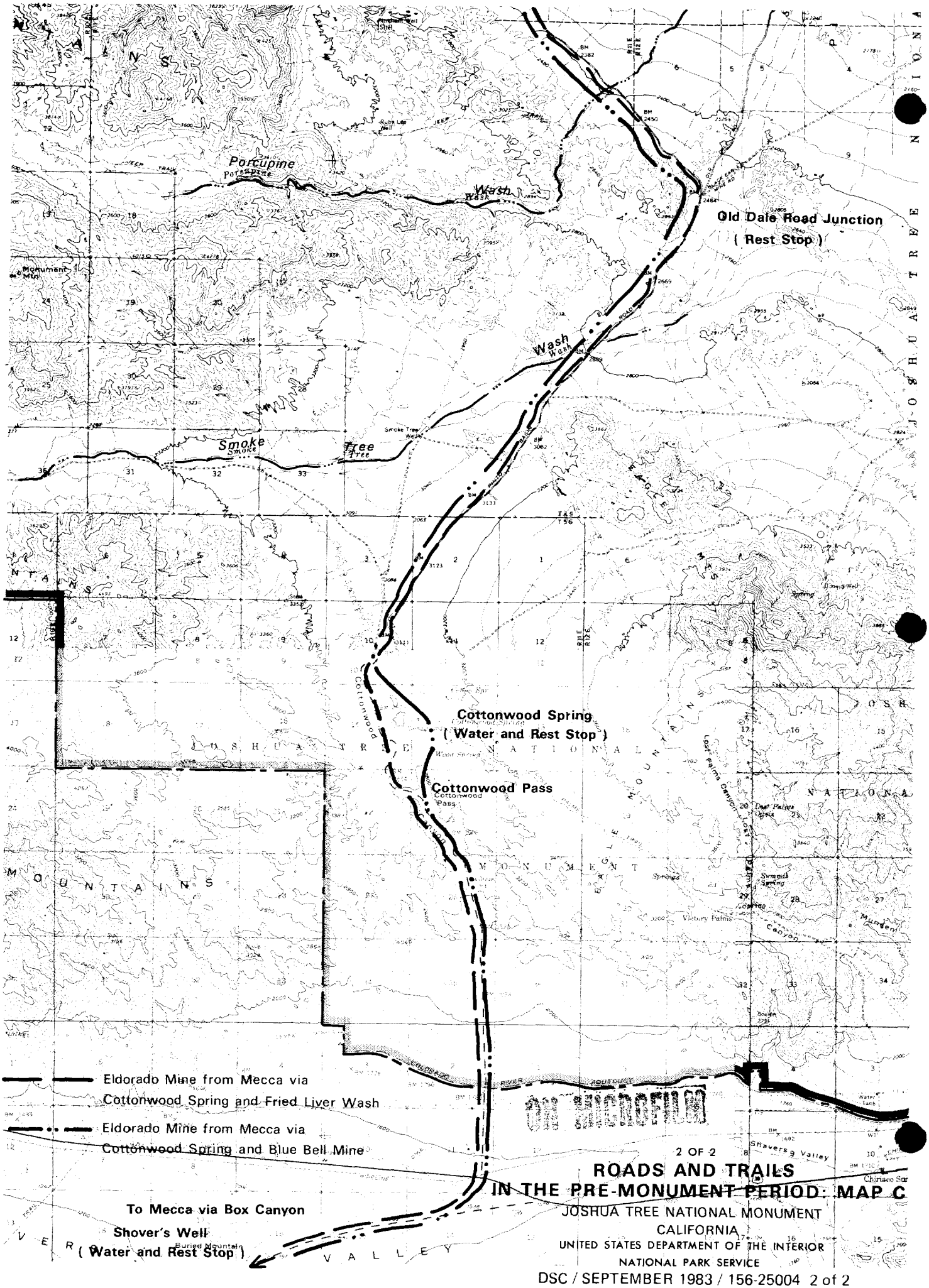
1 OF 2

ROADS AND TRAILS IN THE PRE-MONUMENT PERIOD: MAP C

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ON MICROFILM

DSC / SEPTEMBER 1983 / 156-25004 1 of 2



2 OF 2

ROADS AND TRAILS IN THE PRE-MONUMENT PERIOD: MAP C

JOSHUA TREE NATIONAL MONUMENT

CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

DSC / SEPTEMBER 1983 / 156-25004 2 of 2

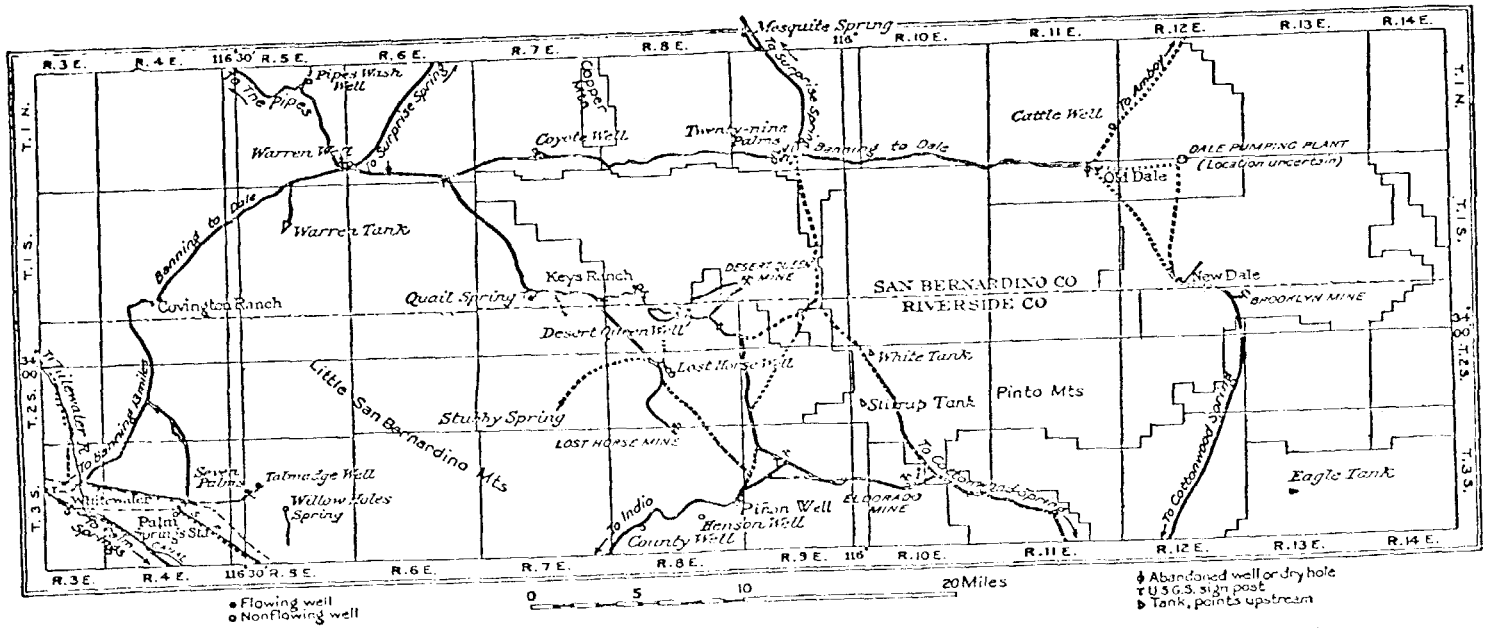


FIGURE 12.—Sketch map showing roads in vicinity of Dale, Twenty-nine Palms, and Pinyon (Piñon) Well, Calif.

Illustration 142.

Map of roads in the vicinity of Dale, Twentynine Palms, and Pinyon Well. From USGS Water-Supply Paper 497, p. 188.

55.9 Geological Survey sign. A branch road goes north to Keys ranch. . . .

56.0 Road forks. . . . Take the southeast (right) branch. . . .

57.0 A dim road goes south to Lost Horse Well. . . . Continue on plain road to left.

58.2 Branch road noted at 56.0 enters from the west. At nearly the same place a branch turns northeast (left) to a windmill which can be seen about half a mile away. This is the Desert Queen Well. . . .

60.0 A branch road leads east to the Desert Queen mine, 2 miles away. Turn to the right and go southeast. The road is not much used and is rather sandy at places in the next few miles.

61.8 County sign. A branch road leads east to Twenty-nine Palms. Go southeast (right).

63.2 County sign. A branch road leads east (left) to Cottonwood Spring. Continue south (right).

65.7 County sign. A branch road coming from Twenty-nine Palms enters on the left. Continue south.

67.5 The main road swings east (left) into a little basin called Pleasant Valley. A very faint trail may be seen leading south. It is a short cut to Pinyon Well and is probably passable. . . . Continue east, as there is a good road not far away.

68.7 Point is on a small playa in the center of Pleasant Valley. . . . Abandoned buildings of the Gold Coin mine are conspicuous 0.1 mile east. The road continues east to the Eldorado Mine. . . . To reach Pinyon Well turn southeast (right). . . .

69.9 Going southwest on road to Pinyon Well. A branch road enters from the east, coming from the Eldorado mine. Continue southwest.

71.0 The road enters a canyon in the Little San Bernardino Mountains.

71.7 Pinyon Well. Two tumble-down cabins and the wreck of a stamp mill identify the spot.

Road to the Eldorado mine

68.7 Geological Survey sign on playa in Pleasant Valley, near Gold Coin mine. From this point . . . continue east to reach Eldorado mine.

68.8 Pass by buildings of Gold Coin mine, which was abandoned in 1918.

70.3 A plain road enters from the west (right), coming from Pinyon Well. Continue east, down a sandy wash.

71.2 Road forks. A plain road leads to the left over a hill. It is a small cut-off but is rocky and little traveled. Continue to the right, down the wash.

71.8 Pass an abandoned cabin [Hersey Mine?] and mine building and turn north (left), out of the wash. [or connected to Hexie mill?]

72.1 The branch road noted at 71.2 enters from the west. Road turns abruptly east. About 20 feet north of the road at this turn there is a faucet in a pipe line which is buried near the road. The pipe line leads water from Pinyon Well to the Eldorado mine. . . . Continue east over a hilly country, later going down a small canyon leading east.

74.8 Eldorado mine. House and mine buildings are conspicuous in canyon. . . . A road goes east to Cottonwood Spring and another goes north to Twenty-nine Palms.[8]

6. Mecca to Cottonwood Spring, Iron Chief Mine, Dale, Eldorado Mine, Pinyon Well, and Indio

As early as 1870 Cottonwood oasis and its good water supply was a focal point of the region. During the late 1800s and early 1900s Cottonwood Spring was a refreshing stop for freighters, miners, and other travelers on their way from the railhead at Mecca in the Coachella Valley to the Dale Mining District. The road, starting in Mecca, ran northeast to Shaver's Well, then along the west flank of the Eagle Mountains and the east side of Pinto Mountain to Dale. The first twelve miles was over the same route as the Mecca-Blythe road and was well traveled; beyond that the road was used chiefly by miners. It was a fair wagon road that was satisfactory for autos except for portions that might become impassable because of sand or washouts.

Selected portions of the 1918 log of the Geological Survey describe the route:

0.0 Mecca. Start east.

6.0 Enter Shaver Canyon [Box Canyon]. . . .

12.1 Shaver Well, on north side of road. . . . Continue northeast, up canyon. . . .

12.6 Road forks. Right-hand road goes to Blythe. Take left-hand road for Cottonwood Springs and Dale. For several miles it leads up a rather sandy wash.

---

8. USGS Water-Supply Paper 497, 1923, pp. 190-92.

20.4 The road enters a canyon at the edge of the mountains, crossing the very sandy canyon bed at this point.

20.8 County sign. The road turns north up the east side of the canyon avoiding the deep sand in its middle.

22.0 The road takes the center of the very sandy canyon bed. Autos may have difficulty here. Continue up the canyon between low granite walls. At one place the road goes over a short steep cut in rock at the side of the canyon [Little Chilcoot Pass?--Moorten related in 1969 that the road around the rockfall in Cottonwood Wash was kept in shape by area people so that they would not have to take the long way (presumably up Cottonwood Canyon) to the spring.]

23.5 Branch road leads east (right) to Cottonwood Spring. . . . Near spring is a house. . . . Road to Dale continues up the canyon until it emerges from the mountains upon a rolling upland.

25.0 County sign. A dim branch road leads northwest (left) to Pinkham Well. Take right-hand road for Dale.

31.3 Branch road turns west (left) to Twenty-nine Palms, Pinyon Well, etc. About 100 feet farther north another branch road turns east (right) to the Iron Chief mine. . . . Use the center road to reach Dale.

> The road from this point to Dale . . . is known to pass first over a long, broad desert basin. About 15 miles from this fork it reaches the Brooklyn mine. . . . From the Brooklyn mine the road goes northwest through the mountains to New Dale. . . . From New Dale a road leads northwest across a sandy desert basin to Old Dale, 6 miles farther. It is probable that a road also leads north from New Dale to a pumping plant 6 miles away. . . . A road leads northeast [from Old Dale] to Amboy. . . . A road leads west from Old Dale into Banning. . . .

IRON CHIEF MINE.

At 31.3 miles from Mecca a branch road goes east (right) to the Iron Chief mine. . . . This road is reported to be passable by automobile. . . .

ROAD WEST FROM COTTONWOOD SPRING.

At 1½ miles north of Cottonwood Spring (25.0) a branch road marked by an old Riverside County sign goes west (left) to various portions of the Cottonwood Mountains [and Pinkham Well] and is reported to end somewhere about 10 miles west. . . . It serves prospectors in the region west of Cottonwood Spring. . . .

COTTONWOOD SPRING TO ELDORADO MINE AND PINYON WELL (31 MILES).

0.0 Cottonwood Spring. Go north, up a sandy canyon, emerging in an upland region.

7.7 A county sign marks a road fork turning to the left, and another marks one leading to the right about 100 feet away. Turn left on a dim road at the first sign. The road straight ahead leads to Dale, and the right-hand road goes to the Iron Chief mine.

17.7 A dim trail comes in from the east. In January, 1918, it was marked by a small board sign that pointed along it to the Brooklyn mine and Dale. . . . The road to Eldorado leads nearly west, across a rather sandy basin.

20.2 Road fork. The right-hand branch leads northwest to Twenty-nine Palms and does not pass the Eldorado mine. . . . could probably be used as a cut-off to Twenty-nine Palms. It intersects the road from Eldorado to White Tanks and Twenty-nine Palms, about a mile away. . . . Take left-hand road for Eldorado mine.

21.3 A road leads north, around the mountain, to White Tanks and Twenty-nine Palms. For Eldorado mine continue west, entering a canyon.

21.8 Eldorado mine. House and other buildings in canyon. . . . To reach Pinyon Well continue west. The road leads up a small narrow canyon and crosses a low divide.

24.8 The road turns west, up a wash, around an abandoned cabin and mill [Hexie?].

25.4 The branch road noted at 24.1 enters from the east. Continue west, up the wash.

26.3 Road fork. The right-hand road is the best route to Banning. One may also follow it to the Geological Survey sign at the Gold Coin mine 1.6 miles from this fork, and there turn southwest to Pinyon Well.

28.8 Road from Gold Coin mine enters from northeast. Continue southwest.

29.9 Enter canyon in Little San Bernardino Mountains. . . . Continue up the canyon, which is sandy at places.

30.6 Pinyon Well.

PINYON WELL TO INDIO (21.7 MILES).

NOTE.--The road from Indio to Pinyon Well was originally made to connect Indio with mining properties in the vicinity of Pinyon Well and Pleasant Valley, but in 1918 it was almost unused for any purpose. It is practically impossible for automobiles to travel from Indio to Pinyon Well on account of sandy grades and very steep hills; but they can safely go from Pinyon Well into Indio, as the road is nearly all downhill.

0.0 Pinyon Well. Start southwest, up a sandy canyon.

1.3 A large tributary ravine enters the main canyon, which swings west at this point, and a dim trail leads over the hill between the two canyons to Henson Well, about three-fourths mile south. Continue west, up the main canyon.

1.7 Summit of the pass over the Little San Bernardino Mountains. Continue west, down a very steep hill along a deep canyon with sandy bed.

6.8 County well, on south (left) side of road. . . . Continue down the canyon.

10.5 The road emerges from the canyon upon a rocky slope and turns southeast, down a sandy wash, passing between the base of the Little San Bernardino Mountains on the east and an isolated mountain ridge on the west.

17.9 The road turns suddenly southwest, ascending a very sandy slope, passing through a gap in the clay hills . . . and emerging upon Coachella Valley in sight of Indio.

19.1 The road branches at about this point, and a fork leads to the right, directly toward Indio. Use the road to the left (south), which is probably better.

ELDORADO MINE TO TWENTY-NINE PALMS BY WAY OF WHITE TANK.

0.0 Eldorado mine. Go east, down the canyon.

0.5 Road fork. Right-hand road leads east to Cottonwood Spring. Turn left, crossing about 3 miles of very rocky alluvial slope.

2.0 A branch road enters from the south, coming from Cottonwood Spring. Continue north, up a wide pass between the Hexie and Pinto mountains.

4.0 A dim branch road leads west (left) toward Keys ranch. Continue northwest, up the main pass. . . .

7.5 The road here has reached a high upland plain. . . . About half a mile east is White Tank. . . . Continue north for Twenty-nine Palms. . . . About 4 or 5 miles beyond the vicinity of White Tank [the road] joins a road from the west that comes from Quail Spring and Keys ranch.[9]

Another interesting road at Cottonwood Spring is the "Little Chilcoot Pass" trail, visible by hiking down the wash from Cottonwood Spring toward Moorten mill. To circumvent a dry waterfall in the wash, a bypass road was built up out of the wash on the west. James states that it was built by a local politician with county money and was a grade over which only wagons with strong teams or light buggies could pass because of its steepness and ruggedness. Moorten, on the other hand, said that the road around the dry rock fall, "the one with all the rock work," was one of the original Iron Chief Mine roads into Cottonwood.[10]

7. Roads from Gold Park Mining District

This mining center's greatest period of activity was between 1905 and about 1915; during this time several routes of travel radiated from the camp:

---

9. Ibid., pp. 184-87.

10. Wonders of the Colorado Desert, II:430; Moorten interview, Oct. 28, 1969, p. 7.

a) Gold Park-New Dale

Soon after serious mining activity started at Gold Park, probably about 1906, miners hewed a trail east from the Paymaster Mine five miles to the Groover Mine in the Dale District. This route, following along the crests and through the canyons of the Pinto Mountains, is not shown on modern maps. Remains of it are probably almost nonexistent.

b) Gold Park-Twentynine Palms

From Gold Park a road went north to the oasis. Another trail to the oasis led north from White Tank, thereby avoiding the steep climb to Gold Park in the Pinto Range. By the time the Gold Park mines became inactive, the White Tank-Twentynine Palms road was the main one from the south.

c) Gold Park-Pleasant Valley

Another trail went southwest from Gold Park to White Tank. It then headed south toward the El Dorado Mine. Near the Blue Bell Mine the trail forked, one branch heading south to Cottonwood Spring, the other veering west to the El Dorado and Gold Coin mines and Pinyon Well.

VII. Establishment of Joshua Tree National Monument

A. Need Seen for Preservation of Desert Areas

1. Twentynine Palms Area Attracts Visitors

The desert around Twentynine Palms remained relatively untouched until the 1920s. Because of its lack of good roads, inaccessibility, and isolation, it had few visitors. The real estate boom in the area beginning in the 1920s, however, and provocative motorlogues appearing in Los Angeles newspapers, began to direct attention toward the area. Health resorts and communities began springing up in the desert, which became popular for weekend stays out of Los Angeles. As exotic desert plants for cactus gardens became the rage, dealers came to the desert and hauled truckoads of native plants back to the city where they were used for landscaping Mission-style homes. Because of this practice, the Devils Garden west of Desert Hot Springs was stripped of cacti, yuccas, and ocotillos, and other areas north and east were threatened. This growing practice was abhorred by conservationists who became intent on convincing people that the American desert was not a vast wasteland to be exploited, but an important part of our national heritage.

2. Minerva Hamilton Hoyt Organizes the International Deserts Conservation League

Joshua Tree National Monument probably owes its existence primarily to one South Pasadena conservationist, Mrs. Albert Sherman Hoyt. Mrs. Hoyt was born on a cotton plantation in Mississippi in 1866 amidst wealth and prestigious social surroundings. Educated in fine schools, she eventually married a wealthy New York surgeon and moved to California in the late 1890s. In addition to organizing many civic and cultural activities in Pasadena, Mrs. Hoyt gained a growing admiration for the desert and began studying its flora and fauna. Following the death of an infant son, and later of her husband in 1918, she found solace and comfort in the desert's isolation. As the auto made the desert more accessible to people and as signing of roads and better maps made desert travel safer, more and more people ventured into it. Mrs. Hoyt became dismayed to see some of these individuals carting off cacti for their rock gardens.

To publicize the dangers of indiscriminate collecting of desert plants, Mrs. Hoyt designed a desert conservation exhibit at the Garden Club of America's flower show in New York City in 1927. Her southwestern desert habitat group, with special lighting, live native cacti, backdrops, and stuffed birds and animals, created a sensation. Mrs. Hoyt followed this up with similar exhibits elsewhere, culminating in a show in England in 1929, that acquainted the public with the desert and stimulated interest in preserving desert landscapes.

In March 1930 the International Deserts Conservation League was organized with Mrs. Hoyt as president to attract further attention to the dangers of despoliation of the desert and champion protection of its beauty spots. The group was immediately supported by women's groups, civic organizations, and the scientific community.

Mrs. Hoyt particularly liked Joshua trees, which she felt symbolized the beauty, uniqueness, permanence, and vulnerability of the desert. The Mormons gave this giant yucca its name, seeing in its extended branches a symbol pointing them to the promised land they were seeking. Unfortunately the wood of the Joshua tree was coveted for surgical splints, because it was not as likely to split as woods with definite grains, and also for making strips to protect fruit trees from rabbits and rodents. In desert areas where wood was scarce and fuel difficult to obtain, local residents hauled away the Joshua trees and pinyon pine for fuel. The need for protection was real and it was thought important to set aside stands of these trees for protection.

3. A Desert Park is Proposed

Sometime during the 1920s Minerva Hoyt began expressing the need for an extensive federal desert park in southern California. She suggested an area of over one million acres stretching from the Colorado Desert to the Mojave. This encompassed an area east of Palm Springs from the Salton Sea north to Twentynine Palms. When Mrs. Hoyt proposed this park to the Director of the National Park Service, Horace Albright, stressing the scenic beauties, distinctive flora and fauna, and unusual geological formations, there were two other projects involving

proposed desert areas that were in the mill, prohibiting Albright's active participation in yet another project.

All three of those areas proposed for park status were difficult situations due to the disorderly state of their land titles. Death Valley had mining interests, the proposed saguaro cactus area near Tucson was almost completely held by the University of Arizona, and in the future Joshua Tree National Monument a Southern Pacific Railroad land grant extended over the portion containing the best trees. Elsewhere in a checkerboard pattern over this last proposed area were federal lands interspersed with homestead and mining claims. Complicating the situation was a deteriorating relationship between President Herbert C. Hoover and Congress. Hoover's secretary of the interior, Ray L. Wilbur, had proposed in 1929 that remaining public lands be returned to the states. Congress opposed this, but refused to pass legislation allowing federal purchase of private lands or the exchange of federal lands for those within proposed park boundaries.

The prospects for a southern California desert park improved with Franklin D. Roosevelt's election in 1932. Under his New Deal, conservation programs and especially the National Park Service would prosper. Harold L. Ickes, the new secretary of the interior, welcomed new park proposals as a means of expanding park and recreational resources. Ickes proposed to reserve areas first and work out land ownership problems later. Hoover's establishment of Death Valley and Saguaro as national monuments brightened prospects. Before Roosevelt took office in March 1933, a group of real estate men anxious to promote the Twentynine Palms area as a tourist attraction, persuaded Assemblyman John P. Phillips of Riverside County to introduce a bill in the California assembly for establishment of a "California Desert Park" including many of the scenic attractions Mrs. Hoyt wanted in the federal park.

Hoyt persuaded Governor James Rolph, Jr., of California to give her more time to push her cause and he cooperated by vetoing the state park bill. Roosevelt was interested in Hoyt's idea and Ickes said he would take the necessary steps for preliminary withdrawal from

entry of the public domain in question. This withdrawal, the first concrete realization of the park, took place by executive order on October 25, 1933. The area involved comprised 1,136,000 acres. It was withdrawn for consideration as a national monument, but advocates requested its establishment as a national park. On January 22, 1934, the Board of Supervisors of the county of Los Angeles adopted a resolution approving the proposed establishment of a national monument upon certain desert lands in Riverside and San Bernardino counties, saying that

> said public lands include areas of great beauty and support many unusual forms of plant life characteristic of the American desert which should be fostered and preserved for the use and benefit of the general public, and the establishment of a national monument upon the said lands would be of inestimable value, particularly to the great centers of population in the County of Los Angeles, in that the establishment thereof would permanently preserve the flora and fauna of the desert and make available for recreation and study a desert area unequaled close to great urban centers. . . .[1]

One of the principal reasons for the enthusiastic support many gave to the proposed monument area was its accessibility from Los Angeles. Trips to the desert were becoming increasingly popular in the 1930s, which added to the danger of injury from thoughtless and often destructive visitors.

Roger W. Toll, superintendent of Yellowstone National Park, inspected the area for the National Park Service in March 1934. In a report submitted afterwards he said that the Joshua tree did merit national protection as a representative desert plant. He felt that the area

---

1. General File, July 25, 1927, to Feb. 28, 1934, Central Classified Files, 1933-49, RG 79, NA.

was not suitable for a national park because it was not an outstanding desert habitat and that, although it was interesting and valuable for local and state use, the area lacked any

> distinctive, superlative, outstanding feature that would give it sufficient national importance to justify its establishment as a national park. It is believed that a part of the area would justify the establishment of a national monument, with the Joshua trees as its primary feature, and other sources of interest as secondary features. While the groves of Joshua trees are not the finest in the state, their surroundings are scenically interesting. The area is available to two million people of the Los Angeles district, and taken all together, it is as suitable for a Joshua tree national monument as any area I have seen.[2]

Toll recommended that the original withdrawal be reduced to 138,240 acres featuring the best stand of Joshua trees in Lost Horse Valley. In June 1934 he proposed this as "Joshua Tree National Monument," and it was approved by National Park Service Director Arno B. Cammerer. Hoyt violently opposed a reduction in boundaries and a month later Dr. Harold C. Bryant arrived for a second field inspection. The Park Service biological specialist, Bryant favored enlarging the proposed monument to include a wider variety of desert life zones. Impressed with the contrast between the Joshua tree forests of the high desert and the creosote flats of Pinto Basin, he recommended inclusion of the basin, which Toll had excluded from the proposed boundaries. Preventing further extension south to the Salton Sea was the Los Angeles Metropolitan Aqueduct leading from the Colorado River through Coachella Valley to Los Angeles. The final boundaries followed the lines Bryant recommended.

---

2. Roger W. Toll to Arno B. Cammerer, Dir., Office of National Parks, Buildings, and Reservations, Apr. 7, 1934, Central Files, 1907-49, RG 79, NA.

Mrs. Hoyt's friends suggested that the proposed reservation be called the "Minerva Hoyt National Park," but stopped pushing for this after being told that it would place unnecessary difficulties in the way of the project because it was an established policy of the Department of the Interior to refrain from naming national parks and monuments after individuals. It was thought more fitting to choose a name reflecting the area's natural features or early history. (At one point the name "Desert Plant National Monument" had been proposed.) The California legislature, however, did pass a joint resolution asking Congress to erect in the monument some form of memorial to Mrs. Hoyt in recognition of her tireless efforts to establish a national desert park.

Conner Sorensen, evaluating Mrs. Hoyt's tireless conservation efforts, concluded that

> viewed in retrospect, Mrs. Hoyt's crusade for desert preservation charts an important shift in American attitudes toward the desert. Her generation was the first to view the desert in positive terms, worthy of preservation, rather than as a barrier to be crossed or a wasteland to be reclaimed. When faced with the paradoxical implications of the automobile revolution which enhanced the desert's appeal but threatened its destruction, Mrs. Hoyt and others pressed for recognition of desert values by a means much in vogue in the 1920s and 1930s--the creation of a national park. The establishment of Joshua Tree National Monument signaled a new recognition, not only of the Joshua tree, but of the desert environment.
>
> The story of Joshua Tree National Monument highlights two important facets of conservation history: it demonstrates the activities of a representative type of environmental activist, and it illustrates the larger cause in which she became involved. For in her role as promoter, organizer, publicist, and philanthropist, this energetic, determined, and at times cranky

society matron both reflected and contributed to a heightened appreciation of America's desert heritage.[3]

B. The Monument Is Established

On August 10, 1936, President Roosevelt signed a proclamation establishing Joshua Tree National Monument. Approximately 825,340 acres of desert were officially set aside as a desert reserve. No administration was established on site until September 1940, when James E. Cole, the first superintendent, transferred from Yosemite National Park. Headquarters of the monument were established at Twentynine Palms.

The area included in the Joshua Tree National Monument withdrawal was situated in San Bernardino and Riverside counties, California. Its approximate boundaries were the San Bernardino baseline on the north, the right-of-way of the Metropolitan Water District Canal on the south, Morongo Creek on the west, and the Coxcomb Mountains on the east.

The monument was established by a presidential proclamation issued under the authority contained in the act of June 8, 1906, which provides for the preservation of "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States."

1. Geological Features

The Joshua Tree National Monument area is California desert country representative of both the Colorado and Mojave deserts, which merge within its boundaries. It is typical of that portion of the

---

3. Conner Sorensen, "Apostle of the Cacti: The Society Matron as Environmental Activist," Southern California Quarterly LVIII, n. 3 (Fall 1976): 423-24. Much of this background material was taken from this article, encompassing pages 407 to 424.

desert region of the southwest known as the Basin and Range Province. For this reason, it has great geological interest. The relief of the area is due to extensive block faulting by which large sections of the earth's crust have been broken, tilted, and raised. The area is notable as an example of basin and range physiography and as a type of relief formed by block faulting and subsequent extensive erosion under desert conditions. The resulting remarkable rock formations, deep canyons, and broad basins provide magnificent scenic beauty.

2. Flora and Fauna

The monument embraces a wide variety of biological environments, with both Great Basin and Sonoran life zones represented. Three ecosystems exist--in the two desert environments and the oases. The area is rich in a variety of plant species, some being rare and endangered. The monument was established primarily to preserve not only a typical Joshua tree forest, but also a wealth of other desert flora that seemed to occur in greater abundance in the monument than in other comparable desert ranges. In addition to the Joshua tree, the monument includes the California native fan palm, the pinyon pine, California juniper, manzanita, desert willow, scrub oak, smoke tree, cottonwood, palo verde, sagebrush, and mesquite. Other plants include the Mojave yucca, bladder-pods, catsclaw acacia, barrel cactus, several chollas, ocotillo, nolina, creosote bush, and many others.

Most of these plants are essential to desert wildlife, which use them as food or water sources, for cover, or as residences. Animal life includes migratory creatures such as the coyote, bobcat, kit and grey foxes, and birds. Various reptiles--a wide variety of snakes and lizards and the desert tortoise--are present. Smaller rodents include the desert chipmunk (antelope ground squirrel), the white-footed mouse, the pack rat, and the kangaroo rat. Larger animals such as jackrabbits, ringtail cats, badgers, bobcats, and mountain lions are also found. The two largest animals are the California mule deer and the desert bighorn, which are seldom seen but inhabit the remote mountain regions of the monument.

3. Points of Interest

This unspoiled desert area was seen to be rich not only in scientific and biological data, but in scenic and recreational values as well. Although no development specifically aimed at promoting tourism had occurred, several scenic spots already were luring people into the monument, which was divided naturally into two major units. Pinto Basin to the east, bordered by mountains, comprised about two-thirds of the area. In contrast to the higher western section, Pinto Basin seems most characteristic of the true desert. In the basin vegetation is sparse and the encircling mountains are practically devoid of vegetative cover. It is an area of extreme temperatures and little water. To the west, separated from Pinto Basin by the Hexie Mountains and an extension of the Pinto Range, lies a group of valleys about 2,000 feet higher in elevation. In these upper valleys are huge outcroppings and boulder piles of eroded granite. On the summit of one of the peaks of the Little San Bernardino Range, at 5,185 feet elevation, is an outstanding scenic auto viewpoint--Keys View (Inspiration Point, Salton View).[4] From the crest a spectacular view unfolds encompassing the Coachella Valley, the Salton Sea, and Mounts San Jacinto and San Gorgonio. On clear days it is possible to see Signal Mountain in Mexico, some ninety miles south.

---

4. A 1942 map of Riverside County published by the Automobile Club of Southern California referred to this spot in Section 7, T3S, R8E, as "Inspiration Point." It was earlier referred to as Keys View because the road to it was built by William F. Keys. Because Keys was still living at the time discussion of a formal NPS name for the site began, the use of his name in any official designation of the spot was precluded by established procedure. "Salton View" was the preferred alternative of the Park Service and was instituted in 1948. In an interview with Art Kidwell, Frank Kiler recalled working on this road with Keys and Jeff Peeden. Straight Joshua trees were dragged behind wagon wheels to produce a track. Small brush was pulled out of the way and rocks pitched aside to make the road. Kiler thought that Keys had built it as a way to make some money from tourists, because he set a locked cable across the road with a sign telling people the rate to go through and see the view after picking up a key at Keys Ranch. Kiler interview, Jan. 13, 1978. In 1974, several years after Keys's death, the point was renamed Keys View.

4. Prehistory and Archeological Sites

Early archeological work was conducted within the monument by Mr. and Mrs. William H. Campbell, who made their home at the Twentynine Palms oasis in 1925. They became interested in the history and artifactual remains of the former aboriginal inhabitants of the area through their friendship with Bill McHaney, who had a thorough knowledge of the country and of the customs, living habits, and migrations of its last Indian inhabitants. McHaney's statements aroused in the Campbells a deep interest in local archeology. Although the Campbells had little formal training in archeological or ethnological methodology, they were extremely enthusiastic and conducted their fieldwork under the auspices of the Southwest Museum in Los Angeles. Through their avid research and close observation, much information on the early inhabitants of the monument was revealed. Involved not only in research and preservation, they maintained a desert branch of the Southwest Museum at Twentynine Palms where they displayed a varied collection of Indian artifacts that had been assembled, cleaned, repaired, and properly catalogued. Through public awareness they hoped to teach local residents the importance of leaving remains undisturbed until they could be properly studied in place. The Campbells investigated numerous late aboriginal caves and campsites near Twentynine Palms and found arrow points, pottery, beads, metates, manos, petroglyphs, and pictographs left behind by the Serranos, Chemehuevis, and Paiutes who occupied the oasis area until about 1913. Their first monograph was An Archaeological Survey of the Twenty Nine Palms Region, authored by Elizabeth W. Crozer Campbell and published in 1931.

The Campbells then turned to the study of the Pinto Basin, which turned out to be a rich archeological site. There, in prehistoric times (Pleistocene Epoch), a moist climate existed and a small stream once flowed, ending in a lake about whose borders a primitive people lived four to five thousand years ago. There the Campbells discovered split prehistoric camel and horse bones and chipped artifacts. Later evidence has shown that prehistoric animals definitely were killed and eaten here. Fossilized bones of camels, horses, antelope, and ground sloths have been found imbedded in shore deposits. Pinto

Man, as the early inhabitant of this basin is called, represents one of the first "early man" areas located in California. He hunted with atlatls, and his distinctive crude flint arrow points, as well as other evidences of a simple culture (drills, knives, pestles, hammerstones, scrapers), are still found in the clays and gravels of the old lakeshore. After the last ice age, as rainfall lessened and the stream and lake dried up, these early inhabitants left. A second desert monograph, co-authored by Elizabeth and William H. Campbell and entitled The Pinto Basin Site: An ancient aboriginal camping ground in the California desert, was published by the Southwest Museum in 1935.

Following this pioneer work, the archeology of the monument was neglected until 1957. In that year the National Park Service engaged the Department of Anthropology of the University of Southern California, Riverside, to institute a research program and through field surveys to compile concise information regarding the archeological resources of the region and supply additional information on the lifestyle of the prehistoric peoples of Joshua Tree National Monument.[5] From 1957 to 1959 William Wallace supervised survey work in the Deep Tank-Squaw Tank area. Twenty-three campsites apparently belonging to the last phase of aboriginal occupation were found. Wallace also surveyed the Sheep Pass region. Two more surveys, in 1959 and 1961, produced sixteen sites. A reconnaissance survey of Indian Cove in October 1965 found four more, and another six were located during additional fieldwork in the area. In the spring of 1968 the Barker Dam region was examined and twenty sites discovered. Other areas, including the Keys Ranch and the Oasis of Mara, were surveyed in 1973. The only excavation that has taken place in the monument was carried out by Wallace at a rock shelter at Squaw Tank in 1958.[6]

---

5. William J. Wallace, "An Archaeological Reconnaissance in Joshua Tree National Monument," Journal of the West, v. III, n. 1 (January 1964): 90.

6. United States, Department of the Interior, National Park Service, Environmental Assessment, Natural Resources Management Plan, Joshua Tree National Monument, California (Denver: Denver Service Center, 1974), pp. 24-25.

Archeological remains within the monument represent two major periods of aboriginal occupation separated by a period of several thousand years. The oldest period is represented by Pinto Man. More recently, nomadic groups of Shoshonean and occasionally Paiute peoples occupied the monument area, living around water holes and springs until the land became settled by whites in the early 1900s. Serranos occupied much of the monument, including the higher west end. Chemehuevi territory lay in the mountains to the east. During the warm summer months these Indian groups migrated up to the pine forests of the San Bernardino Mountains to the west, returning to the desert for the colder months. Because mobility was essential to finding sufficient food and water, these early inhabitants did not build permanent structures, but utilized rock caves, overhangs, and other natural shelters as homes. They subsisted on local plants and seeds that they gathered, supplementing that diet with small game. Water was scarce, found in a few springs or natural rock basins or tanks. Most campsites were established at some distance from water sources so that game would not be frightened away. Although the Indians in this district had to work hard for a living, it was possible for them to live in relative comfort.

The types of archeological resources recorded in the monument include shallow middens, rock shelter and cave sites, and petroglyph and pictograph sites. The Indians that lived several hundred years ago in the middle and western portions of the monument left behind much visible evidence of their activities. Artifacts such as flints, pottery, beads, metates, and manos have been picked up. Petroglyphs have been found hammered into canyon walls and boulders along washes in the Hexie and Cottonwood mountains. Pictographs in red, black, and white have been found on the ceilings and walls of rock shelters. At some campsites there are deep mortar holes in small boulders or bedrock mortars in the main rock formation. Often campsites are marked only by pieces of wood or charcoal, broken metates and manos, a few scattered flint flakes and potsherds, or simply by smoked ceilings. Because it was inconvenient for migratory peoples to carry all their possessions with them, they often left heavy cooking pots and ollas near a campsite for their return, and these have been found in shelters where they were stored.

Portions of Indian trails may be found in a few places, visible on hillsides. Used chiefly as food/migration routes, linking water holes, they were marked by blazes or stones. Campsites have been found at Mystery Hole, Sneakeye Spring, Rattlesnake Canyon, Willow Hole, Barker Dam, Hidden Valley, Juniper Flats, Squaw Tank, White Tanks, Twentynine Palms oasis, Pinkham Spring, Conejo Well, Lost Indian Tank, Cottonwood Spring, Ivanpah Tank, and Mano Spring. Pictographs are located at Stirrup Tank, Hidden Valley, Hidden Valley Campground, and Barker Dam. Petroglyphs are found at Porcupine Wash, Smoke Tree Wash, Lost Indian Tank, and Stirrup Tank.[7]

In 1981 some archeological survey work was undertaken in connection with a road improvements project within the monument. Twelve historic sites were surveyed. Six of them related to activities predating the establishment of the monument and were associated with mining and refuse dumping. The other six sites related to modern littering and vandalism or to National Park Service construction and surveying activities.[8]

There are no archeological sites listed on the National Register of Historic Places for Joshua Tree National Monument. As archeological sites are identified and evaluated in the future, those that appear to meet the criteria of significance will be nominated to the National Register in accordance with Executive Order 11593, Section 2(a), and the National Historic Preservation Act of 1980. In the meantime, the Park Service is exercising caution in accordance with Section 2(b) to ensure that archeological resources are not destroyed or altered.

C. Problems with Landownership

The proclamation of August 10, 1936, established Joshua Tree National Monument "subject to existing rights and prior withdrawals." This meant that all valid private rights existing in lands within the

---

7. "Master Plan Development Outline, Joshua Tree National Monument," Apr. 3, 1957, FARC, Laguna Niguel, Ca., n.p.

8. Simpson, Road Improvements Project, p. 57.

monument on that day were recognized and preserved and that prior withdrawals of public land within the monument for purposes not in conflict with the new reservation were to remain effective until revoked.[9]

The most difficult and yet the most pressing problem facing the proper administration and development of the new monument was the private land situation. Until private land holdings were diminished or abolished, little could be done to develop the area. Improvement of roads or drilling of wells, which would be necessary before large numbers of people could comfortably visit the monument, would have the unfortunate effect of increasing the value of private lands, thus hindering and making more costly their eventual acquisition.[10] When the monument was established, there were approximately 295,000 acres of alienated land--more than in all the rest of the National Park Service put together, except Boulder Dam, said the first superintendent.[11] Studies of the land situation in 1937 showed that the Southern Pacific Railroad Company controlled 231,000 acres, the California State School Lands consisted of 43,000 acres, and the remainder was made up of homesteads and other patented lands. There were also an estimated 11,000 mineral locations, including mining claims of twenty acres each and mill sites of five acres.[12]

1. Railroad Lands

In 1862 an act of Congress gave the builders of the Union Pacific and the Central Pacific (parent of the Southern Pacific Railroad) alternate odd-numbered sections of land for ten miles on each

---

9. Oscar L. Chapman, Asst. Sec. of the Dept. of the Interior, to Mrs. William F. Keys, Dec. 16, 1944, Central Files, 1907-49, RG 79, NA.

10. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," p. 18.

11. James E. Cole, Supt., JTNM, Memo for Regional Director, Region Four, July 28, 1942, Roads 1938-43, RG 79, FARC, San Bruno, Ca., p. 2.

12. Superintendent's Annual Report, 1941, Central File, 1907-49, RG 79, NA, p. 3; A.W. Burney, Asst. Chief Engineer, NPS, Branch of Engineering, to The Director, NPS, July 16, 1937, Central Classified File, 1933-49, RG 79, NA.

side of the railroad line, plus a right-of-way 400 feet wide. (This accounts for the checkerboard pattern of landownership in many areas.) The Railroad Act of 1864 extended the grant to include lands for twenty miles on each side of the track. The government's purpose was to have the companies sell the land to settlers to help pay the cost of railroad construction. Although it was assumed that the sale of these lands at low prices on easy terms would bring in settlers rapidly, often it did not. Settlers were slow to buy and the railroads had to mortgage grant lands to remain solvent. Also, the land could not legally be sold until it had been surveyed, and this was a slow process, especially in the desert regions.[13] The railroads had originally been granted 190 million acres of public land, more than 500,000 of which were later included in several national parks and monuments. The Transportation Act of 1940 released about 350,000 acres. Much of the remaining 150,000 acres were in Joshua Tree National Monument.[14]

In February 1935 Minerva Hoyt had met with Park Service Director Cammerer, Dr. Harold Bryant, and Henry I. Harriman, president of the U.S. Chamber of Commerce, to discuss possible ways of gaining title to the Southern Pacific lands in the proposed monument. Harriman agreed to ask if the railroad would donate the parcels. The railroad replied that making a gift of the lands would be impossible, but that an exchange for federal lands might be arranged. This was attempted shortly after the monument was established, but by then the company professed disinterest. Further complicating the situation was the fact that the Taylor Grazing Act of 1934 had converted most public lands into grazing districts and so there were few opportunities for exchanging

---

13. Robert W. Durrenberger with Robert B. Johnson, California: Patterns on the Land, 5th ed. (Palo Alto, Ca.: Mayfield Publishing Co., 1976), p. 61; Beck and Haase, Historical Atlas of California, p. 67.

14. John Ise, Our National Park Policy: A Critical History (Baltimore: Johns Hopkins Press, [1961]), pp. 482-83.

large blocks of land. As a result, the status of the railroad lands remained in limbo for several years after the monument's establishment.[15]

By 1938 much of the railroad land in the Pinto Basin had been acquired by private individuals but not developed. In the upper portion of the monument where living conditions were better, some railroad land had been acquired by settlers, with limited development work done.[16] By 1941 Southern Pacific holdings had been reduced somewhat due to congressional action by which the company relinquished its rights on unselected lands. By 1952 a total of 53,110 acres of Southern Pacific lands in the monument had been acquired over the previous three years by exchanging public domain for the privately owned land.[17]

2. State School Lands

The General Land Office around the turn of the century set aside every section numbered 16 and 36 of every township in the state for schools. During the time she was negotiating with Southern Pacific officials, Mrs. Hoyt persuaded the California legislature to grant 22,000 acres of school lands within the proposed monument boundaries. The grant was unacceptable to the federal government, however, because the state reserved mineral rights on the ceded lands. The question of school lands eventually was settled by federal legislation authorizing an exchange of state land for federal lands in California.[18]

---

15. Sorensen, "Apostle of the Cacti," p. 421; Superintendent's Annual Report, 1941, Central File, 1907-49, RG 79, NA, p. 3.

16. Inspector P.T. Primm and Junior Park Naturalist James E. Cole, "Report on Joshua Tree National Monument," Dec. 27, 1938, pp. 3-4.

17. Superintendent's Annual Report, 1941, p. 3; "Monument Acquires More Private Land," Desert Trail, Mar. 27, 1952.

18. Sorensen, "Apostle of the Cacti," p. 423.

3. Homestead Lands

Willis Keys recalled that people started moving into the monument area when the Great Depression hit and the stock market fell in 1929. Desperate for some place to go where they could scratch out a living, many people came to the desert to homestead. Most of them soon found they could not succeed, even in the central part of the monument. Crops could not be grown in the sandy loam without irrigation or even by dry farming. Continued drought conditions eventually forced many settlers to give up and move on after they had ploughed the land, fenced, and often built small houses. When the monument was established, it contained eleven homesteads of 160 acres each, which were eventually bought by the government.[19] The deplorable condition of the roads at that time probably kept many people from acquiring property and building homes in the area. A special investigation of the monument during 1935-36, however, stated that several homesteaders had filed on lands in the monument, although they had neither established residences nor cultivated the land. The investigator pointed out that there was no way to make a living on a homestead except by raising stock and that required additional lands exceeding the limit of 640 acres. Most homestead entries were made, the investigator continued, for mineral development or for health reasons because the area was excellent for consumptives and asthmatics. Most of the homesteads were occupied by claimants only on weekends. Therefore, most entries could probably be cancelled because of noncompliance with residence requirements.[20]

By 1938 it was noted that private individuals had acquired railroad land in Pinto Basin and that in the western portion of the monument some government land had been homesteaded. Development work had been limited. Most settlers were dependent on government watering places, although a few wells had been dug that supplied enough water for domestic purposes. The holdings acquired by purchase and

---

19. Wm. R. Supernaugh, Supt., JTNM, to Tom Vale, Jan. 14, 1960, RG 79, FARC, Laguna Niguel, Ca.

20. F.O. Martin, Special Agent, Div. of Investig., to Dir. of Investig., Mar. 18, 1936, Central Files, 1907-49, RG 79, NA, p. 2.

patent were selected in the most desirable parts of the monument. None of the owners had performed enough development to make a livelihood from their holdings, and were probably hoping to benefit financially from the area's designation as a national monument.[21]

As development of an improved road system began in 1941, the superintendent feared that more people might try to acquire private property in the cooler scenic part of the monument. By the mid-1940s it was becoming more and more clear that no further development of the monument could be made until the privately owned lands were acquired. Planning, therefore, would be at a standstill for awhile. By that time great strides had been made in eliminating thousands of invalid mining claims, but little had been accomplished with regard to acquisition of bonafide private land titles. The longer that situation continued, the more monument resources--natural and historical--remained in danger of being destroyed. Needed reasonable development was being delayed. It was hoped that by constantly pointing out these facts, sufficient support would arise for a comprehensive land acquisition program.[22]

Acquisition of private landholdings in the monument was a frustrating project that extended over a long period of time. During World War II even budget requests for small amounts of money for critical land acquisitions were not granted. Helping the situation to some degree was the fact that the Southern Pacific Company made an effort to retain the greater part of its holdings until the federal government was in a position to negotiate for their purchase. Attempts of the government to obtain private lands were made by cancelling homestead entries for noncompliance with requirements, trading private lands in the monument for government lands outside, acquiring by exchange with the state

---

21. Primm and Cole, "Report on Joshua Tree National Monument," 1938, pp. 3-4.

22. Conrad L. Wirth, Chief of Lands, to John L. Duck, Mar. 15, 1945, Central Files, 1907-49, RG 79, NA.

tax-deeded lands that had been reimbursed to the state through condemnation proceedings, and finally, by outright purchase.

The status of landownership in the mid-1940s was as follows: of the monument's gross area of 838,559.85 acres, 655,961.33 were in United States ownership. In nonfederal status were the remaining 182,598.52 acres of which 135,515.30 were owned by the Southern Pacific Land Company; 25,637.92 were in other private holdings; and 21,445.30 acres were state school lands. A current threat to the monument was the reported proposal of a prospective purchaser to acquire from the railroad company some of its sizable holdings in Lost Horse Valley to subdivide into ranch estates and thereon to build a hotel, golf course, and swimming pool. This would, of course, have greatly diminished the public value of the most important part of the monument.[23]

In the mid-1950s there were about one thousand five-acre tracts in the Pinto Basin,[24] and by January 1960 the superintendent noted six or more landowners with title to one to five sections each, mostly in the west half of the monument. In all, about 20,000 acres still remained in private ownership at that time.[25]

4. Mineral Lands

At the time of the October 1933 executive order for withdrawal of land for the proposed Joshua Tree National Monument, mining was in progress in the region. It was reported that seven mines within the boundaries were producing and numerous prospects were being worked. Opposition began to mount quickly against monument status for the area if it meant this activity would have to stop. It was

---

23. Newton B. Drury, Director, NPS, to the Hon. Will Whittington, House of Representatives, July 9, 1945, Central Files, 1907-49, RG 79, NA, p. 2.

24. Jim Saulsbury, "The Battle of Joshua Tree: Mining Vs. Recreation," Daily Sun (San Bernardino, Ca.), Oct. 14, 1954.

25. Supernaugh to Vale, Jan. 14, 1960.

suggested that if the area were designated a national park, the right to file mining claims not be withdrawn. As the city engineer of San Bernardino argued, "this is an area richly mineralized and in which much prospecting and development work is being done at the present time, and to withdraw this land from mineral entry will work an injustice to the mining industry as well as to the two interested counties, San Bernardino and Riverside."[26]

The presidential proclamation of August 10, 1936, establishing the monument reserved the lands therein described from all forms of appropriation under the public land laws, including mineral lands and deposits, subject to valid existing rights. No new mining claim locations could be made after that date nor could claims covering the extension of orebodies then being worked in existing claims. Any valid claims made prior to that day were not affected by establishment of the monument. The new area included the principal mineral sections of Riverside County. The Twentynine Palms and Virginia Dale mining districts were very active and several properties were being developed. The Gold Crown Mining Company on the San Bernardino-Riverside county line had a fifty-ton cyanide plant operating at capacity. There was also considerable activity and prospecting in the Piñon and Eagle Mountain districts. A custom plant was operating in the Cottonwood Mountains treating ore from several small properties in the area.[27]

Records of the U.S. Bureau of Mines showed that in 1936 there were seven mines operating in T3S, R10E, and adjacent townships.

---

26. Gordon Stewart, U.S. Mineral Surveyor, City Engineer of San Bernardino, Ca., to Department of the Interior, Feb. 20, 1934, Central Classified Files, 1933-49, RG 79, NA.

27. State of California, Department of Natural Resources, Division of Mines, California Journal of Mines and Geology, Quarterly Chapter of State Mineralogist's Report XXXII 32, no.1 (January 1936): 382.

Fifteen hundred tons of gold ore were milled, netting approximately $22,000 (in 1937 production dropped to 1,400 tons netting $10,090).[28]

The unrest in the mining community left uncertain the question of final boundaries for the monument. Because it was not known whether mining was economically important, it was recommended that no action be taken to change the situation during the next few months until concrete facts could be secured. In December 1936 the superintendent of Yosemite National Park requested the Division of Investigations of the General Land Office in San Francisco to investigate mining locations and unauthorized grazing within the monument boundaries. During March 1937 an investigation of the monument was made, and among the topics addressed were minerals and ore deposits.

The investigator noted first that ores of economic importance occurred over the major portion of the monument. At the time of his field studies there were more than forty groups of mining claims (150 locations) being actively developed, and commercial ores had either been blocked out ready for milling or were being milled. Most of the ores on these properties had been discovered and developed since 1932 and prospecting was still active at the time of withdrawal of the area from mineral entry. Commercial ores being mined contained principally gold, silver, copper, and iron, but there also occurred some secondary minerals valuable chiefly for their varied coloring and smoothness when polished. Gold was the principal mineral being mined and was being recovered by amalgamation and cyanide processes.

> Several mills having a capacity of from two or three tons to sixty tons in twenty-four hours were in operation. The mine run of the ores was reported to have a value of $10.00 to $100.00 per ton but upon examination . . . it was determined that the average value of the ore milled was approximately

---

28. Frank A. Kittredge, Reg. Dir., Region Four, Memorandum for the Director, Apr. 11, 1939, Central Files, 1907-49, RG 79, NA.

> $18.00 per ton, with a recovery of from 65% to 70%, mining and milling costs varying from $5.00 to $10.00 per ton. Production of ore from the different mines varied from two or three tons per day to thirty tons per day, the average production of ore per day from the entire area of the Joshua Tree National Monument amounting to approximately one hundred tons per day at the time of this investigation. . . .[29]

Investigator S.E. Guthrey noted that practically all of the ores being produced and developed occurred in the easterly two-thirds of the area, east of R8E. To the west economic minerals had been developed in only three mines--the Lost Horse, Desert Queen, and D.C. Mine (location unknown)--which were idle in 1937. It was the investigator's opinion that sufficient amounts of gold and other valuable minerals had been produced and developed in the eastern portion of the monument to warrant its being considered valuable for minerals.

During the investigation it was estimated that 250 people were employed in the various mines and mills, with a payroll of about $40,000 per month. Because the mines were all lode or underground ones and no open cut or placer methods were used, the investigator felt that the location of mining claims and of mining and milling operations within the area would not detract from or destroy scenic or recreational values. A large number of mine owners, operators, prospectors, and others were protesting the withdrawal of land in the monument from mineral entry and location, Guthrey noted, in addition to protests from the Los Angeles Chamber of Commerce, the Mining Association of the Southwest, and the California State Mining Bureau.[30]

---

29. Guthrey to Dir. of Investig., May 6, 1937, p. 9.

30. This data pertaining to mining operations in the monument was taken from Guthrey to Dir. of Investig., May 6, 1937, pp. 8-10, 20-22.

A comparison of the number of working mines and of the amount of ore handled by the mills in both the western and eastern portions of the monument showed that the latter was definitely the active mining region. Although gold in the mines of the upper valleys existed in pockets that would always attract prospectors and spasmodic mining activity, the gold in the eastern portion was found in extensive mineralized ore deposits that offered inducements to large operators and investors.

By 1941 the superintendent noted that considerable headway was being made toward decreasing the number of mineral claims in the monument. Of all those examined by the Division of Investigations, 3,170 claims were being adversely reported to the General Land Office, 600 more cases were almost complete but not yet reported, and notices of cancellation had been sent to 2,170 claimants with only nine appeals. (As closely as can be determined, there were about 8,800 purported claims in the area when the monument was established. Of the 3,782 claims in the western half, only 28 were found to be valid. Of the 5,000 claims checked in the eastern part, 405 were valid.)

Mining interests still were agitating through the Mining Association of the Southwest to reopen the monument to prospecting and claim location. Due to efforts of this association, resolutions favoring mining in the monument were adopted by several southern California organizations and sent to Congressman Harry R. Sheppard who in February 1939 introduced a bill to extend the mining laws of the United States to the monument. Soon after the administrative office at the monument was established, the superintendent contacted many of these organizations and persuaded several of them to reverse their actions. Sheppard thereupon reversed his stand and the bill was not reported out of committee. Then the Mining Association of the Southwest attempted to organize miners and interested groups to agitate for a congressional bill to open the monument for mining for strategic defense minerals.[31] That bill would have permitted prospecting and mining in the monument for a

---

31. Superintendent's Annual Report, 1941, pp. 3-4.

period of ten years. The argument of its proponents was that "gigantic deposits of mineral and metal are being held out of the channels of the national defense program while this country imports tungsten and other wartime necessities from foreign countries." The miners claimed that if they were allowed to work the monument "they could make untold quantities of strategic materials available to the country."[32] That attempt to penetrate the monument under the guise of assisting in national defense also failed.

By 1942 there were only a few mills in the monument and none were active. Mining activity continued to taper off during the war years due to several factors: Limitation Order L-208 of the War Production Board, suspending gold-mining operations in the United States; a wartime shortage of men and materials; and the lack of strategic minerals in the monument. In 1946, after L-208 was repealed, Representative Sheppard introduced another bill, H.R. 4703 (79th Congress), which provided for reducing the boundaries of the national monument while retaining the scenic western portion and for the purchase by the government of private lands. It would delete the eastern portion of the monument that held the more important mineral and ore deposits and that was considered less scenic. Even this compromise met strong opposition, from people who had spent time and money building homes and developing water in the western part of the monument and did not want to have to sell, and from groups such as the Western Mining Council which felt that mineralized ores were scattered over the entire monument and that therefore the whole area should be reopened to mining. An example that was continually thrown forward of the feasibility of this type of arrangement was Death Valley National Monument, where mining had been first restricted and then permitted. Mining interests felt that similar legislation, allowing a combined mining and recreation area, was called for at Joshua Tree.

---

32. "Strategic Metal Search Proposed," Los Angeles (Ca.) Times, June 23, 1941.

In response to H.R. 4703, the National Parks Association undertook to secure more definite information on the mineral and ore deposits within the monument. Their report noted first that there had been considerable gold prospecting in the monument area with many claims located and a few actually showing a profit. Most of the claims, however, were of marginal importance and similar in value to those made anywhere else in the southern California desert. A few mines were still operating after the monument was established, but all were idle during the war. Iron was the only other commercially important ore--the Iron Chief deposit being the most important in southern California and of increasing importance after establishment of the Kaiser plant at Fontana. Two copper mines and one lead-silver mine were located within the area to be excluded by H.R. 4703. Twenty-five gold mines were situated within the part of the monument that would remain in that status under the Sheppard Bill. Most of the important gold strikes had been made in the Pinto Mountain Range in the north-central region, while the other ore deposits were in the Eagle Mountains to the southeast.[33]

Sheppard's bill to delete the eastern end of the monument remained in committee for a long time, rigidly fought by various mining groups endeavoring to secure a law whereby the entire reservation would be opened to prospecting and mining. Because he felt it was impossible at that time to come up with a coalition of interests, Sheppard decided not to refile the bill he had proposed originally to change the boundary lines. On March 26, 1947, Sheppard introduced H.R. 2795 to revise the boundaries of the monument. It would eliminate and open up over 300,000 acres of mineralized land. Specifically, the bill would delete from National Park Service control fifteen sections of good hunting country on the west end and large mineralized portions in the north and southeast of the

---

33. Fred M. Packard, National Parks Association, "Report on the Mineral and Ore Deposits within the Joshua Tree National Monument, California," Dec. 17, 1946, Central Files, 1907-49, RG 79, NA.

monument. That legislation also authorized an appropriation of over $200,000 to acquire private lands in the monument.[34] It also was defeated.

On April 8, 1949, John Phillips, representative to Congress from the 22nd District, in which about three-fourths of the monument is located, introduced a bill, H.R. 4116, reducing the boundaries almost to those in the Sheppard Bill. It was defeated. Finally, H.R. 7934, entitled "A Bill To reduce and revise the boundaries of the Joshua Tree National Monument in the State of California, and for other purposes" (Phillips Bill), was passed on September 25, 1950. By Public Law 837 of the 81st Congress, some 318,112 acres were deleted from the monument and returned to the public domain, while 37,788 were added. The areas eliminated were those in which it was thought that minerals in commercial quantities could be developed. The monument was thereby decreased from 838,258 acres to approximately 557,934, resulting in a net loss of 280,324 acres. The National Park Service, from numerous studies and the experience it had so far gained in administering the monument, had concluded that the land remaining after the reduction would be sufficient for the proper care and management of the resources requiring protection. The boundary revision eliminated most of the mineralized areas around Pinto Basin, but retained the basin in the monument and the rim of mountains bordering it. The National Park Service believed that the deleted lands had been adversely affected by mining and it would best serve the public interest, simplify administrative problems, and reduce road maintenance costs if these sections were deleted. Greater protection could then be given to the more unspoiled parts of the monument. Lands, largely public domain, added to the monument would result in a more natural boundary, give greater protection to wildlife, and simplify administration. A joint survey by the U.S. Bureau of Mines, the U.S. Geological Survey, and the National Park Service decided which lands were mineralized and should be

---

34. "The Shepard [sic] Bill," Joshua Journal (Joshua Tree, Ca.), Sept. 17, 1947.

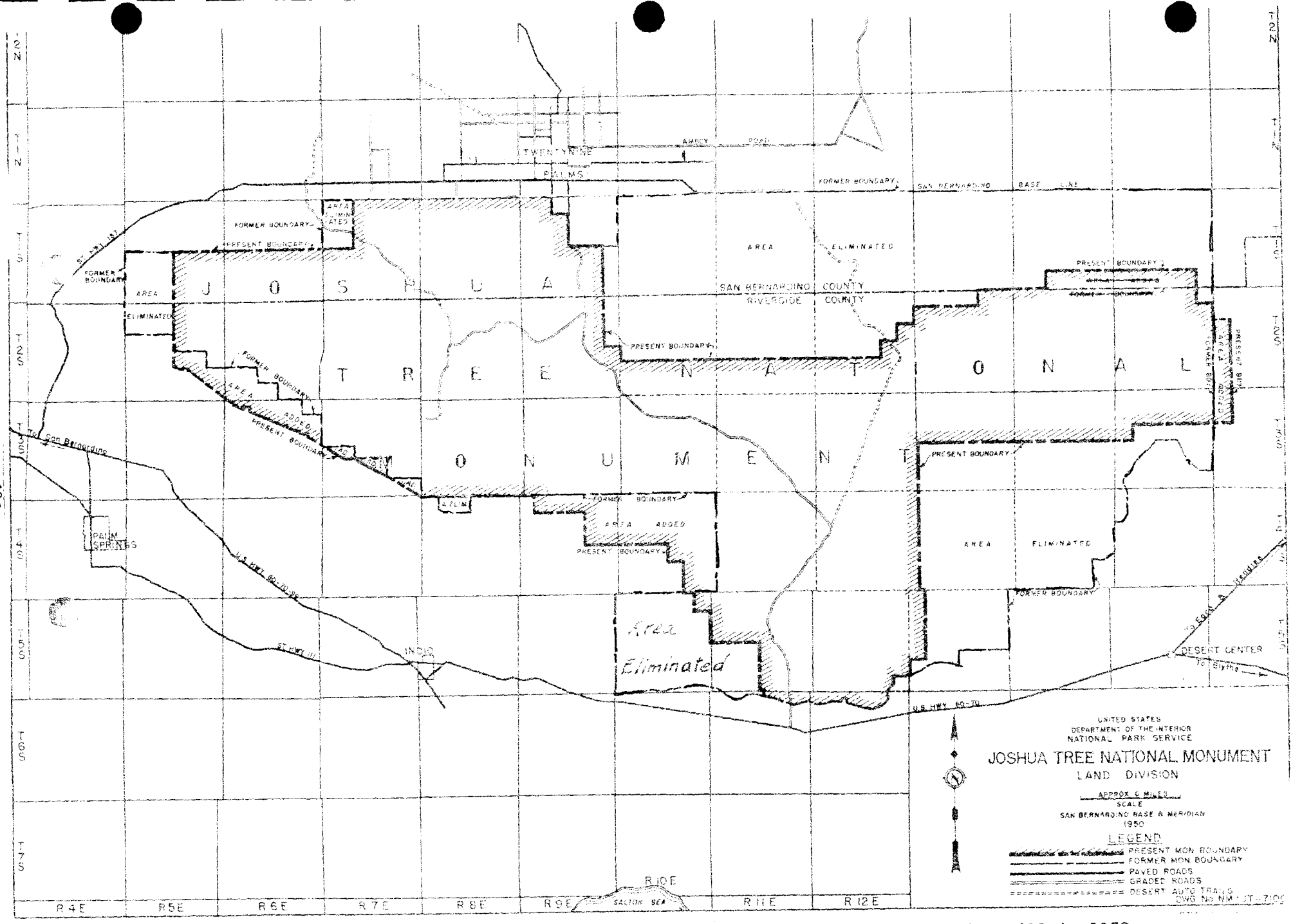


Illustration 143. Map showing former monument boundary and boundary after passage of Phillips Bill in 1950. From Master Plan Development Outline, JTNM, April 3, 1957, FARC, IN.

returned to the public domain. Some sections in the west and southwest were deleted because of private ownership of land.[35]

It is interesting to note that subsequent activity in the deleted portions did not disclose any substantial yield of precious metals. Mining in the 1950s was minimal, both outside and inside the revised monument boundaries. Much of this was due to the fact that during the wartime scrap drives of the 1940s, dormant mine and mill plants were stripped of scrap metal, making them inoperable. Labor shortages had prohibited the employment of regular watchmen and properties were often left unattended. Much mine machinery, many ore cars, and other metal items had been taken. Also most of the mining in the area had been done in vertical or inclined shafts, and the long period of idleness had left them in bad condition. The rehabilitation necessary before new operations could start in the mines was too costly for many.

In 1952, due to press publicity that radioactive and other strategic minerals might exist in the monument, a portion of it was included in an airborne scintillometer survey undertaken as part of a Geological Survey search for radioactive minerals. There were no indications of occurrences of such materials that were considered significant enough to warrant ground checking. Thus another threat to the monument's integrity was averted.

Again in 1954 attempts were made to force opening of the monument to prospecting and mining. The pro-mining forces were spearheaded by the powerful Western Mining Council that stated there were strategic and precious minerals in the area. It was opposed by the Sierra Club and various local and national conservation groups.[36] Other than continual invasion by uranium prospectors, however, the national monument was not again threatened by mining interests.

---

35. Wm. R. Supernaugh, Supt., JTNM, to Tom Vale, Jan. 14, 1960; Secretary of the Interior to the Hon. J. Hardin Peterson, Chmn., Comm. on Public Lands, House of Representatives, Apr. 28, 1950, Central Files, 1907-49, RG 79, NA.

36. Saulsbury, "Battle of Joshua Tree," Oct. 14, 1954.

VIII. Roads After the Establishment of the Monument

A. Road Conditions in the Late 1930s

The roads south of Twentynine Palms were in no better condition when the national monument was established than they had been for the last twenty years. This was not perceived as detrimental however:

> Although the present roads by no means can be considered good, still they seem quite fitting to the spirit of this desert area. Although the greatest speed that can be made on the present roads is about twenty-five miles per hour, no greater speed is needed. . . . In general, all that is needed is to eliminate some of the kinks, to widen sufficiently to allow passing, and enough cutting of vegetation along the road to prevent the sides of the car from being scratched.[1]

Another assessment of the road system in the monument at that time noted that no roads had been constructed and only a small portion of the area was accessible by desert wagon trails. The principal route traversed the monument in a south/southeasterly direction from Twentynine Palms to Cottonwood Spring. Several short trails to mining properties branched off it, some passable by auto and some not. The more scenic area of the park was accessible from Twentynine Palms or Warren's Well. The roads in that area, however, were also sandy, narrow, crooked, and rough, leading to Lost Horse Valley, Quail Spring, and adjacent areas.[2]

The monument was accessible from U.S. Highways 99, 60, and 70, at Indio, Whitewater, and Cottonwood Pass. Grading and widening were seen as necessary for the roads before they could be used safely.

---

1. Merel S. Sager, Park Planner, Memorandum for the Regional Director, Sept. 16, 1937, Central Files, 1907-49, RG 79, NA, p. 18.

2. Guthrey to Dir. of Investig., May 6, 1937, pp. 6-7.

The westernmost northern entrance road, the one most traveled by early visitors, entered the monument in the vicinity of Quail Spring and connected with the Twentynine Palms entrance road in the northeastern portion of Queen Valley. From this intersection a road ran south into Pinto Basin where it met the third northern entrance road from Old Dale leading through Cottonwood Pass and out of the monument to the south. From the Keys Ranch a branch road headed into Lost Horse Valley. It divided several times and provided adequate access to the area. Several roads also crossed Queen Valley. Pinto Basin and vicinity, comprising two-thirds of the monument, was served by an inadequate system of roads.

Two old mining roads impassable in the 1930s entered the monument from the south. The most westerly crossed the Little San Bernardino Mountains at The Blue Cut and led into Lost Horse Valley near Keys View. Its southern end was U.S. Highway 99 about ten miles northwest of Indio. Another road a few miles east led up Pushawalla Canyon into Queen Valley. The Pushawalla Canyon route passed three watering places--County Well, Henson Well, and Pinyon Well. At that time many of the Automobile Club of Southern California directional signs erected in the monument within the previous two years had already been badly mutilated.[3]

The only road going through the Pinto Basin from north to south was originally used to freight supplies from the Coachella Valley into the mining districts in and north of Pinto Basin. It was felt that if the National Park Service improved this route it would receive heavy use by mining interests hauling supplies and ore, compounding maintenance problems. The fact that the New Dale road served only commercial needs and could not be justified from the standpoint of recreational purposes also mitigated against its being repaired or reconstructed. From this one

---

3. "Report on Field Inspection of Merriam, Apr. 14-15, 1938," pp. 15-18.



Illustration 144.
Road to Keys View, 1940.



Illustration 145.
Road between White Tank and Pinto Basin, n.d. Photos courtesy JTNM.

main road, trails branched off to small mining operations and watering places. From the Pinto Basin road a branch led into the upper valleys of the monument through Wilson Canyon and connected with a branch to Twentynine Palms and with another across the upper valleys past Keys Ranch and Quail Spring to the highway, about eighteen miles west of Twentynine Palms. Many other roads crisscrossed the park that were difficult to travel for one unfamiliar with the area.[4]

Although it was realized that some improvement would have to be made to some of the monument roads to provide at least one loop drive in the area, the land ownership problem in the early days was so involved because of private property and mining claims that it was almost impossible to plan any definite program of road improvement. In the beginning, other than a nominal amount of maintenance, officials would only provide road informational and warning signs. The maze of mining and cattle roads were a lure to some drivers who would find themselves in dire trouble when their car broke down in a deserted area during the long hot summer. Actually this approach tended to be thought of as the proper one because it avoided over-development at the expense of wilderness values.[5]

B. Development of a Better Road System

The National Park Service intended eventually to provide sufficient good roads so that visitors could traverse the scenic parts of the area without danger to themselves or damage to their cars. The development of a road system in the monument began early in 1941. By March stretches of the desert road between Twentynine Palms and Indio had been improved. A branch road led from this road into the Pinto Basin and circled back through Old Dale to Twentynine Palms, connecting with the Amboy road near Old Dale. A second loop used a portion of the

---

4. Primm and Cole, "Report on Joshua Tree National Monument," 1938, p. 4.

5. A.E. Demaray, Acting Director, National Park Service, to Edmund C. Jaeger, Dec. 11, 1940, Central Files, 1907-49, RG 79, NA.

main road and swung west in a wide semicircle, returning to the Twentynine Palms highway at Joshua Tree Ranch. Side roads led to Keys View and Split Rock Tank. From the Keys View road--the principal scenic route--short spurs reached several points of interest. Another side road from the Twentynine Palms highway reached the foot of Rattlesnake Canyon in Indian Cove. Agitation in Riverside County for a road connecting Palm Springs with Twentynine Palms via Berdoo Canyon, The Blue Cut, or one of the other canyons tributary to the head of Salton Basin was continual.[6]

Construction work on monument roads was minimal through the early years because of lack of appropriations, because of an attempt to maintain a near wilderness condition, and because the law precluded any permanent improvement of roads unless the United States had complete title to them. Road improvement in 1941 centered primarily on those roads that were to become principal routes and consisted only of what was sufficient to permit safe travel: cutting down high centers and grading, widening out wheel tracks so that two cars could pass, removing rocks, filling sandy and rutted portions with crushed rock, and improving several water channel crossings and making the dips more pronounced to divert flood waters from the road. It was hoped that the idea could be maintained that a secondary type of road was sufficient for the monument. Existing roads with a little oil for erosion control were considered ample. Without oil, the roads would develop into troughs and canals. It was suggested early in the monument's development, however, that the northern entrance from the state highway west of Twentynine Palms be closed, providing only one access from Twentynine Palms and one from Indio. Only two entrances would simplify protection and add to the sense of entering the desert. All that was really seen as essential at this time were additional parking areas and overlooks at Keys View.[7]

---

6. Goodwin, T.R., Supt., Death Valley NM, transmittal letter of "Report on Joshua Tree National Monument," Mar. 18, 1941, Central Files, 1907-49, RG 79, NA.

7. Vint, T.C., "Notes on Joshua Tree National Monument Trip, May 9-12, 1941, in accompany with Superintendent Cole, Messrs. Davidson & Lange," Central Files, 1907-49, RG 79, NA, p. 2.

Confining the number of road entrances to one on the north boundary and one on the south was still a future aim in 1943, as was elimination of several little used roads. It was further suggested that the primary roads be constructed to a standard similar to those in Death Valley National Monument, which was somewhat below the standard of primary roads in areas such as Yosemite and Sequoia. The secondary roads could conform to a somewhat lower standard of gradient and alignment with oiled surfaces.[8]

By 1945 the minimal actions taken on monument roads back in 1941 because of limited appropriations were causing problems. At that time the monument had been authorized only to improve existing roads. All those roads had been developed by use. When they encountered large rocks they went around them. Many of these the staff had moved with a power grader, but many were either too large, embedded, or bedrock that could not be moved. Some were covered over and had since been uncovered by erosion. Others were left and the road merely improved around them. As a result, by 1945 there were many sharp radius turns that were difficult to maintain and were hazardous because of their short radii and loose sand. Maintenance on them was difficult and expensive.

By 1948 there were 78.5 miles of minor primary roads that were kept in good condition, except for a 5-mile stretch through Pinto Basin; 36.8 miles of minor secondary roads that were just passable for drivers familiar with the desert; and 88.5 miles of administrative and protection roads receiving little attention other than keeping them passable for monument equipment.[9] In 1949 it was noted that a total of twenty-two roads crossed the monument boundaries, mostly of a good desert type.

---

8. Newton B. Drury, Director, NPS, Memorandum for the Regional Director, Region Four, Feb. 19, 1943, Central Files, 1907-49, RG 79, NA.

9. Custodian's Annual Report, transmittal letter of May 19, 1948, Central Files, 1907-49, RG 79, NA.

By the end of 1949 road signs of heavy redwood with routed letters were being erected and received with favorable comments. On November 19, 1950, a twenty-one-mile strip of paved highway from the Twentynine Palms entrance to the 5,185-foot summit of Salton (Keys) View was formally dedicated. This road passed through the Split Rock area and Queen and Lost Horse valleys. It was pointed out at this time that campgrounds and new roads in the area had resulted in 72,600 visitors to the monument in 1949 compared with only 9,000 five years earlier.[10] In September 1950 entrance signs were constructed at the four main entrances.

C. Agitation for a Blue Cut Access Road

In 1952 the Baseline Highway Association and the city of Indio encouraged support for a proposed road through the monument from Indio to Twentynine Palms. In response the Desert Protective Council organized to oppose these efforts by commercial interests to build a shortcut through the heart of the monument via The Blue Cut and thereby channel trade from the U.S. Marine Base at Twentynine Palms to the Coachella Valley. In 1954 the California legislature requested the federal government to construct The Blue Cut road. By April of that year a large percentage of the main roads in the upper portion of the monument were paved. There were now 92 miles of primary roads and 106 of secondary roads and fire trails. In 1955 the Bureau of Public Roads reported on the proposed Blue Cut road and indicated that both proposed routes (Blue Cut-Fan Hill and Blue Cut-Pushawalla Canyon) were economically unfeasible. Both would also require excessive maintenance costs.

D. Agitation for a Berdoo Canyon Access Road

In 1958 L. Burr Belden wrote articles about the monument road improvements. He noted that the usual tour for visitors roughly

---

10. "Joshua Tree Road to be Dedicated," Los Angeles (Ca.) Times, Nov. 18, 1950; "Ceremony Opens New Desert Road," Los Angeles (Ca.) Times, Nov. 20, 1950.

paralleled the Twentynine Palms-Joshua Tree highway in an arc dipping south through the northern border of the monument. It was a scenic drive but failed to give visitors a true idea of the variety of resources in the monument. Most of that drive was surfaced as was the side road to Keys View. No other road surfacing existed in the monument. The road from the Twentynine Palms entrance to Cottonwood Spring was a graded and maintained dirt road. The Dale Road had not been well maintained but was passable to cars except when the soils were very dry and cars dug in. Brief side excursions could be made to Split Rock, Split Rock Tank, Ivanpah Tank, and Salton View. West of Split Rock a side road veered north into the Jumbo Rock area. This side road also went to the Desert Queen Mine, the Keys Ranch, and Cow Camp. On the side trip to Salton View one could go west to Stubby Spring or east to the Lost Horse Mine. A longer side trip starting near Split Rock Tank followed a road south to Squaw Tank, where modern cars had to stop. To the south a jeep trail continued to Pinyon Wells. Another road turned east to the Gold Coin Mine and continued south from there to Indio via a county road down Berdoo Canyon. The Dale entrance road took off south about twenty miles east of Twentynine Palms via the Base Line Extension road.[11]

By 1958 partisans requested that the portion of the Berdoo Canyon Road within the monument be improved by the National Park Service. A few miles south of the proposed Blue Cut route, Berdoo Canyon was perceived as a quick connecting road between the Coachella Valley communities and Twentynine Palms. The paved county portion already joined the government dirt road in the Pleasant Valley area that continued on to the oasis. The Berdoo Canyon Road was not sanctioned by the National Park Service. It had been improved in 1958 despite earlier government protests to Riverside County. The county work done was on the old right-of-way established during the late 1800s. The

---

11. L. Burr Belden, "Wonderland of Rocks and Superb Desert Vistas Abound Nearby," San Bernardino (Ca.) Sun-Telegram, Apr. 29, 1958, and L. Burr Belden, "Visitors Will Find Ghost Towns, Fantastic Rocks, Rare Plant Life," San Bernardino (Ca.) Sun-Telegram, Dec. 26, 1958.

National Park Service did not plan to grade the part of the old road within the monument, but could not legally prohibit travel on it because the route was a public right-of-way through the monument to Squaw Tank sanctioned by its long history of use since early mining days.[12] It was finally decided in 1958 that the Blue Cut road would not be built. The cost would far exceed its limited use and in addition would open up a wilderness area that needed to be maintained for wildlife protection.

E. New Roads in the 1960s and 1970s

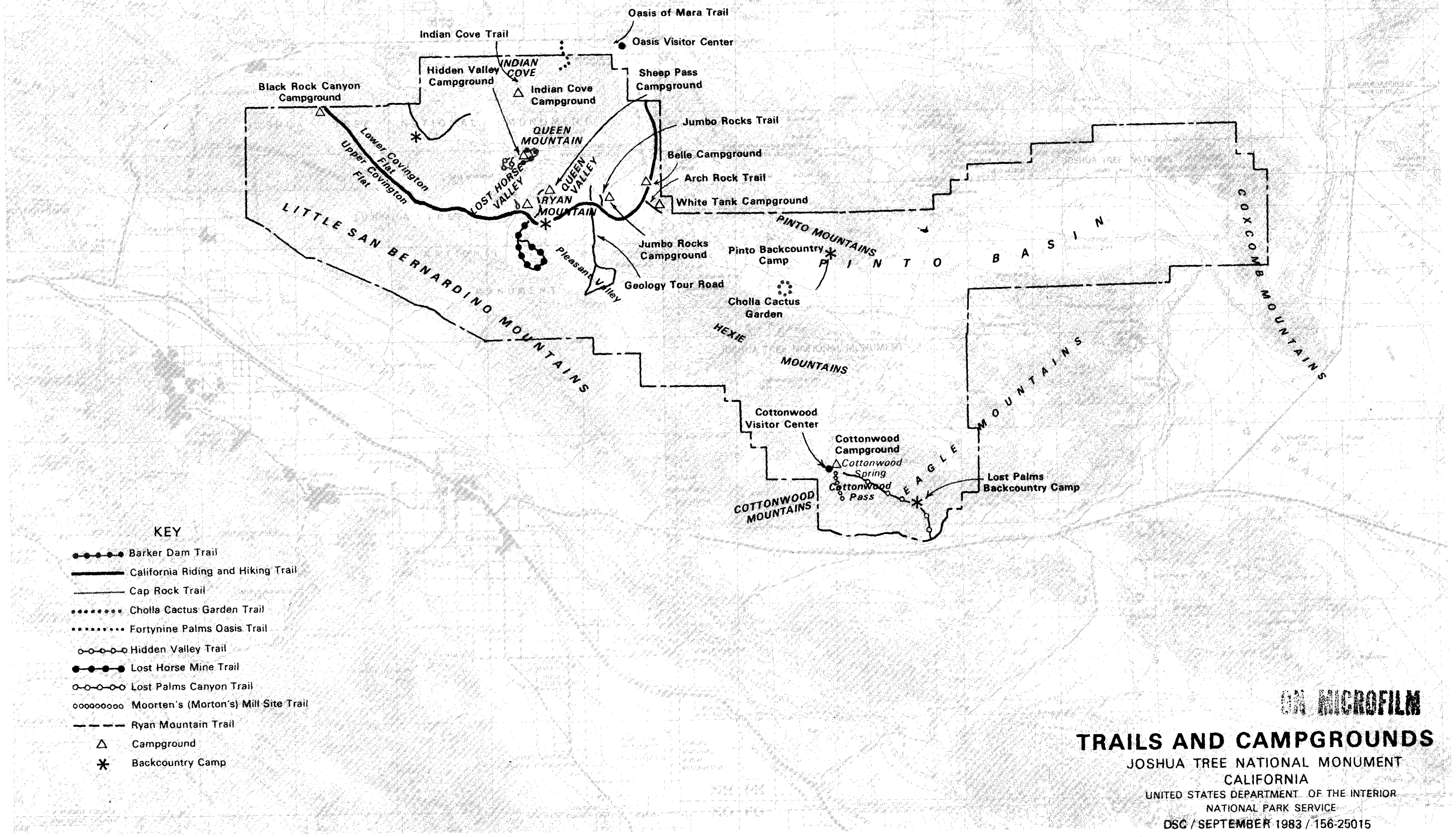
A few new roads were built during the 1960s and 1970s. In 1963 a new Fortynine Palms Canyon road access was established to replace the old winding wagon track. By 1965 116 miles of road were maintained. The Geology Tour Road (Squaw Tank Motor Trail) was new in February 1970. This eighteen-mile tour with sixteen stops meets the Hidden Valley Road just west of Jumbo Rocks.

F. Recommendations and Evaluations

None of the roads in Joshua Tree National Monument are considered eligible for the National Register due to modernization and/or lack of integrity and historical significance.

---

12. "Berdoo Canyon Road Wanted," Riverside (Ca.) Daily Press, Nov. 11, 1958; Supt., JTNM, to E.C. Bower, Pres., Ramblers, Inc., Aug. 17 and 26, 1959, and Actg. Dir., NPS, to Mr. and Mrs. Arthur G. Morley, Mar. 30, 1959, FARC, Laguna Niguel, Ca.



ON MICROFILM

TRAILS AND CAMPGROUNDS

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / 156-25015

IX. Trails of Joshua Tree National Monument

The 1949 Museum Prospectus for Joshua Tree National Monument pointed out that the monument was not a trail area as the term is commonly used. Most places were reached either by desert wheel tracks or not at all. Occasionally traces of primitive Indian trails could be seen, but no purely recreational trails were available to the public. It was noted that if the Twentynine Palms oasis were selected as a headquarters site, a loop nature trail should be created through it. Other sites where nature trails would be desirable were Indian Cove, Split Rock, Hidden Valley, Cholla Garden, and Smoke Tree Wash (petroglyphs).[1]

By 1957 four self-guiding natural history trails were in use and much enjoyed by the public. The establishment of trails at several other locations was then being studied. The four trails already in use were: the Indian Cove trail identifying the plant life and giving a short dissertation on the geology of the rock formations; the Oasis Nature Trail near the visitor center, teaching about oasis plants and animals and some human history associated with that spot; the Cholla Cactus Garden Nature Trail in Pinto Basin, explaining the significant plants of that locality and including a naturally occurring exhibit of a pack rat nest; and Cap Rock Nature Trail, identifying plants indigenous to that section of high desert country and containing an account of the geology of the White Tank quartz monzonite rock formations. Another self-guiding trail was proposed for the Split Rock area.[2]

Many of the monument's trails were added during the 1960s. At this time a system of surfaced trails was constructed through the valley to confine the public to established routes and prevent devastation of

---

1. Museum Prospectus, Joshua Tree National Monument, June 7, 1949, FARC, Laguna Niguel, Ca., p. 3.

2. "Master Plan Development Outline, Joshua Tree National Monument," Apr. 3, 1957, pp. 9-10.

natural features. Previously visitors had scattered at will, inadvertently destroying plants. By 1965 the park contained 43.3 miles of maintained trails. In 1973 several trails were available: for short hikes--Jumbo Rocks, Cholla Cactus Garden, Cap Rock, Twentynine Palms Oasis, Hidden Valley, and Barker Dam; for medium-distance hikes--a 1.5-mile trail to Fortynine Palms oasis on the north boundary, a 4-mile trail to Lost Palms Canyon, and a two-mile trail to the Lost Horse Mine stamp mill.[3]

A brief rundown of the monument trails follows:

A. Nature Trails

1. Arch Rock (White Tank)

This trail is located in the White Tank Campground. During its 0.3-mile-long course through rock formations, it describes the geology of the area. The White Tank Trail leading to a natural bridge or arch was graded and ready for use by June 1953.

2. Barker Dam

Taking off from the Hidden Valley Campground area, this four-mile roundtrip trail points out evidences of human habitation and identifies plants and animals used and eaten by Indians. A shorter one-mile trail leads to the dam from the Barker Dam parking area.

3. Cap Rock

This 0.4-mile trail was laid out in June 1953 and opened to the public in October. It winds through a variety of high desert vegetation.

---

3. United States, Department of the Interior, National Park Service, Environmental Statement, Proposed Wilderness Area, Joshua Tree National Monument, California (Denver: Denver Service Center, 1973), p. 10.

4. Cholla Cactus Garden

This 0.1-mile trail was opened to public use in August 1953. It is a natural cactus garden featuring plants and animals of the Colorado Desert.

5. Cottonwood Spring

The trail system at Cottonwood consists of five major trails, from one-half to eight miles in length. A self-guiding nature trail 0.5 mile long runs between the campground and Cottonwood Spring. The other four trails will be discussed under "Hiking Trails."

6. Hidden Valley

From the Hidden Valley picnic area leads a trail system 1.4 miles long winding its way through the jumbled rocks. Short and long loops of the trail interpret plant life and history of the area.

7. High View

This one-mile loop trail at Black Rock Canyon interprets the natural history of the pinyon juniper habitat.

8. Indian Cove

The original trail was completed in 1957 for public use. This has since been modified and slightly rerouted.

9. Jumbo Rocks

This signed 1.7-mile trail deals with high desert plants and geology.

10. Oasis of Mara

In 1950 construction started on the walks around the Twentynine Palms oasis area. In March 1951 the oasis footpaths were completed and oiled. This half-mile trail at park headquarters interprets the cultural and natural history of the Oasis of Mara.

11. Geology Tour Road

By February 1970 this motor nature trail had been established--an eighteen-mile round-trip dirt road winding south from west of Jumbo Rocks toward Squaw Tank.

B. Hiking Trails

1. Fortynine Palms Oasis

The oasis is accessible via a 1.5-mile trail. Washingtonia fan palms grow here around a natural watering place hidden in the mountains extending across the north side of the monument. It was undoubtedly a perfect campsite for the early Indian inhabitants of the region because of the presence of a cool spring and a food supply from the fruit of the palms and from the pinyon trees on higher elevations.

In 1922 Mrs. Bernice Tucker of Twentynine Palms decided the oasis would be a good place to live. As a sideline she would sell water to miners in the area. After filing on the spring, she and her children packed in cement and tools, camped at the spring, and worked when possible between 1923 and 1933 to build a dam and clear the area for an access road and house. Running out of funds, Mrs. Tucker finally relinquished the water rights to the National Park Service.[4]

During 1941 the Fortynine Palms Canyon Trail was improved and made easily passable for foot and horse traffic. At the same time the oasis was cleaned up and debris removed from the spring. In 1948 a fire started by two teenage boys encompassed approximately one acre of the oasis, consuming a large number of the palms. The area is approachable only from Twentynine Palms. The trail leaves from a parking area on Canyon Road, four miles west of Twentynine Palms, and follows an old Indian trail into the canyon.

2. Lost Horse Mine

A four-mile round-trip trail from a parking area on the Keys View road leads to this historical site where the visitor can view a mine and stamp mill structure representing the monument's early gold mining history.

---

4. Randall Henderson, "Trail to 49 Palms," Desert Magazine (December 1940), p. 26.

3. Lost Palms Canyon

The Lost Palms oasis was also burned over, during the summer or fall of 1944. By the mid-1950s, the old four-mile trail from Cottonwood Spring to Lost Palms Canyon was well marked and an inviting trip.[5] The Lost Palms Trail was rehabilitated in 1963. A new trail was constructed from Cottonwood Campground to Cottonwood oasis and the old Lost Palms Trail terminus. A side loop was built through the Cotton Spring area (old Winona mill site) and much new trail constructed to Lost Palms. The present trail leads through canyons and washes to the largest native oasis in the monument--over 110 California fan palms are found there.

4. Ryan Mountain

An approximately 1.5-mile hike leads to the summit of Ryan Mountain. Fine views are afforded of Queen, Lost Horse, Hidden, and Pleasant valleys. In 1963, 2.47 miles of trail were built from the parking area at Indian Cave, up Ryan Mountain, to an overlook on the highest point. Connecting trails were built between this trail and the Sheep Pass Group Campground.

5. Cottonwood Spring

a) Winona Mill

This half-mile trail leads east from the campground area to the mill site, the remains of a gold mill active in the 1930s. Because of its proximity to the campground, this trail is heavily traveled, passing through typical Colorado Desert plant and animal areas.

b) Mastodon Peak

A three-mile round trip from Cottonwood Spring, this trail leads east to Mastodon Peak via the Lost Palms Oasis Trail and then loops back west to the Winona mill site. From the peak one gains excellent views of the monument and the Salton Sea.

---

5. Edmund Jaeger, "Monument of the Joshuas," Pacific Discovery 8, no. 3 (May-June 1955): 19.

c) Moorten's (Morton's) Mill

This trail basically follows an old freight wagon road down the wash south from Cottonwood Spring oasis into Cottonwood Canyon. About one-eighth of a mile down the canyon the Little Chilcoot Pass road bypasses a rock waterfall for a distance of about 300 yards. From the bottom of Little Chilcoot Pass the trail follows the canyon for another half mile to the mill site on the west hillside above the wash. The trail provides a grand opportunity to see plants unique to desert washes.

6. California Riding and Hiking Trail

Twenty-nine miles of this trail pass through the monument. Access to the trail is available at its junction with the Covington Flat, Keys View, and Squaw Tank roads, and at Ryan Campground, allowing for shorter hikes than the two to three days required to hike the entire length. The Ryan Campground is located at approximately the halfway point of the trail within the monument.

7. Recommendations and Evaluations

None of the hiking trails in Joshua Tree National Monument are considered to be historically significant.

X. Campgrounds of the Monument

A. Frontcountry Campgrounds

From the time of establishment of the monument, National Park Service officials had believed that in order to maintain the feeling of a true desert preserve, only a minimum of camping facilities should be provided. By 1949 several camping places had been designated, but there were no developed campgrounds. In June 1950, twenty-four fireplaces were placed in campgrounds and by September as many pit toilets had been completed and installed. In July 1950 eight tables were installed in campgrounds, bringing the total to thirty-eight. In late September 1950, the superintendent stated that six campgrounds had been developed that year with concrete tables and fireplaces and with pit toilets.[1]

By 1954 the monument had eight public camps--at Cottonwood Spring, Indian Cove, Belle, White Tank, Sheep Pass (group campground), Ryan, Hidden Valley, and Jumbo Rocks. In 1960 there were only seventy-two individual campsites and nine group sites available in the monument, and these were inadequate in view of increased visitor use.[2] It was still believed, however, that concession facilities were not necessary in the monument because overnight accommodations were available immediately outside the boundaries at Twentynine Palms, Joshua Tree, Yucca Valley, Indio, and other places. To retain the area's desert wilderness character, overdevelopment had to be avoided.[3] The monument now contains nine campgrounds. A brief description of each follows.

---

1. Frank R. Givens, Supt., JTNM, to Harry C. James, The Trailfinders, Sept. 28, 1950, RG 79, FARC, San Bruno, Ca.

2. Supt., JTNM, to Regional Director, Region Four, May 5, 1960, RG 79, FARC, Laguna Niguel, Ca.

3. "Master Plan, Joshua Tree National Monument," 1960, FARC, Laguna Niguel, Ca.

1. Belle

Located about 1.5 miles south of the Pinto Wye junction, its main scenic interests are the gigantic boulders looming over the twenty campsites.

2. Black Rock Canyon

This camp contains one hundred campsites with flush toilets and running water. It is a fee area.

3. Cottonwood Spring

The original campground was established at the oasis in 1949. In 1950 concrete tables were installed, and in 1952 a water system was activated. Intense visitor use resulted in the destruction of much vegetation around the spring, where shrubs and tree limbs were chopped up for firewood. New campground construction was scheduled for 1962 in an area near the oasis with the spring being turned into a day-use nature area. The area in and around the spring was used as a campground until 1964, when that facility was relocated half a mile northwest. A comfort station, picnic shelters, and a campfire circle were finished in 1968. In 1977 the newer campground had sixty-two units with flush toilets and running water. Adjacent is the Cottonwood Group Camp. This is a fee area.

4. Hidden Valley

This campground was also established around 1949. In April 1950 concrete tables were erected there. In 1977 it contained sixty-two sites amid the picturesque rock formations of the Wonderland of Rocks.

5. Indian Cove

In 1941 the majority of winter camping in the monument was confined to Indian Cove (Rattlesnake Canyon). The area was not accessible by car to the rest of the monument except by leaving the monument and reentering by one of the northern entrance roads. This site had the benefits of isolation, an adequate water supply, numerous natural sheltered coves, a lower elevation and lower temperatures, and was in the center of an unsurveyed township so that all the land was

controlled by the federal government. No sanitary facilities were provided and no development other than road improvements had been made.[4] In 1950 concrete tables were added.

In 1977 Indian Cove Campground contained 114 sites on the north edge of the Wonderland of Rocks. It is reached from the Twentynine Palms highway between Joshua Tree and Twentynine Palms. The Indian Cove Group Camp contains thirteen sites, and reservations are necessary.

6. Jumbo Rocks

This campground was developed in 1950 with the erection of concrete tables. It was further expanded in 1964 so that by 1977 it was the monument's largest campground, containing 130 sites.

7. Ryan Riding and Hiking Campground

In 1977 this campground had twenty-seven sites and was the only one where horses were permitted, because of its position on the California Riding and Hiking Trail and the availability of hitching rails and feed troughs. (Black Rock Campground now also has a hitching area for horses.)

8. Sheep Pass

The layout work for the group camp at Sheep Pass was initiated in February 1954. In May seven tables and fireplaces were installed in the campground, putting it in service. About eight miles west of Pinto Wye, the camping area is nestled among large monzonite uplifts and boulders. In the 1950s it was used for camping and picnics, serving large groups of military personnel from the Marine Corps base north of Twentynine Palms, Boy Scouts and Girl Scouts, and other organized groups. In 1977 it consisted of six sites that must be reserved in advance.

---

4. Superintendent's Annual Report, 1941, p. 2.

9. White Tank

This campground was in use by 1951. In 1977 it contained twenty sites.

B. Backcountry Campgrounds

Except for six major day-use areas, the entire monument is open for backcountry camping. Camping is prohibited within 500 feet of a trail or within 1 mile of an established road.

C. Recommendations and Evaluations

None of the campgrounds in Joshua Tree National Monument are considered to be historically significant.

XI. Other Structures in Joshua Tree National Monument

A. Development of Government Support Facilities

The development of support facilities at the monument was slow, the primary concern at the establishment of the park being improvement of the roads. "Early among these [development needs] undoubtedly will be some provision for a headquarters area, as the Superintendent is now renting office and residence in Twenty Nine Palms. We have as yet no space for warehousing nor the storage and repair of vehicles, equipment and tools."[1] No need was seen for overnight facilities within the monument because the entire area could be adequately seen in a day or two out of Twentynine Palms or Indio or other of the neighboring towns. Such concessions would detract from the area's sense of purity and isolation. Keys View was considered from an early date to need more surfaced parking areas and overlooks with footpaths to protect the ground cover. By 1943 there were still no government-owned buildings of any kind operated by the National Park Service in the monument. The buildings finally constructed, beginning in the late 1940s, will be discussed below.

1. Utility Areas

By 1948 two 4,200-gallon oil storage tanks had been erected near the Pinto Wye road junction to store oil for repairing roads. Also erected was a temporary road equipment storage shed near the Pinto Wye road junction to protect new equipment from extreme weather conditions and thievery.[2] In 1952 it was noted that the monument had only one existing building, the equipment storage facility at the Pinto Wye utility area. The monument requested a maintenance shop and sheds and oil and gas storage facilities at the Pinto Wye utility area in 1954. By early 1956 there were four permanent buildings in the monument--the

---

1. A.E. Demaray, Actg. Dir., to Edmund C. Jaeger, Dept. of Zoology, Riverside Jr. College, Riverside, Ca., Dec. 11, 1940, Central Files, 1907-49, RG 79, NA.

2. Custodian's Annual Report, transmittal letter of May 19, 1948, Central File, 1907-49, RG 79, NA.

shop and equipment storage building at Pinto Wye, and a shop and equipment storage building, a gas and oil storage building, and a headquarters building at the oasis. These were cinder block buildings on concrete slabs.[3]

A utility building in the Cottonwood District was finished by the summer of 1964. Another equipment storage building, at Lost Horse Valley, was built around 1967.

2. Headquarters

As early as 1937 a private business concern, the Twentynine Palms Corporation, offered to donate land at the Twentynine Palms oasis to the federal government for a headquarters site and nature study area. Four possibilities were considered for a headquarters location: 1) on donated land in Twentynine Palms, 2) on the quarter-section Indian reservation near Twentynine Palms, 3) somewhere within the monument where water had already been developed, or 4) within the monument where water could be developed.

The general opinion was that there were several advantages to having a temporary headquarters near Twentynine Palms because that was already the accepted center for the monument. It was suggested that no permanent buildings be erected until planning was further advanced. It was possible that a main entrance road might be developed from the south and Indio or Mecca be preferable as the clerical and administrative headquarters. It seemed desirable to remain uncommitted to Twentynine Palms and not accept donated land but lease property as needed.[4] The final completion papers in connection with the donation of

---

3. Superintendent, JTNM, to Chief, Western Office, Division of Design and Construction, NPS, Dec. 6, 1955, RG 79, FARC, Laguna Niguel, Ca., p. 2.

4. John R. White, Regional Director, to the Director, NPS, Feb. 11, 1941, Central Files, 1907-49, RG 79, NA.

the oasis were not submitted and the deed recorded until May 1950. In this manner the National Park Service acquired 57.839 acres of the historical Oasis of Mara.

In November of that year construction started on the walks and walls around the oasis area. By May 1951 6,000 feet of block wall around the oasis had been constructed and by June concrete curbs around the headquarters parking area had been completed and the parking area paved. In October 1953 construction on the administration building at the east end of the oasis began with appropriate groundbreaking ceremonies. The building was completed in February 1954 and the dedication ceremony held on April 3 with a crowd of over five hundred people in attendance. An addition to the visitor center--the concrete block area now housing exhibits and offices--was completed in early 1964. The headquarters site at Twentynine Palms contains the monument administrative offices, a visitor center with exhibits and salesroom, a maintenance facility and museum storage area, and is the takeoff point for the Oasis Nature Trail.

3. Ranger Stations

The office and contact station in the Cottonwood District was completed by August 1964 and the Indian Cove ranger station in 1968. The Lost Horse fire guard station, built in 1953, and the adjoining residence, built in 1947, were part of an inholding that the National Park Service bought from Charles L. Stokes in 1958.

4. Employee Residences

Three employee residences around the Cottonwood District headquarters were completed by January 1964. A residence at the Indian Cove ranger station was finished in 1968. As of 1976 the monument contained eight quarters--five at Cottonwood Spring, one at Lost Horse, one at Indian Cove, and one at Keys Ranch. Cottonwood and Keys Ranch have mobile homes as opposed to "constructed" buildings.

B. Miscellaneous Structures

1. Aircraft Warning Stations, Viewfinders, Plaques

A special use permit was issued to the U.S. Forest Service to install two aircraft warning stations in the monument for the Fourth



Illustration 146.

Exterior of Signe Ohlson home in monument, 1975. Courtesy JTNM.



Illustration 147.

Ohlson home, 1982. NPS photo by Linda W. Greene.

Fighter Command, U.S.A. In February 1943 the Split Rock aircraft warning station was activated and then deactivated in October. The Pinto Basin aircraft warning station was activated in March 1943 and closed and moved out in September. In 1951 viewfinders and a descriptive text were installed at Salton View. On May 30, 1955, a memorial plaque sponsored by the Joshua Tree Women's Club was dedicated at the overlook in memory of Mrs. Sherman Hoyt.

2. Ohlson House

In the northwest quarter of Section 3, T2S, R8E, is the Ohlson property, containing the burned-out shell of a brick house faced with pink stucco. The house ruin is filled with rubble and old metal parts. Nearby is a concrete building platform, perhaps the remains of a storage shed, around which are strewn the remains of dynamite boxes and some lumber. A cistern about 2½ feet in diameter lies south of the house and toward the wash that runs along its west side. Across the wash from the house is a bank of small caves formed by the erosion action of water flowing in the branch of the wash that runs in front of this rock cliff below a manmade dam. The Olsons made a patio out of the cave area by placing lawn chairs under the rock overhang. One of the small caves is walled in with masonry as if it had been used as a storage area. Faint pictographs can be seen on the rock wall behind the chairs and the ceiling of the overhang is fire blackened. In front of one of the caves is a bedrock mortar.

The house is not considered historically significant and is an intrusion on the natural scene and on an archeological site. It should be obliterated subject to archeological control to insure complete protection of the prehistoric resource.

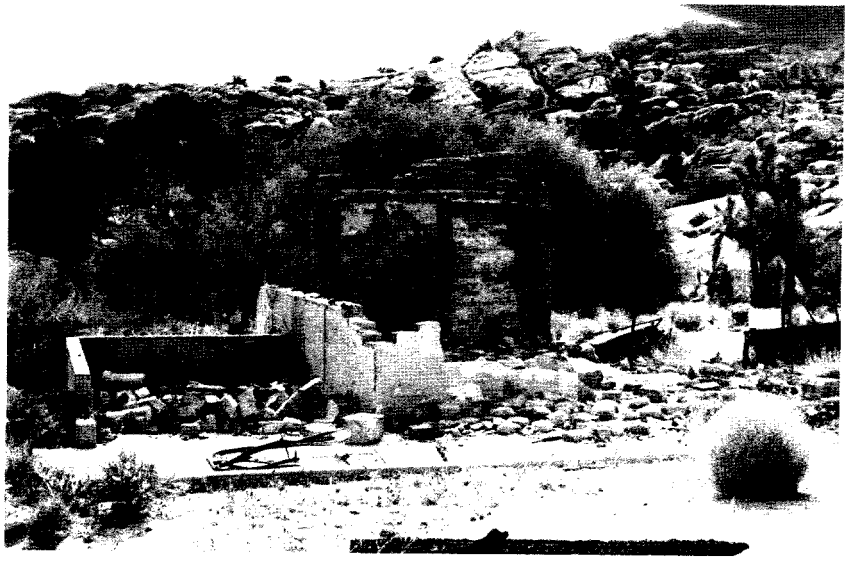


Illustration 148.

Ruins of Ohlson home, 1982.



Illustration 149.

Area of pictographs near Ohlson home. NPS photos by Linda W. Greene.

XII. Other Historical Resources

A. Desert Queen Ranch

1. Origins of William F. Keys

Bill Keys's relationship with the Joshua Tree National Monument area was long, intimate, and unique. He arrived while the land was wide open and grass was knee-high, when neighbors were few and far between, and when a high degree of self reliance was absolutely essential for survival.

Keys's origins are somewhat unclear. His daughter relates two different stories of his birth. Her father told her that he was born in Palisade, Nebraska, in 1879 of parents who had migrated there from Virginia.[1] His name at birth was George Barth. In a later interview, Mrs. Pat Garry said that his parents were German millers who moved to Russia, where all but one of their children were born. She states the family did not emigrate to the United States and settle in Nebraska until Keys was a teenager.[2]

Some time during his teen years, an urge to see new places drove Keys farther west. He supported himself by working as a ranchhand. Reaching Colorado, he became deeply interested in prospecting and mining. Moving on to Phoenix, he enlisted in Teddy Roosevelt's Rough Riders, changing his name to William Key at this time. Because of a hospital stay, he never saw action, however, and began drifting around Arizona instead. He worked in the copper mines and smelters of Jerome for almost two years.

Keys then moved to Needles, California, where he worked on a cattle ranch and from the Indian cowboys there learned their language and much about their culture. Returning to Arizona around

---

1. "Life Story of Bill Keys, as Told to His Daughter, Pat Garry," Desert Journal (Joshua Tree, Ca.), Oct. 4, 1956.

2. Garry interview, Mar. 3, 1976, in JTNM files, p. 1.

1901 he worked for another cattle company and acted as a deputy sheriff of Mojave County in Arizona Territory. Ultimately Keys decided to concentrate on mining, and after working a while in Arizona headed up toward the Rhyolite, Nevada, area and then over into Death Valley. He located several claims there over the next year or two, including the Desert Hound Mine, which became the focus of a large-scale mining hoax that resulted in the infamous Battle of Wingate Pass. This fiasco was cooked up by Death Valley Scotty, a desert prospector and notorious con artist, to sell a bogus gold mine to Eastern capitalists. In an effort to discourage the Easterners from their insistence on seeing the mine before making a decision, Scotty decided to scare them off with a fake ambush and enlisted Bill and another man to shoot at the expedition, without hitting anyone, as it entered Death Valley. Unfortunately for Keys, his fellow ambusher wounded Scotty's brother, and the resulting outrage resulted in the arrest of Scotty, Keys, and his partner. All charges were finally dropped. Although no indictments ever resulted, the incident cast a pall over the reputations of all concerned.

Keys later sold his Death Valley claims to the Boston-based Key Gold Mining Company. Over the next several months he traveled throughout California, from Randsburg up into the Mother Lode country of the Sierra Nevadas, and finally into the High Desert area of the Mojave. Around 1910, and possibly as early as 1908, he was involved in prospecting in the Bullion Mountains north of Twentynine Palms and in working as a cowboy for one of the cattle companies in the area. At Twentynine Palms he met Joe Reynolds, who invited him to participate in the spring roundup. Every evening Keys hiked from camp at Twentynine Palms to the Desert Queen Mine, where he became acquainted with the watchman and the owner, William Morgan. After the roundup, Keys leased Reynolds's Crown Prince Mine south of the Queen Mine. (About this time [1911] Keys also leased the Tully Mine in the present monument area.) Ore was hauled from there to the Bryant roller mill in Twentynine Palms. Keys also hauled ore there by burro for C.W. Roach, who was operating the Desert Queen that summer. Phil Sullivan and family

operated the cookhouse at the mill. After Roach left the area for Los Angeles, Keys began to "watch" the Queen Mine.[3]

2. Keys and the Desert Queen Ranch

Keys worked as a watchman and assayer at the Desert Queen Mine for several years, taking care of the mine, machinery, and mill site. After his employer's death, Keys acquired ownership of the mine in lieu of back pay. This writer assumes that the Desert Queen mill site in the Cow Camp area, about six miles west of the mine, was included in the deal.

Evidence in the form of pictographs and rock cairns indicates that the Cow Camp area had earlier been frequented by Indians. Improvements there when Keys took over the property consisted of the original McHaney five-stamp crushing mill, a well, and three adobe buildings built by the McHaneys in the mid-1890s when they were using the land as pasturage for their cattle. The precise year that Keys started working at the Desert Queen Mine is unclear. He might well have started as early as 1910--the year Mrs. Keys once stated he had begun living at the ranch site.[4] The McHaneys had probably never legally filed on the land, but utilized it for the period of time they ran cattle and operated the Desert Queen Mine. It is possible Keys started living there in one of the cabins while watching over the Desert Queen mill site for William Morgan. During the time the McHaneys occupied the property, it was known variously as Piñone Ranch, the Old McHaney Cow Ranch, the Desert Queen, and the Queen Mill.

The McHaneys ultimately left the ranch, and in 1916 Keys filed on an eighty-acre homestead that included the mill site. Sometime

---

3. Keys, "A Brief Sketch of the Life of Wm. 'Bill' Keys," September 1962, p. 12.

4. Mrs. W. F. Keys to United States Land Office, Department of the Interior, Sept. 14, 1944, Central Files, 1907-49, RG 79, NA.

around 1913 possibly, Keys erected a small frame home (either from scratch or using an already existing shack) with a stone chimney and set up housekeeping with Frances Lawton whom he met on a trip to Los Angeles and married in 1918. Together these two resourceful individuals built a comfortable home, raised a large family, and indelibly left their mark on the desert they loved.

Keys, who finally added an "s" to his name during this time, had gradually been building up a small herd of cattle. In addition he raised horses, mules, and burros. These animals, used as pack animals and to pull wagons, were corralled in rock-enclosed valleys north of the ranch. Goats provided meat and dairy products. Domestic rabbits and chickens were also raised for food. To water his livestock, and for domestic and gold-milling needs, Keys created a reservoir behind his house by erecting dams across washes. He also developed several springs and water holes and dug additional wells. He continued to homestead more property until he had acquired 880 acres of beautiful choice mountain and desert land.

No towns of any size existed near the Keys homestead. Because of the distance to Banning, over primitive dirt roads, the Keyses had to provide much of their own food and other necessities. In the early years, except for occasional prospectors and cowboys, few visitors penetrated their splendid isolation. Guest houses were eventually built to house relatives, acquaintances, and tourists who dropped by. The family adapted beautifully, and thrived. The entire Keys Ranch area is an example of modifying a harsh environment to provide the necessities of life. The concrete dam northeast of the ranchhouse stored water from seepage and rainfall. This reservoir was later stocked with bluegill, bass, and catfish. Water collected in this reservoir was channelled through pipes to a garden and orchard. The latter contained apple, peach, apricot, pear, crabapple, and prune trees. Grapes and all kinds of berries grew. The garden was filled with corn, tomatoes, beans, squash, turnips, beets, carrots, cucumbers, melons, peanuts, kale,



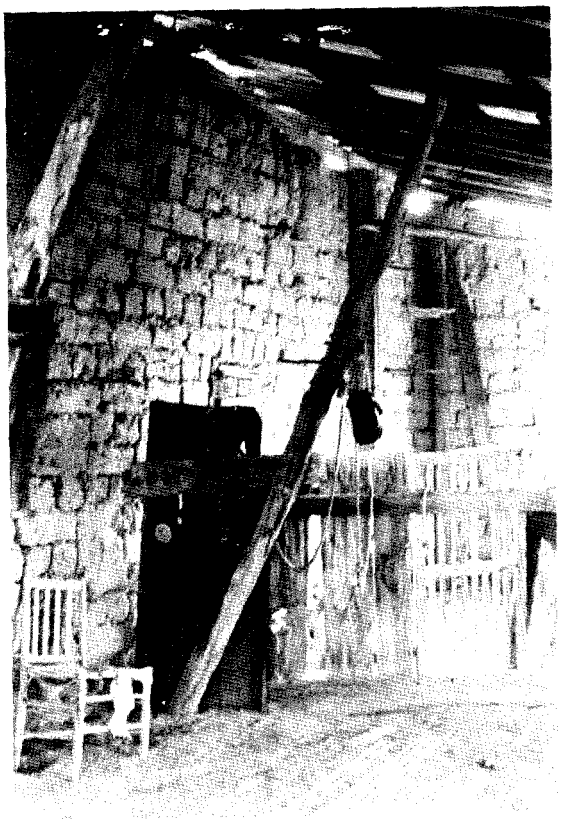


Illustration 150 (top).
Keys ranchhouse, 1982.

Illustration 151 (bottom).
Interior of adobe barn at Keys Ranch. NPS photos by Linda W. Greene.

lettuce, dill, and asparagus.[5] Produce from these areas was canned or dried, and some of the excess was sold in Yucca Valley. Oats, barley, wheat, and alfalfa were grown and the grains milled at the ranch.

Keys's cattle, numbering less than 100 head, ranged over the Queen and Lost Horse valleys and over to Quail Spring in the summer and were sheltered in lower Pleasant Valley during the winter. Keys kept Pinyon Well in operation and pumped water from it into a Pleasant Valley water trough. Keys's cattle-raising efforts were the foundation of many of his problems, first with other cattlemen and later with the federal government. As his herd grew, he erected fences around some of his land and water holes. This cut down on the amount of open range and water available to other cattlemen in the area. In retaliation Keys's cattle were often stolen or shot and his fences cut.

The family's principal source of income during the early years was mining. Keys acquired many properties throughout the monument. He worked several mines at different times and hauled the ore to the ranch by horse and wagon for milling. Many of his properties were periodically leased to companies and individuals. The lessees would bring in stoves and other equipment to furnish their small cabins. When they left, Keys often dismantled the cabins, removed the lumber, and took the furnishings to his ranch. In this way he also acquired all kinds of machinery (compressors, drills, mine cars, hoists, wagons, and trucks) that enabled him to mine profitably. The ranch became a phenomenal junkyard as Keys routinely brought in equipment and building supplies from abandoned mining and homestead sites. Much of this salvaged material was used in repair work and the construction of buildings at the ranch. The rest was stored on the ground for future need. Keys reportedly bought an entire junkyard at one time and hauled it to the ranch, where the trays of nuts, bolts, washers, and the like now sit rusting in the parching desert sun. Keys also owned the Wall Street two-stamp gold mill, located between his ranch and the Desert Queen Mine. There he did custom milling and assessment work for other miners.

---

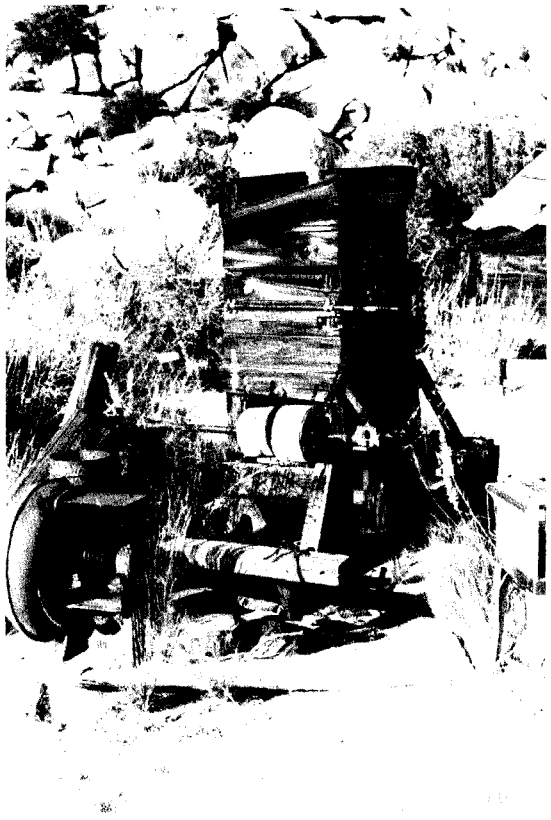
5. Garry interview, Mar. 3, 1976, p. 34.

To ensure a decent education for his young family, Keys hired school teachers for several years beginning in the early 1930s, originally utilizing a cabin at the ranch for a schoolhouse. Later a regular school building was erected. The county declared it an emergency school and provided a teacher. A few children from neighboring homesteads also attended. The school was finally discontinued in 1942.

Although Keys had previously gotten into arguments over boundaries, waterholes, and loose stock that resulted in shots being exchanged, it was not until the 1940s that anything serious occurred. Late in the 1930s Worth Bagley, a retired Los Angeles lawman, moved onto a neighboring homestead. For whatever reason, ill feelings immediately grew up between him and Keys. Some of Keys's stock was shot, and in 1943 a gunfight occurred in which Bagley, who by then nurtured a deep-seated obsession to murder Keys, was killed. Convicted of manslaughter despite his plea of self-defense, Keys was sent to San Quentin Prison, from which he was paroled in 1948. With the help of lawyer-writer Erle Stanley Gardner and other influential people, who found new evidence supporting Keys's innocence, Keys eventually obtained a full pardon in 1956.

Returning to his ranch, Keys picked up the threads of his old life. He undertook further improvements, building two more dams behind his house, increasing his orchard and garden areas, continuing assessment work on his mining properties, raising the wall of Barker Dam, manufacturing adobe, and temporarily reopening the Wall Street mill (1966).

After Frances Keys died in 1963, Keys continued to live at the ranch. He hoped to one day turn it into a fishing and recreation resort by creating more small lakes along the creek near his house. Although this dream never materialized, the ranch became a favorite camp and picnic spot for Boy Scout and other youth and civic groups and clubs. In 1964 Keys sold the ranch to a man from Los Angeles who eventually traded it for government land elsewhere. The ranch then



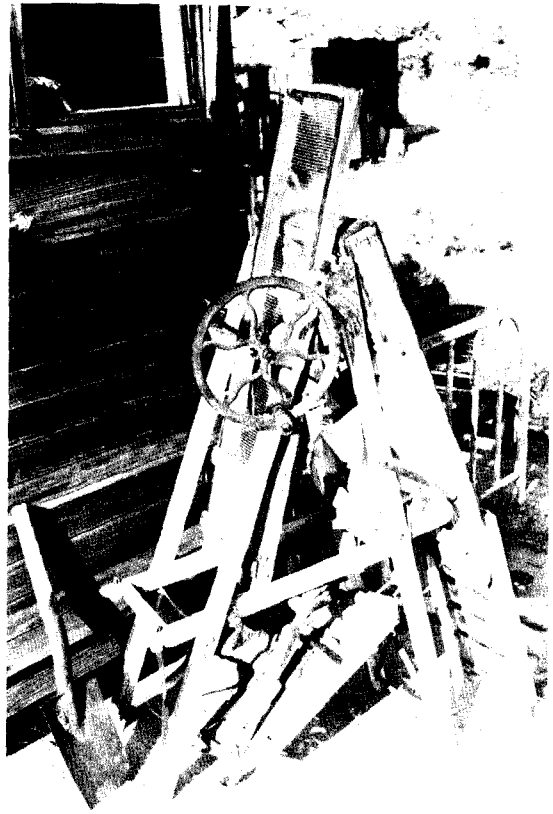
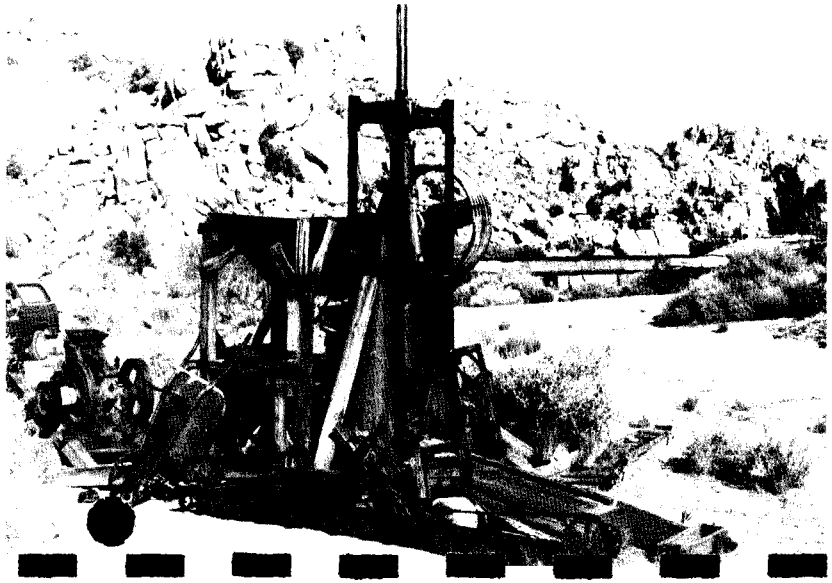
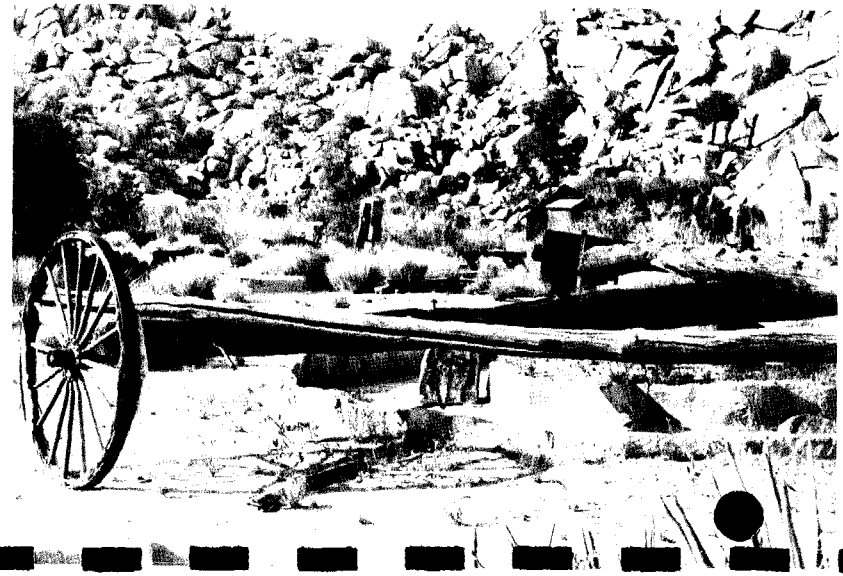


Illustration 152.
Some of the mining equipment at Keys Ranch, 1982. NPS photos by Linda W. Greene.





became part of Joshua Tree National Monument with Keys having life tenancy. He died in 1969, just short of his ninetieth birthday. Bill and Frances Keys and three of their sons are buried in the family cemetery at the ranch.

3. Keys's Impact on Area

Keys's impact on the land and history of the national monument was widespread and lasting. In addition to his large ranch complex, he built several roads, including the one to the overlook atop the Little San Bernardino Mountains that offers a majestic view of the Salton Sea, Coachella Valley, and Colorado Desert south of the monument. Keys was the only settler in the monument who gained a comfortable long-term livelihood from his livestock, homesteading, and mining ventures. His success was due not to luck or chance, but to the type of individual he was. Ambitious, independent, self-reliant, a hard worker, and a man quick to take advantage of any opportunity presented, Keys was able to eke an existence from the desert unaided by pension or welfare checks, by working with it, realizing its potential for adversity, yet appreciating its natural beauty and assets.

Keys's relationship with National Park Service personnel was volatile in the early years of the national monument. That is understandable when one remembers that Keys had already been living on the land for twenty-five years and was used to being able to run his operations as he pleased. He could not be expected to be amenable to attempts to suddenly limit his cattle grazing, open his water holes to the public, and restrict his homesteading and mining activities.

Keys's cattle had always grazed in Lost Horse Valley, which unfortunately was one of the most scenic areas of the monument. Keys also found himself in violation of federal law when timbering his mine shafts with native trees--an action natural for a desert miner and prospector but contrary to National Park Service regulations. Keys thought it was unfair of the government to remove so much land from the public domain and exclude its use by cattlemen and miners. He believed his cattle should be able to roam at will over Lost Horse and Queen

valleys, grazing from one water hole to another as weather and forage conditions changed--just as they had always done. He felt he had a legitimate right to sole use of the water in Barker Dam because of the improvements he had made there and because he had been using it for so long. He also resented that many of the mining properties on which he had kept up assessment work through the years were invalidated and he was forbidden to work them. He was especially disappointed that his patent application for the Desert Queen Mine was turned down.

It was a difficult situation for monument personnel, also, who had to make a sincere effort to enforce regulations but who at the same time often wanted to be lenient with old-timers in the area. The cattle issue pretty much resolved itself in the 1940s as the effects of overgrazing and a decline in rainfall mitigated against successful cattle ranching. Keys's involvement in this activity was further restrained by his indictment for the murder of Worth Bagley and his absence from the area for the five years between 1943 and 1948. Keys appeared to mellow during his years at San Quentin and in later years became much friendlier with monument personnel. Both parties were, after all, highly appreciative of the abundant resources of the area.

4. Evaluation of the Desert Queen Ranch

a) Anthropological Concerns

In 1977 Country Nodes: An Anthropological Evaluation of William Keys' Desert Queen Ranch was published by the National Park Service. Its author, Patricia Parker Hickman, set forth in this work an argument for the anthropological and ethnohistorical importance of the site as a source of data important to an anthropological understanding of certain patterns of human behavior in American history. On the basis of this perceived value, Ms. Hickman determined the site to be of regional significance.

The application of anthropological terms and concepts to explain human behavior at Keys Ranch in response to social stimuli and to economic and technological changes that are known to have occurred during a certain historical period detracts from the main values

for which the site is important within the history of Joshua Tree National Monument. The lack of a sound and complete historical data base, which is a prerequisite to behavioral studies, makes many of the assumptions in Country Nodes questionable. The historical research on Keys Ranch on which that study was based comprised primarily family reminiscences, secondary documentation, and overviews. The lack of data in Country Nodes for instance, in regard to mining activities is clear both in the paucity of data presented and in some of the inaccuracies in the text and on the maps.

Certain hypotheses in the Hickman report need to be reevaluated in light of historical data obtained during research for this historic resource study that do not support, and sometimes even contradict, assumptions and interpretations of the anthropological report. Specifically, on the basis of more in-depth historical research, it is difficult to accept

1. the strong emphasis on a continual competition between Keys Ranch and the neighboring communities of Twentynine Palms, Joshua Tree, and Yucca Valley (p. xviii) and between the Desert Queen Mine/Keys Ranch and the Lost Horse Mine/Ryan's Ranch (p. 14);

2. the statement that Keys built up a social network that extended throughout southern California and to the Pacific Coast (p. xix);

3. the suggestion that Keys always carefully weighed his actions in terms of what his return on the investment would be--strategies that are in anthropological terminology referred to as generalized reciprocity, negative reciprocity, and the like (pp. 12-13);

4. the determination that Keys's affinity toward old-timers in the area and his minimal involvement with residents of Twentynine Palms was a conscious effort to disassociate himself from that

community (p. 15) rather than merely due to his limited ability to socialize because of distance from town and understandable feelings of stronger kinship with those who entered the area when he did. Keys was also too busy to socialize to any great extent. Furthermore, home was almost completely self-sufficient--minimizing this loner's need for closer relations with townspeople;

5. that there was ever any conscious effort by Keys to develop his home as a "major interaction node in the region" (p. 16).

6. that a pattern of collective "non-local" ownership of mines had been characteristic of the Joshua Tree region since the 1870s (p. 20);

7. that Keys's filing on Cow Camp and his acquisition of the Desert Queen Mine should be dwelled upon as a planned strategy toward a shift in status from "employee, outsider and newcomer" to landowner (p. 28). The records indicate that around 1916 the question of disposition of the mine property was in the courts, and, because Keys had not been paid for the last few years it was decided he should be given the property. Also at this time Cow Camp was finally vacated by McHaney and the land, over which McHaney had no legal control, was open to filing. Keys's actions in taking these properties seem to be perfectly logical for a man who desired to settle in the area, who was familiar with these tracts, and who took advantage of their being vacant;

8. that strong emphasis should be given to "hostile interaction" and "zones of tension" as constant factors in relationships between mining communities and mills as they competed for natural resources from surrounding areas in the monument (pp. 29, 63-64). There is simply no evidence that this was a major problem;

9. that the aggrandizement of mining claims by Keys was done to insure his staying power over his rivals (p. 40)--these claims were for a while his primary sources of income; and

10. that he hoarded material goods as a form of display, a statement of his material wealth and status (p. 79). Retrieving abandoned material that could be used for repair or construction has long been typical of desert mining camps and other isolated communities where people live far from sources of supply.

Part of the premise in Country Nodes for the importance of Keys Ranch for study is an assumption that it was closely involved in and influenced by regional developments. Thorough historical research has shown that this simply was not true to the extent assumed in Country Nodes. Nor is it true that Keys exerted a sizable influence in the region. Historical evidence does not support considering the ranch a "node" in which "regional networks of social interaction were centered."

Keys's mining activities in the region cannot be considered to have been important outside the general monument area. He owned several mining properties, but his operations were small and only minimally productive, although he did derive some income from them. His most important contribution in that area was probably the custom milling and assay work that he performed for other individuals. Although cattle operations may have been economically important to some ranchers in the region at one time, Keys's stockraising efforts were sufficient only to fulfill his personal needs--he usually ran less than 100 head of cattle. His subsequent problems with other cattlemen and the federal government were not of regional consequence but were a direct response to efforts to curtail already low-scale operations that he felt were essential for his family's personal welfare. Keys never, as far as the historical evidence indicated, attempted to become an important cattle raiser in the region or to compete in either mining or ranching on a regional level. The exaggerated sense of Keys's economic and social influence in the region as presented in the anthropological study detrimentally influenced judgements about Keys's actions and those of his family.

In Country Nodes, the anthropological importance of the site is based on supposedly characteristic responses by its occupants to "culture contact, frontier and developmental situations" that could be expected to be similar to those of people undergoing like experiences, thereby proving the commonality of human behavior on the frontier and resulting in an identifiable set of responses by early settlers to changing socioeconomic situations in remote areas. First a determination should be made as to whether the Keys family epitomizes common reactions to frontier settlement processes. If they do, then such a study might have value beyond the local level. However, this type of detailed comparative analysis was not carried out, and indeed its use for management and interpetive purposes would be negligible. It is acknowledged by a variety of people, however, that Keys was a unique individual, proven by the fact that he was able to succeed where so many others failed. Were his and his family's motivations and responses to their environment and its challenges, therefore, not unusual, differing markedly from those of other settlers attempting to live under the same conditions? The comparative value of such a detailed study would then be limited. For this reason Keys's Ranch can only be valuable when studied in a local rather than a regional context.

The emphasis of the anthropological report on calculated personal relationships, ever-changing statuses and roles in relation to fluctuations in the socioeconomic system, and other complex behavioral analyses are irrelevant to the ranch's role in the history of the monument. Keys's efforts to make a proper life for himself and his family seem to be viewed too heavily as schemes and planned strategies to improve his power and status than as natural reactions of an ambitious and fiercely independent individual to existing situations and opportunities. Keys's Ranch was not in competition with other communities. Its growth as a separate self-contained entity began long before other towns existed and was necessary because of its distance from supply sources; its decline was not due to overshadowing by competing towns, but to Keys's family growing up and leaving home, his jail term and absence from the area, the onset of old age, and to a changing set of historical and environmental conditions over the fifty years he lived in the monument that made obsolete most of his former lifeways.

building material was scavenged from abandoned mines and homesteads. The buildings were piecemeal and patchwork assemblages with no foundations, comfortable but insubstantial to be sure, and certainly not executed in any recognizable architectural style.

Preservation by major stabilization and repair also appears to be a futile recourse because of the vast amount of money and time involved and the fact that it would be only a temporary expediency. In harsh economic times it is difficult to justify such expenditures of government money on professional preservation of flimsy structures of only local significance. Ultimately the machinery and odd bits of furnishings left on site will deteriorate to such a degree that they will become useless for interpretive purposes and eyesores on the landscape. In the long run, it has been recognized, the historical scene that now exists cannot be preserved, simply due to the nature of the resource. Eventually the structures will fall and the site will deteriorate and be restored to its natural condition.

In the meantime only minor repairs, continuing maintenance, and structural reinforcing have been performed, primarily for safety reasons, but also in an attempt to extend the life of the structures. The problem then arises as to how much repair work should be done. Because visitors do not need to enter the buildings to acquire the flavor of the spot, some reinforcing (but no major repair of fabric or hardware) could take place inside the structures and not be visually intrusive or objectionable. By keeping visitors away from the buildings and only permitting access to the area through controlled conducted tours, a minimum of safety-related work would have to be done.

The ranch's picturesque setting, its ability to impress upon visitors the realities of life in that area in the not-too-distant past, and the curiosity to see the site first-hand after viewing the movie Challenge of the Desert at the visitor center, convince this writer that the ranch should be used interpretively as long as possible. It is one of the primary historical resources of the monument and important enough to justify minimal expenditure related almost totally to life safety measures

and not to a major overhaul or aesthetic concerns. The philosophy in the past has been, and should remain in the future, to perform minimal selective work to slow down the action of the elements, preserving the ranch as long as possible as a unique interpretive resource--a monument to one man's adaptation to, and unity with, the desert. It is strongly recommended that no deliberate demolition or substantial alteration take place until the integrity of the resource is irretrievable. At that point structures that have fallen or become dilapidated beyond interpretive use can be removed after consultation with the Advisory Council on Historic Preservation. Even when all structures are gone, the site can be interpreted through an on-site exhibit.

In 1974 the ranch was declared a Point of Historical Interest by San Bernardino County. Two years later an interdisciplinary team of cultural resource specialists visited the ranch to select a museum collection out of the vast amount of significant late-nineteenth- and early-twentieth-century mining and agricultural implements at the site. This array of items was especially valuable because they all still had their original relationship to each other. The tools were in close association to the areas where they were made and to the equipment they were used to make. Historically or technologically significant artifacts were documented as to original site, then removed from the site to the monument collection room in the garages in the headquarters compound. Many artifacts of lesser but still notable importance were left on site and will be allowed eventually to recycle into the desert. Others were identified as items that could be loaned to other Park Service areas for interpretive purposes. The ranch area was mapped, recorded, and photographed during the Keys Ranch team project of April 1976. A Section 106 proceeding on the recommendation that the National Park Service not attempt to preserve the buildings, which are considered unpreservable to National Park Service standards, is needed. Also required is further documentation of the structures by detailed mapping, preparation of measured drawings, and additional photography to mitigate the eventual loss of the resource.

The importance of Keys's Ranch is its association with Keys, not necessarily as a symbol of him but as a monument to man's ability to adapt. The ranch is important because it is what enabled Keys to succeed. It represents what one unique individual accomplished in the way of adaptation to a hostile environment. The extent to which Keys improved the property and succeeded in making a living there is what makes the site important interpretively and historically as an unusual early twentieth-century desert homestead. The existence of Keys Ranch is due to the fact that Keys, in an arid region, acquired abundant water--that life-saving commodity that permitted stockraising, the cultivation of food, and the milling of ores. Keys's actions and relations with his neighbors, while open to as much conjecture as anyone else's in terms of psychological motivation, were primarily aimed at minding his own business and sustaining his chosen lifestyle rather than making himself all-powerful in the region. Certainly he was aware of his impact on and contribution to the area and undoubtedly felt that he had to actively fight the encroachment of civilization to preserve his lifestyle, but it is difficult to believe that he was so concerned with social position that every action he took was aimed at maintaining a certain status in the region.

If Keys had not been as hard a worker or as ingenious a thinker, as skillful a laborer or as determined a rancher, as good a miner or as astute a businessman, the ranch would never have existed. These are the qualities of Keys's life that should be studied and interpreted and that are preserved through the ranch. The ranch's primary importance, therefore, is due to its association with Keys and its status as an uncommon twentieth-century desert homestead and ranch. Significance of the site can easily be justified on the local level, but hardly beyond that. Keys Ranch is what Keys made it, not out of a desire to create a significant "interaction cluster," but to create a comfortable life and niche for himself and his family.

It is furthermore not the responsibility of the National Park Service to perform pure as opposed to applied research. In fact, the Service requires that research it undertakes and funds be mission-oriented, which some of the research proposed in Country Nodes is not.

In the first part of Ms. Hickman's study the Keeper of the National Register is quoted regarding the wealth of source material available on Keys Ranch usable to several disciplines. Although there is a fair amount of material on the ranch and its occupants, much of it consists of reminiscences, news articles, and hearsay. It is often not very dependable, as Ms. Hickman herself realized. Her statements that "that someone said something is a piece of information regarding the purported event and the person speaking, regardless of its factuality," and that she did not "propose that everything which follows is 'true' in the sense that it actually happened," are perhaps the most telling remarks concerning the validity of this study.

b) Recommendations for Management

This report will not present a detailed listing of buildings and artifacts at the Desert Queen Ranch. Several inventories of the ranch complex and studies by the National Park Service adequately describe the resource, with the best guide probably being "Keys' Desert Queen Ranch, Joshua Tree National Monument, Preservation Study," written by the Historic Preservation Team of the Western Region, National Park Service, based on a study commenced in 1974. The complex consists today of buildings, sheds, dams, mining machinery, and miscellaneous tool and equipment parts associated with ranching and mining.

Keys's Desert Queen Ranch was determined, unquestionably, to be of local historical significance in terms of Agriculture and Industry (mining) and was entered on the National Register of Historic Places on October 30, 1975. A major question concerning the resource was whether or not attempts should be made to preserve the structure, and if so, how this objective could be accomplished. The several buildings of the ranch complex are slowly melting back into the desert. National Park Service cultural resource specialists determined that any attempt at restoration would result in a resource in much better condition than the original structures and therefore an inaccurate representation of the original homestead. Another factor making accurate restoration infeasible is that the buildings were mostly unpainted frame, with some adobe and stone used. Much of the



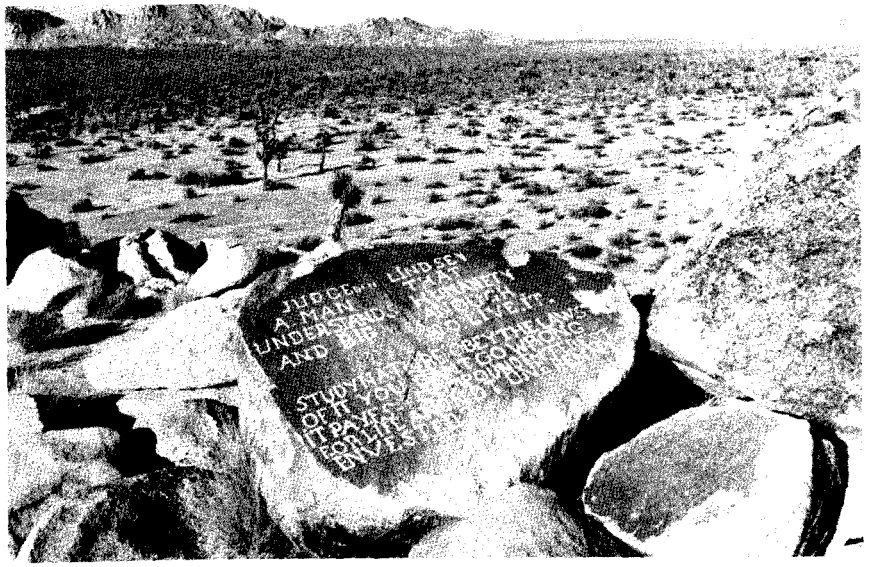
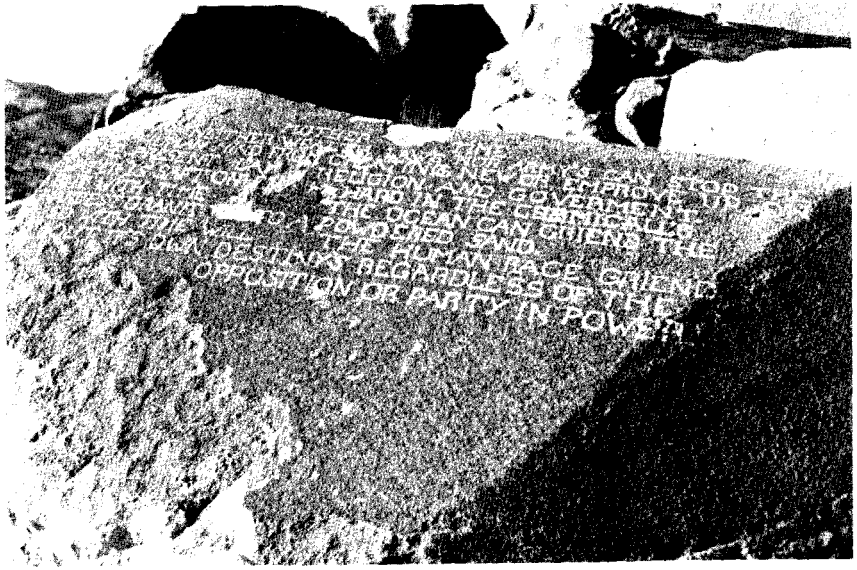


Illustration 153. Samuelson's Rocks, 1972. Courtesy JTNM.





B. Samuelson's Rocks

1. History

John Samuelson was a Swedish gentleman who around 1926 worked with Bill Keys at the Hidden Gold Mine below Keys View and lived at the Keys Ranch. After working for a time at the Desert Queen Mine around 1928 he took up a homestead near Quail Spring. It was during this time that he chiseled politically oriented sayings on eight nearby flat, smooth rocks in a boulder field. One of the inscriptions is dated 1927 and certainly their economic theme places them as having been executed during the years leading into the Depression. One writer states that in 1928 Samuelson sold his homestead and moved to Los Angeles where a year later he killed two men during a fight and was sent to Mendocino State Prison. He escaped from there in 1930 and fled to Washington State, where he eventually died from injuries received in a logging camp accident. (This information does not agree with correspondence found indicating that he was working the Hidden Gold Mine in the late 1930s.)

2. Importance

These inscriptions are an interesting type of folk art and an interesting commentary on the hard times and bitterness of the Depression. Inscribed in a Gothic-type lettering, they remain well preserved primarily due to their distance from main roads. One writer stated that

> for a man who lived and died in obscurity, John Samuelson managed to leave a legacy of thought and attitude more enduring than most men leave. However simple his statements (and the laborious process of transcribing them must have encouraged the discipline of succinctness), they encapsulate the feelings of a whole age in American history.[6]

---

6. Walter Houk, "Writ on Rock" (journal and date unknown), JTNM files, p. 54.

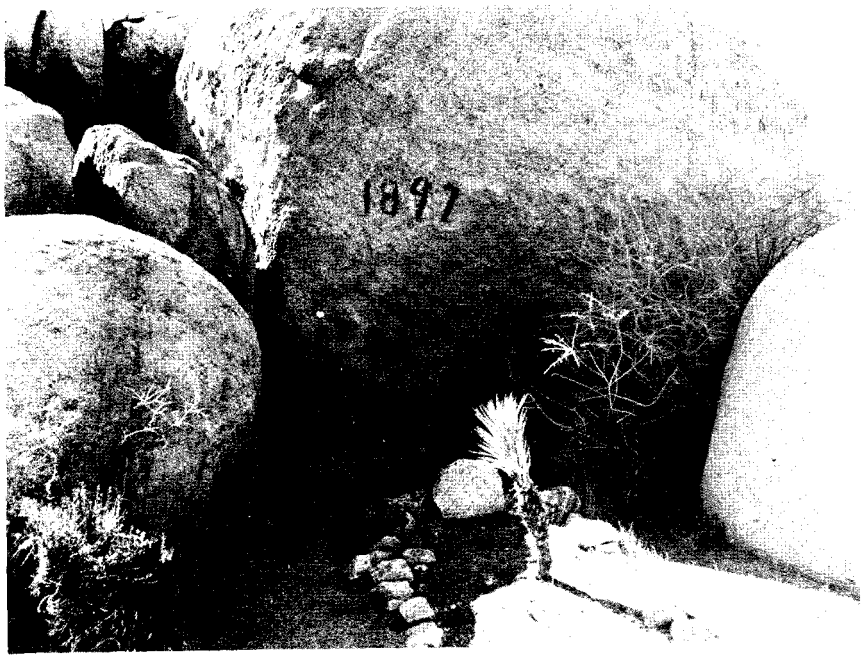


Illustration 154.

Grave at Lost Horse Well, n.d.



Illustration 155.

Grave at Lost Horse Well, 1967. Photos Courtesy JTNM.

C. Graves

Ordinarily cemeteries or graves of historical figures are not considered eligible for the National Register unless they are integral parts of districts that do meet the criteria or it is a grave of a historical figure of outstanding importance and there is no other appropriate site or building directly associated with his productive life.

1. Ryan's Ranch

Local legend holds that several people are buried at Ryan Ranch. Art James, shot to death soon after his discovery of the Desert Queen Mine, was reportedly buried near the old Lost Horse Mine headquarters on the west slope of Ryan Mountain, near a group of boulders. Above his grave a date was painted on the rock face. It is said that the boulder once read "James 1893." Currently the date 1897 is found among the boulders alongside the road to the ranch. A former superintendent of the Lost Horse Mine also was supposed to have been buried at the camp at the well, then referred to as Langville. Les Earenfight stated in an interview that five Mexican miners killed during an altercation there were buried at the ranch and their names painted in red on these same rocks southwest of the house. It is obviously unclear who, if anyone, is actually buried at the ranch. In 1966 a park ranger counted eight graves. No recommendations are made for the protection of these structures because the data surrounding them is so uncertain.

2. Matt Riley

Matt Riley, a miner about forty years old, and a fellow worker at the O.K. Mine in the Dale Mining District decided to walk to Mecca to celebrate the Fourth of July 1905. They took only one canteen of water to sustain them during the sixty-mile walk. The other fellow decided to return to the O.K. after only about twelve miles, but Riley pushed on. On July 6 his body was found by a teamster under a bush near the Mecca/Cottonwood Spring road fork. Riley's trail of footprints indicated he had been within a mile of the spring, probably suffering from heat and thirst, when he became confused and turned back north. Some claim that Riley was carrying bourbon, not water. Riley is buried about one-quarter mile west of the Cottonwood residential area alongside



Illustration 156.

Matt Riley's grave, n.d.



Illustration 157.

John Lang's grave on Keys View road, n.d. Photos courtesy JTNM.

the old wagon road. His grave is outlined in rocks. A wooden board supported by metal posts serves as a headstone under a juniper tree. Although Matt Riley was not a locally significant character and his gravesite is not eligible for the National Register, it should be protected. The site of his grave serves as a reminder of the mining traffic that moved through this area and of the hardships faced by desert dwellers, especially those who did not take sufficient precautions.

3. Johnny Lang

Between 1917 and 1926, Lang lived in the old cookhouse at the Lost Horse Mine. Whenever he was hungry he would go out and shoot one of Barker's cattle. As time passed, Lang became sick and had trouble keeping himself fed. In January 1926 he set off for town and, apparently weak from lack of nourishment, died. His mummified body was found wrapped in his bedroll about two months later by Frank Kiler, Jeff Peeden, and Bill Keys. A grave was dug and he was buried on the spot. Keys ultimately replaced the original weathered marker on Lang's grave with a white-painted headboard with Lang's name and the dates "1853-1926." Later Keys placed a rough granite slab there, but for some reason changed the death date to 1925. The grave is roughly two miles from Cap Rock Wye, west of the road to Keys View, and about one hundred feet north of the Lost Horse Mine road.

Johnny Lang was a prominent character in local history and especially in the early development of the national monument area. He located one of the earliest and most productive mines there--the Lost Horse--and although he sold his interest in it, he remained closely associated with the mine throughout its history. Stories linking him with early saloon-keeping and gold thievery have assured him a prominent place in the oral and written traditions of the region. His grave is not considered eligible for the National Register. It is felt that Lang is forever memorialized by the existence of the Lost Horse Mine complex. The Lost Horse Mine itself is so directly associated with him that its placement on the National Register is as much a memorial to him as to the Ryan family. Lang's grave should be protected, however, because it is the final resting place of an early pioneer.

4. Keys Ranch

The family cemetery at the ranch contains five graves with headstones. Buried there are Bill and Frances Keys and three of their sons that died in infancy and early childhood. The cemetery is the property of the Keys heirs and considered by the National Park Service to be part of the locally significant Keys Ranch complex.

XIII. General Recommendations from the Division of Park Historic Preservation, Western Regional Office, National Park Service

Frequently, with respect to properties not considered significant, this report has recommended a management policy of allowing natural deterioration to reclaim old mine sites. This means taking such measures as are necessary to protect against safety hazards of old tunnels and shafts, but otherwise not disturbing such sites, leaving them to the processes of time and natural decay. The mines in Joshua Tree National Monument were for the most part small, hard-rock operations, and surface stripping was minimal. They are not, by and large, major intrusions on the natural scene. While parts of the monument have been designated formal wilderness areas, historically they have not truly been wilderness for a half century or more, having experienced extensive cattle ranching, mining, and development of water sources and roads. Many of these past developments are already obscure and fast fading into the desert, and the best treatment is simply to leave them alone, neither attempting to preserve nor attempting to pretend that they never existed by obliterating them. This concept of management has been described as leaving such properties as "mouldering ruins" or following a management technique called "benign neglect," but the term "natural deterioration" seems better to describe what is intended. In a few instances where some non-historically significant development is intrusive, its removal rather than natural deterioration has been recommended.

In some instances, a management approach of allowing natural deterioration is recommended for a property which is significant; in such instances, full compliance with the provisions of Section 106 of the National Historic Preservation Act is necessary prior to formalizing that decision.

BIBLIOGRAPHY

Books

Admiral, Don. Desert of the Palms. . . . El Centro, Ca.: Desert Magazine, 1938.

Ainsworth, Edward Maddin. Beckoning Desert. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962.

_____, Ed. Five Acres of Heaven. Los Angeles: Homer H. Boelter, Lithography, 1955.

Bagley, Helen. Sand in My Shoe. Twentynine Palms, Ca.: Calico Press, 1978.

Barrows, David Prescott. The Ethno-botany of the Coahuilla Indians of Southern California. Chicago: University of Chicago Press, 1900.

Beattie, George William, and Beattie, Helen Pruitt. Heritage of the Valley: San Bernardino's First Century. Oakland, Ca.: Biobooks, 1951.

Beck, Warren A., and Haase, Ynez D. Historical Atlas of California. Norman: University of Oklahoma Press, 1974.

Bieber, Ralph P., ed. Exploring Southwestern Trails, 1846-1854. By Philip St. George Cooke, William Henry Chase Whiting, Francois Xavier Aubry. The Southwest Historical Series, VII. Glendale, Ca.: The Arthur H. Clark Co., 1938.

Brown, John, Jr., and Boyd, James. History of San Bernardino and Riverside Counties. Chicago: Western Historical Assn., Lewis Publ. Co., 1922.

Caballeria, Rev. Father Juan. History of San Bernardino Valley From the Padres to the Pioneers, 1810-1851. San Bernardino, Ca.: Times-Index Press, 1902. Facsimile edition. Ann Arbor, Mich.: University Microfilms International, 1979.

Campbell, Elizabeth W. Crozer. The Desert was Home. Los Angeles: Westernlore Press, 1961.

Casebier, Dennis G. The Mojave Road. Norco, Ca.: Tales of the Mojave Road Publishing Company, September 1975. Tales of the Mojave Road Number Five.

Chase, J. Smeaton. California Desert Trails. Boston: Houghton Mifflin Company, 1919.

Corle, Edwin. Desert Country. New York: Duell, Sloan and Pearce, 1941.

Coues, Elliott. On the Trail of a Spanish Pioneer: The Diary and Itinerary of Francisco Garces in His Travels Through Sonora, Arizona, and California, 1775-1776. 2 vols. New York: Francis P. Harper, 1900.

Dale, Edward Everett. The Indians of the Southwest: A Century of Development Under the United States. Norman: University of Oklahoma Press, 1949.

D'Autremont, Hugh. West of Dawn. New York: Exposition Press, 1971.

Durrenberger, Robert W., with Robert B. Johnson. California: Patterns on the Land. 5th ed. Palo Alto, Ca.: Mayfield Publishing Co., 1976.

Edwards, E. I. Desert Voices: A Descriptive Bibliography. Los Angeles: Westernlore Press, 1958.

Ekman, A.; Parker, I.H.; Storms, W.H.; et al. Old Mines and Ghost Camps of California (Statewide for 1899). Fort Davis, Tx.: Frontier Book Co., 1968.

Evans, Carolyn, ed. A Glimpse into the History of Yucca Valley, Morongo Valley, Palm Wells and Yucca Mesa, California. Yucca Valley, Ca.: Artcraft Print Shop, 1965.

_____, Carol. Remembrances of the High Desert. Yucca Valley, Ca.: Artcraft Print Shop, 1966.

Foreman, Grant, ed. A Pathfinder in the Southwest. Norman: University of Oklahoma Press, 1941.

Fox, Maude A. Both Sides of the Mountain. Palm Desert, Ca.: Desert Magazine Press, 1954.

Gabbert, John R. History of Riverside City and County. Phoenix, Az.: Record Publ. Co., 1935.

Gardner, Erle Stanley. The Desert is Yours. New York: William Morrow & Company, 1963.

_____. Neighborhood Frontiers. New York: William Morrow & Company, 1954.

Gudde, Erwin G. California Gold Camps. Ed. by Elisabeth K. Gudde. Berkeley: University of California Press, 1975.

Guinn, J. M. Historical and Biographical Record of Southern California. Chicago: Chapman Publ. Co., 1902.

Heizer, Robert F., ed. Handbook of North American Indians, Vol. 8, California. Washington, D. C.: Smithsonian Institution, 1978.

_____, and Whipple, M. A., eds. The California Indians: A Source Book. 2d ed. Berkeley: University of California Press, 1971.

Henderson, Randall. On Desert Trails, Today and Yesterday. Los Angeles: Westernlore Press, 1961.

Holmes, Elmer W. History of Riverside County, California. Los Angeles: Historic Record Co., 1912.

Ingersoll, L. A. Ingersoll's Century Annals of San Bernardino County, 1769 to 1904. . . . Los Angeles: Ingersoll, 1904.

Ise, John. Our National Park Policy: A Critical History. Baltimore: Johns Hopkins Press, [1961].

Jaeger, Edmund C. The California Deserts. 4th ed. Stanford: Stanford University Press, 1933.

James, George Wharton. The Wonders of the Colorado Desert (Southern California). 2 vols. Boston: Little, Brown, and Company, 1907.

Kidwell, Art. Ambush: The Story of Bill Keys. Fresno, Ca.: Pioneer Publishing Co., 1979.

Kroeber, A. L. Handbook of the Indians of California. New York: Dover Publications, Inc., 1976. Republication of work originally publ. by U. S. Government Printing Office in 1925 as Bulletin 78 of the Bureau of American Ethnology of the Smithsonian Institution.

Laird, Carobeth. The Chemehuevis. Riverside, Ca.: Rubidoux Printing Co., 1976.

Lantis, David W., in collaboration with Rodney Steiner and Arthur E. Karinen. California: Land of Contrast. Belmont, Ca.: Wadsworth Publ. Co., Inc., 1963.

Lawton, Harry. Willie Boy. Balboa Island, Ca.: Paisano Press, 1960.

Leadabrand, Russ. A Guidebook to the Mojave Desert of California. Los Angeles: The Ward Ritchie Press, 1966.

Lee, W. Storrs. The Great California Deserts. New York: G. P. Putnam's Sons, 1963.

Love, Frank. Mining Camps and Ghost Towns: A History of Mining in Arizona and California Along the Lower Colorado. Los Angeles: Westernlore Press, 1974.

Miller, Ronald Dean. Mara: The Desert Oasis of Twenty-Nine Palms. Brand Book No. 15. Los Angeles: Los Angeles Corral, The Westerners, 1978.

_____. Mines of the High Desert. Gendale, Ca.: La Siesta Press, 1968.

_____, and Miller, Peggy Jeanne. Mines of the Mojave. Glendale, Ca.: La Siesta Press, 1976.

Mitchell, Roger. Exploring Joshua Tree. 3d ed. Glendale, Ca.: La Siesta Press, 1974.

O'Neal, Lulu Rasmussen. A Peculiar Piece of Desert: The Story of California's Morongo Basin. Los Angeles: Westernlore Press, 1957.

Paxton, June LeMert. My Life on the Mojave. New York: Vantage Press, 1957.

Phillips, George Harwood. Chiefs and Challengers: Indian Resistance and Cooperation in Southern California. Berkeley: University of California Press, 1975.

Richards, Elizabeth W. Guideposts to History: People and Places of Historical Significance in Early San Bernardino and Riverside Counties. 2d ed. San Bernardino, Ca.: Santa Fe Federal Savings & Loan Assoc., 1977.

Robinson, John W. Mines of the San Bernardinos, Glendale, Ca.: La Siesta Press, 1977.

Robinson, W. W. The Story of Riverside County. Los Angeles: Title Insurance & Trust Co. (Riverside Title Co.), 1957.

_____. The Story of San Bernardino County. San Bernardino, Ca.: Pioneer Title Insurance Company, 1958.

Smith, Gerald A. Cattle Brands of San Bernardino County. San Bernardino, Ca.: San Bernardino County Museum Assoc., 1974.

Spell, Hazel M. The Twentynine Palms Story. N. p., 1953.

Storms, William H. Old Mines of Southern California. Toyahvale, Tx.: Frontier Book Co., 1965.

Sullivan, Maurice S. The Travels of Jedediah Smith. Santa Ana, Ca.: The Fine Arts Press, 1934.

Underhill, Ruth. Indians of Southern California. Sherman Pamphlets No. 2, Education Division, U.S. Office of Indian Affairs. Lawrence, Ks.: Haskell Institute Printing Dept., n.d.

Vredenburgh, Larry M.; Shumway, Gary L.; and Hartill, Russell D. Desert Fever: An Overview of Mining in the California Desert. Canoga Park, Ca.: Living West Press, 1981.

Westec Services, Inc. A History of Land Use in the California Desert Conservation Area. San Diego, 1978.

Wilson, Frank P. The Last Western Manhunt. Riverside County Sheriff Frank Wilson's Official Report on the Willie Boy Manhunt of 1909. San Diego, Ca., 1966.

Articles

Archer, Fred R. "Monuments of the Gods." Touring Topics, December 1926, pp. 18-20, 36-37.

"Back into the Past at Joshua Tree." Sunset Magazine, October 1977.

"Bancroft's Guide to the Colorado Mines." Quarterly of the California Historical Society XII, n. 1 (March 1933).

Beattie, George William. "Reopening the Anza Road." The Pacific Historical Review. Glendale, Ca.: The Arthur H. Clark Co., 1933. II:52-71.

Bennett, John E. "The Deserts of Southeast California." Lippincott's Monthly Magazine. Philadelphia: J. B. Lippincott Co., 1897. LIX:409-13.

Campbell, Elizabeth W. Crozer. "An Archeological Survey of the Twenty Nine Palms Region." Southwest Museum Papers. Number 7. Highland Park, Los Angeles, Ca.: Southwest Museum, 1931.

_____, and Campbell, William H. "The Pinto Basin Site." Southwest Museum Papers. Number Nine. Highland Park, Los Angeles, Ca.: Southwest Museum, 1935.

Carling, James L. "On the Trail of Willie-boy." Desert Magazine 5, n. 1 (November 1941): 6-11.

Carlson, Cary P. "Desert Queen Ranch." Desert Magazine, May 1976, pp. 14-15, 39.

"Cattle Brands Part of Hi-Desert Lore." Roadrunner Magazine, June 1976, p. 10.

De Groot, Henry. "The Mining Resources of Southern California." Overland Monthly IX (Second Series), n. 53 (May 1887): 455-62.

Delamare, H. E. "The Desert Lands of California." Travel, October 1912, pp. 34-36, 56.

Ford, Walter. "Hidden Valley of the Joshua Tree National Monument." Nature Magazine 31, n. 8 (October 1938): 486-87.

Fryer, Roy M. "The Butterfield Stage Route (And other Historic Routes Eastward from Los Angeles)." Historical Society of Southern California Quarterly v. 17, n. 1, pp. 15-22.

Henderson, Randall. "Cabin in the Hot Rocks." Desert Magazine, March 1949, pp. 10-12.

_____. "Trail to 49 Palms." Desert Magazine, December 1940, pp. 24-27.

_____. "Waterhole on the Old Bradshaw Trail." Desert Magazine, January 1947, pp. 4-7.

Hilton, John. "Henry Kaiser Came to the Desert for Iron." Desert Magazine, March 1949, pp. 5-9.

Hoyt, Franklin. "Bradshaw's Road to the La Paz Diggin's." Desert Magazine, February 1956, pp. 4-8.

Jackson, W. Turrentine. "Stages, Mails and Express in Southern California: The Role of Wells, Fargo & Co. in the Pre-Railroad Period." Southern California Quarterly, Fall 1974, pp. 233-71.

Jacobs, Louis L. "Oasis Boomtown." Westways, December 1941, pp. 14-15.

Jaeger, Edmund. "Monument of the Joshuas." Pacific Discovery 8, n. 3 (May-June 1955): 10-21.

Johnston, Phillip. "California's Garden of the Gods." Westways 26, n. 4 (April 1934): 12-13, 36-37.

Keys, Gwen. "A Brief Sketch of the Life of Wm. 'Bill' Keys." Rockhounds Journal, September 1962.

Mendenhall, W. C. "The Colorado Desert." National Geographic Magazine 20, n. 8 (August 1909): 681-701.

Neal, Howard. "Desert Ghosts: The Dale Mining District." Desert Magazine, March 1975, pp. 12-13.

"The Oasis of Maru." Grizzly Bear 80 (November 1946): 13.

Service, George, and Werges, Kent. "Exploring Dale Mine District." Desert Magazine, March 1968, pp. 22-25.

Sorensen, Conner. "Apostle of the Cacti: The Society Matron as Environmental Activist." Southern California Quarterly LVIII, n. 3 (Fall 1976): 407-24.

Stedman, Melissa Branson. "I Got My Five-Acre Title." Desert Magazine, June 1949, pp. 11-12.

Taylor, Frank. "Desert Graves of Joshua Tree." Western Treasures, December 1971, pp. 54-59.

_____. "The Lost Treasure of Lost Horse Mine." Desert Magazine, March 1968, pp. 16-17.

"A Trip to the Colorado Mines in 1862," from the Reminiscences of Mahlon Dickerson Fairchild. California Historical Society Quarterly 12, n. 1 (March 1933): 11-17.

Wallace, William W. "An Archaeological Reconnaissance in Joshua Tree National Monument." Journal of the West III, n. 1 (January 1964): 90-101.

Weight, Harold O. "Legends of the Lost Horse Mine." Desert Magazine, January 1979, pp. 8-11, 30-31.

Wilhelm, Paul. "Vagabond House at 1000 Palms Oasis." Desert Magazine, April 1941, pp. 24-27.

Woon, Basil. "Desert Stampede." Westways, November 1948, pp. 4-6.

Government Documents (Published)

United States. Department of the Interior. Bureau of Indian Affairs. Annual Reports of the Commissioner of Indian Affairs to the Secretary of the Interior. Washington: Government Printing Office, various years.

_____. _____. _____. "Indians of California." Pamphlet. Washington: Government Printing Office, 1968?

_____. _____. Bureau of Land Management. The California Desert, 1968.

_____. _____. Geological Survey. Guidebook of the Western United States. Part F. Bulletin 845. Darton, N. H. The Southern Pacific Lines, New Orleans to Los Angeles. Washington: Government Printing Office, 1933.

_____. _____. _____. Mendenhall, Walter C. Ground Waters of the Indio Region, California With a Sketch of the Colorado Desert. Water-Supply Paper 225. Washington: Government Printing Office, 1909.

_____. _____. _____. Thompson, David G. Routes to Desert Watering Places in the Mohave Desert Region, California. Water-Supply Paper 490-B. Washington: Government Printing Office, 1921.

_____. _____. _____. Brown, John S. Routes to Desert Watering Places in Salton Sea Region. Water-Supply Paper 490-A. Washington: Government Printing Office, 1920.

_____. _____. _____. _____. The Salton Sea Region, California: A Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places. Water-Supply Paper 497. Washington: Government Printing Office, 1923.

_____. _____. _____. Mendenhall, Walter C. Some Desert Watering Places in Southeastern California and Southwestern Nevada. Water-Supply Paper 224. Washington: Government Printing Office, 1909.

_____. _____. _____. Waring, Gerald A. Springs of California. Water-Supply Paper 338. Washington: Government Printing Office, 1915.

_____. _____. National Park Service. Chappell, Gordon; Cox, Robert; and Kelly, Roger. Keys' Desert Queen Ranch, Joshua Tree National Monument, Preservation Study. N.p., n.d. [San Francisco: Western Regional Office, NPS]

_____. _____. _____. "The Desert Queen Ranch." Pamphlet. 1975.

_____. _____. _____. Environmental Assessment, Natural Resources Management Plan, Joshua Tree National Monument, California. Denver, Co.: Denver Service Center, 1974.

_____. _____. _____. Environmental Statement, Proposed Wilderness Area, Joshua Tree National Monument, California. Denver, Co.: Denver Service Center, 1973.

_____. _____. _____. Hickman, Patricia Parker. Country Nodes: An Anthropological Evaluation of William Keys' Desert Queen Ranch, Joshua Tree National Monument, California. Publications in Anthropology, No. 7. Tucson, Az.: Western Archeological Center, 1977.

_____. _____. _____. Interpretive Prospectus, Joshua Tree National Monument, California. Denver, Co.: Denver Service Center, 1972.

_____. _____. _____. "Joshua Tree National Monument, California." Pamphlet. Reprinted 1966.

_____. _____. _____. King, Samuel A. "A History of Joshua Tree National Monument." 1955.

_____. _____. _____. King, Thomas F. Fifty Years of Archeology in the California Desert: An Archeological Overview of Joshua Tree National Monument. Tucson, Az.: Western Archeological Center, 1975.

_____. _____. _____. Levy, Benjamin. Historic Structures Report, Lost Horse Mine, Joshua Tree National Monument. Part I, Historical Data. Washington: Division of History, Office of Archeology and Historic Preservation, 1969.

_____. _____. _____. Parker, Patricia. One Hundred Years of History in the California Desert: An Overview of Historic Archeological Resources at Joshua Tree National Monument. Publications in Anthropology, No. 13. Tucson, Az.: Western Archeological Center, 1980.

_____. _____. _____. Simmonds, Robert V. Historic Structure Report, Lost Horse Mine Complex, Joshua Tree National Monument, California. Denver, Co.: Denver Service Center, 1970. Rev. 1972.

_____. _____. _____. Simpson, Kay. The Joshua Tree Road Improvements Project. Tucson, Az.: Western Archeological Center, 1981.

_____. _____. _____. Chappell, Gordon; Cox, Robert; and Kelly, Roger. Wall Street Mill, Joshua Tree National Monument Preservation Study. N.p., n.d. (ca. 1974).

_____. War Department. 33d Cong., 2d Sess., Ex. Doc. No. 78. Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean Made Under the Direction of the Secretary of War, in 1853-4, According to Acts of Congress of March 3, 1853, May 31, 1854, and August 5, 1854. Volume V. Report of Explorations in California for Railroad Routes, to Connect with the Routes Near the 35th and 32d Parallels of North Latitude, by Lieutenant R.S. Williamson, Corps of Topographical Engineers, 1853. Washington: Beverley Tucker, Printer, 1856.

Government Documents (Unpublished)

Denver, Co. National Park Service. Denver Service Center. Alaska/Pacific Northwest/Western Team. History files.

Laguna Niguel, Ca. Federal Archives and Records Center. Record Group 79 (NPS).

Sacramento, Ca. Bureau of Indian Affairs. Area Office. Indian Office File 34993-1908.

San Bruno, Ca. Federal Archives and Records Center. Record Group 79 (NPS).

San Francisco, Ca. National Park Service. Western Regional Office. Files of Regional Historian. Files of Division of Mining and Minerals.

Twentynine Palms, Ca. National Park Service. Joshua Tree National Monument. History and Fact Files.

Washington, D.C. National Archives. Record Group 79 (NPS): Central Files, 1907-49; Central Classified Files, 1933-49.

County Records

Riverside, Ca. County Courthouse. Official Records of Riverside County.

San Bernardino, Ca. Hall of Records. Mining Records, San Bernardino County.

Journals

Engineering and Mining Journal. New York: The Scientific Publ. Co., 1869-1932. 1901, publ. by The Engineering and Mining Journal, Inc., New York. 1908, published by Hill Publishing Co., New York.

Mining and Scientific Press. San Francisco, 1860-1922.

The Journal and Press merged in 1922 as the Engineering and Mining Journal-Press. In 1926 the publication reverted to the name Engineering and Mining Journal.

California State Publications

Sacramento, Ca. California State Mining Bureau. Annual Reports of the State Mineralogist, 1890-1953.

_____. Department of Natural Resources. Division of Mines and Geology. Bulletins 170, 191, 193.

_____. The Resources Agency of California. Department of Water Resources. Bulletin 101.

Newpapers

Barstow (Ca.) Printer-Review
Desert Journal (Joshua Tree, Ca.)
Desert Trail (Twentynine Palms, Ca.)
Hi-Desert Star-Desert Trail (Yucca Valley, [Ca.] News), Suppl. Roadrunner Magazine
Joshua Journal (Joshua Tree, Ca.)
Los Angeles (Ca.) Times
Outpost (Twentynine Palms, Ca.)
Press-Enterprise (Los Angeles, Ca.?)
Riverside (Ca.) Daily Press
San Bernardino (Ca.) Daily Sun and Evening Telegram

Manuscripts

Clark, May Lillian, and Couzens, Twila G. "Yucca Valley and its History." Paper providing research material to be used to supplement the social science program of the Yucca Valley Elementary School. 1966.

Douglas, Ronald D. "The Cottonwood Springs Archaeological Reconnaissance: Preliminary Report." [Fullerton: California State University], May 17, 1978.

Gray, C. H., Jr.; Evans, J. R.; and Saul, Richard. "Mines and Mineral Resources of Riverside County, California," [1961]. In JTNM library.

Weir, J. E., Jr., and Bader, J. S. "Ground-water and related geology of Joshua Tree National Monument, California." July 15, 1963. USGS open-file report.

Brochures

Johnston, Francis J. The Serrano Indians of Southern California. Malki Museum Brochure No. 2. Banning, Ca.: Malki Museum Press, 1973.

Miller, Ronald Dean, and Miller, Peggy Jeanne. The Chemehuevi Indians of Southern California Malki Museum Brochure No. 3. Banning, Ca.: Malki Museum Press, 1967.

Moore, Jerry A. "A Day at Cottonwood Spring." Pamphlet published by the Joshua Tree Natural History Assoc. in cooperation with the National Park Service, rev. 1973.

Nelson, Steve. "Palm Oases of Joshua Tree National Monument." Pamphlet published by the Joshua Tree Natural History Assoc. in cooperation with the National Park Service, 1974.

Oral Interviews

Twentynine Palms, Ca. Joshua Tree National Monument:

Earenfight, Les, Jan. 8, 1982.

Garry, Pat Keys, by Cheryl Erickson, Mar. 3, 1976.

Hester, Jim, by Reino Clark, Feb. 8, 1975.

Keys, Willis, by Reino Clark and Don Black, while touring Keys Ranch, March 1975.

Kiler, Frank, by Art Kidwell, Jan. 13, 1978.

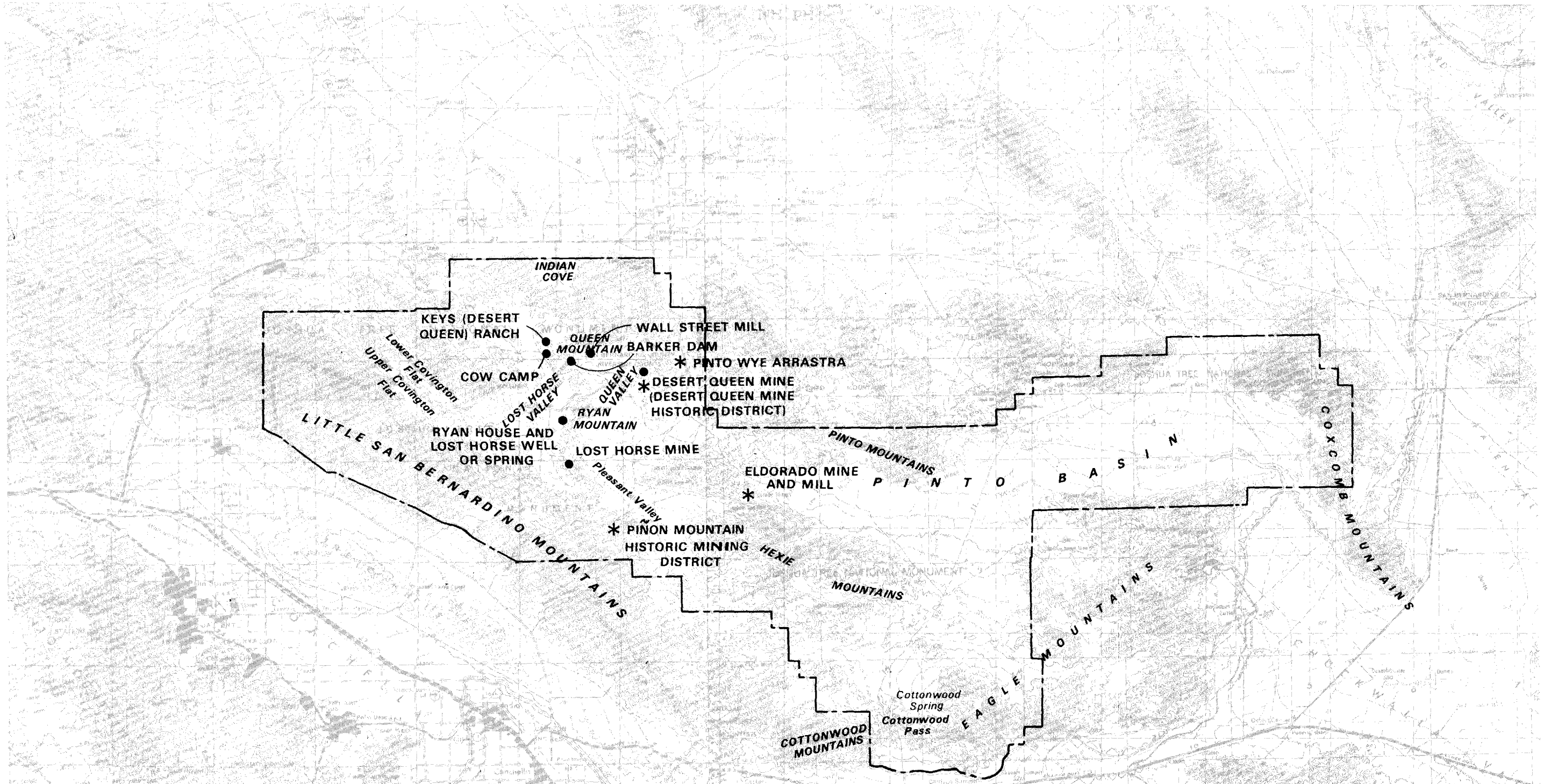
Moorten, Cactus Slim, by H. Sansum, Oct. 28, 1969.

_____. Twentynine Palms Branch County Library. Local History Collection:

Benito, Clovis and Mary, Feb. 13, 1974.

Seely, Bill, by Harold Weight and Cheryl Erickson, Feb. 3, 1975.

Shay, Mrs. W. R., by Reino Clark, May 2, 1975.



ON MICROFILM

SITES ON THE NATIONAL REGISTER OF HISTORIC PLACES

JOSHUA TREE NATIONAL MONUMENT
CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DSC / SEPTEMBER 1983 / T56-25013

☆ U.S. GOVERNMENT PRINTING OFFICE: 1983—676-031/117 REGION NO. 8

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The Department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

Publication services were provided by the graphics staff of the Denver Service Center. NPS 2132

CULTURAL RESOURCES STUDY FOR THE CITY OF RIVERSIDE GENERAL PLAN 2025 UPDATE PROGRAM EIR

Prepared for:
Cotton Bridges and Associates
Urban and Environmental Consultants
800 East Colorado Boulevard, Suite 270
Pasadena, California 91101

On behalf of:
The City of Riverside Planning Department
3900 Main Street
Riverside, California 91106

Prepared by
Applied EarthWorks, Inc.
3292 East Florida Avenue, Suite A
Hemet, California 92544-4941

Authors:
Melinda C. Horne and Dennis P. McDougall

Illustrator:
Cari Inoway

December 2003, Updated January 2007

Certified November 2007

This Page Intentionally Left Blank

CONTENTS

LIST OF FIGURES ..... **vi**

LIST OF TABLES ..... **vi**

1.0 INTRODUCTION **1**

2.0 REGULATORY FRAMEWORK **3**
2.1 Introduction 3
2.2 Federal Regulations Pertaining to Cultural Resources 3
2.3 State Regulations Pertaining to Cultural Resources 4
2.4 Local Regulations Pertaining to Cultural Resources 6

3.0 ENVIRONMENTAL SETTING **8**
3.1 Introduction 8
3.2 Climate and Vegetation 8
3.3 Fauna 12
3.3.1 Valley Grassland Community 12
3.3.2 Riversidian Sage Scrub Community 13
3.3.3 Chamise Chaparral Community 13

4.0 CULTURAL SETTING **15**
4.1 Introduction 15
4.2 Prehistoric Cultural Setting 15
4.2.1 Introduction 15
4.2.2 Paleoindian Period 16
4.2.3 Early Archaic Period 18
4.2.4 Middle Archaic Period 20
4.2.5 Late Archaic Period 23
4.2.6 Saratoga Springs Period 25
4.2.7 Late Prehistoric Period 27
4.2.8 Protohistoric Period 29
4.3 Ethnohistoric Cultural Setting and Ethnography 31
4.3.1 Introduction 31
4.3.2 Social Structure 31
4.3.3 Subsistence 31
4.3.4 Shelter 32
4.3.5 Religion, World View, and the Sacred 33
4.3.6 The Protohistoric and Pre-Reservation Period 33
4.3.7 Prehistoric and Ethnohistoric Cultural Resource Types 35

4.4 Historical Cultural Setting 35
4.4.1 Native American and Early European Settlement (Pre-1830s) 36
4.4.2 Spanish Mission Period (1769–1833) 36
4.4.3 Mexican Rancho Period (1834–1848) 36
4.4.4 American Period (1848–present) 37

5.0 STUDY METHODS AND RESULTS 43
5.1 Introduction 43
5.2 Cultural Resources Literature and Records Search 43
5.3 Archaeological Resources Sensitivity Results 50

6.0 POTENTIAL IMPACTS TO CULTURAL RESOURCES AND PROPOSED MITIGATION MEASURES 56
6.1 Introduction 56
6.2 Potential Impacts to Cultural Resources 56
6.2.1 Destruction of Known Archaeological Resources 56
6.2.2 The Potential to Disturb Native American Human Remains 57
6.2.3 Adverse Changes in the Significance of Historical Resources 57
6.3 Proposed Mitigation Measures 57
6.3.1 Cultural Resources Mitigation Measure 1 57
6.3.2 Cultural Resources Mitigation Measure 2 58
6.3.3 Cultural Resources Mitigation Measure 3 58
6.3.4 Cultural Resources Mitigation Measure 4 60
6.3.5 Cultural Resources Mitigation Measure 5 61

7.0 REFERENCES CITED 62

LIST OF FIGURES

1. General location of the City of Riverside General Plan study area. 9
2. Location of the City of Riverside Core Area and proximate Sphere of Influence 10
3. Survey Coverage for the City of Riverside Core Area and proximate Sphere of Influence....51
4. Known archaeological site density for the City of Riverside Core Area and proximate Sphere of Influence....52
5. Archaeological sensitivity, based on survey coverage and known site density, for the City of Riverside Core Area and proximate Sphere of Influence 54
6. Geographic archaeological site sensitivity for the City of Riverside Core Area and proximate Sphere of Influence 55

LIST OF TABLES

1. Historical cultural resources within the City of Riverside Core Area and Sphere of Influence....45

1.0
INTRODUCTION

The City of Riverside's (hereinafter, the City) cultural heritage includes historical sites, structures, features, natural resources, and prehistoric and historical archaeological resources. Historical cultural resources throughout the community can enhance the charm of the City, offer opportunities to enrich the City's character, and form cornerstones of successful revitalization and preservation efforts within the City. Historical natural resources also add to the cultural heritage of the City; recognized natural resources include the Parent Naval Orange Tree, the Montezuma Bald Cypress Trees in Fairmont Park, the Palm Grove in Hunter Park, the Native Sycamore Tree in the middle of La Paz Lane, the Horse Chestnut Tree in the Victoria Avenue median, and the Chicago White Sox Redwood Tree.

In addition to historical sites, structures, features, and natural resources, hundreds of prehistoric and historical archaeological resources have been identified in and surrounding the City's General Plan study area. Archaeological resources are unique in that they are not readily visible to the common layperson, are typically discovered by trained archaeologists during pedestrian surveys conducted for local, state, or federal projects as required by the California Environmental Quality Act (CEQA) or the National Environmental Protection Act (NEPA), and require time, expertise, and a certain degree of confidentiality to excavate and inventory. Occasionally, buried archaeological resources are discovered accidentally by construction workers during ground disturbing activities such as grading or trenching. Due to their uniqueness, archaeological resource protection requires a unique blend of educational and regulatory efforts on the part of the City.

The purpose of this document is to update the *City of Riverside General Plan* adopted by the City Council on September 13, 1994. The *Historic Preservation Element of the City of Riverside General Plan* was recently prepared by Architectural Preservation Planning Services (APPS 2003), and adopted by the City's Planning Department on February 18, 2003. Although these two documents provide sufficient data regarding the City's historical sites, structures, features, and natural resources, very little information is provided concerning the City's historical and prehistoric archaeological resources. Therefore, the primary purpose of this document is provide the City with a comprehensive review of the current body of knowledge regarding the prehistoric and ethnographic cultural setting of the City's planning region; these data are supplemented with historical data provided in the City's 1994 *General Plan* and 2003 *Historic Preservation Element*, as well as the recently adopted *Riverside County Integrated Plan* (LSA 2000). Utilizing this background information and archaeological data collected specifically for this General Plan Update, the historical and prehistoric archaeological site sensitivity is evaluated for the City's 91,548-acre planning area, including the City's 50,580-acre Core Area of Influence and 40,968-acre Sphere of Influence.

In the following sections, the regulatory framework that dictates the City's treatment and protection of both its historical and archaeological resources is detailed in Chapter 2. Chapter 3 describes the environmental setting of the City's planning area as a basis for understanding the

types and distribution of cultural resources. The culture history of western Riverside County is reviewed in Chapter 4 to provide a context for understanding the types, nature, and significance of the prehistoric, ethnographic, and historical resources identified within the City's planning region. Chapter 5 describes the methodology used during the course of this investigation, as well as the methodology used to develop the archaeological sensitivity rankings and resultant maps for the City's planning area. The final chapter (Chapter 6) outlines the potential impacts to cultural resources by implementation of the City of Riverside General Plan Update, as well as the proposed mitigation measures that would reduce potential impacts on cultural resources to a level of insignificance.

2.0
REGULATORY FRAMEWORK

2.1 INTRODUCTION

Cultural resources in the State of California are recognized as non-renewable resources that require management to assure their benefit to present and future Californians. Therefore, cultural resources management work conducted as part of any proposed undertaking by the City must comply with applicable Federal, and/or State, and Local regulations designed to protect the City's rich cultural heritage. Brief descriptions of these regulations are provided below.

2.2 FEDERAL REGULATIONS PERTAINING TO CULTURAL RESOURCES

Although most projects conducted by the City would not be subject to federal regulations pertaining to cultural resources, a brief review of federal law sets the stage for understanding the state and local cultural resources guidelines. The California Environmental Quality Act (CEQA) and local City guidelines are then addressed in subsequent sections.

Enacted in 1966, the National Historic Preservation Act (NHPA) has become the foundation and framework for historic preservation in the United States. Briefly, the NHPA authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP); it establishes an Advisory Council on Historic Preservation as an independent federal entity; requires federal agencies to take into account the effects of their undertakings on historic properties, and affords the Advisory Council a reasonable opportunity to comment on any undertaking that may affect historic properties listed, or eligible for listing, in the NRHP; and makes the heads of all federal agencies responsible for the preservation of historic properties owned or controlled by their agencies. In addition, the NHPA authorizes funding for state programs with provisions for pass-through funding and participation by local governments. In summary, the NHPA provides the legal framework for most state and local preservation laws.

The National Park Service has issued regulations governing the NRHP (36 CFR 60). Among the topics covered in detail in these regulations are the effects of listing under federal law, definition of key terms (e.g., building, site, structure, and district), nomination procedures, nomination appeals, and removing properties from the NRHP. Importantly, Section 60.4 of the regulations presents the criteria by which historic properties are evaluated for the NRHP.

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or that are associated with the lives of persons significant in our past; or

(b) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(c) that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

A point to be emphasized is that a historic property does not have to be nominated for, or listed in, the NRHP to be afforded protection under the NHPA. Indeed, *most* of the properties managed under this and other federal historic-preservation authorities have never been nominated for the NRHP. The significance of a historic district, site, building, structure or object–and thus its required consideration under the law–is determined by the property's *eligibility* for the NRHP with respect to the criteria set forth in 36 CFR 60.4.

The NHPA established the Section 106 review procedure to protect historic and archaeological resources that are listed in or eligible for listing in the NRHP from impacts of projects by a federal agency, projects funded or permitted by a federal agency, or projects located on federally-owned land or Native American-owned land. State Historic Preservation Officers and programs in all states and U.S. territories receive federal funding to carry out the provisions of the NHPA. This funding comes from a yearly appropriation by the legislative branch of the federal government. The NHPA requires that at least 10 percent of funds to the state be passed through to Certified Local Governments; the City of Riverside has been registered as a Certified Local Government since 1995 and has received several grants for local preservation projects. Thus, Federal Highway and Housing and Urban Development-funded Community Development Block Grant projects are examples of those City projects subject to Section 106 review.

2.3 STATE REGULATIONS PERTAINING TO CULTURAL RESOURCES

Excepting projects that receive federal pass-through funding for Certified Local Governments, such as the City of Riverside, cultural resources management work conducted as part of any proposed undertaking by the City must comply with the *California Environmental Quality Act* (CEQA) *Statutes and Guidelines* (California 1999). Enacted in 1971, CEQA directs lead agencies to first determine whether a cultural resource is a "historically significant" cultural resource. In the protection and management of the cultural environmental, CEQA guidelines provide definitions and standards for cultural resources management. The term "historical resource" is defined as follows:

(1) A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in the *California Register of Historical Resources* (CRHR).

(2) A resource included in a local register of historical resources or identified as significant in a historical resource survey shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

(3) Any object, building, structure, site area, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a cultural resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the CRHR, including the following:

(A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(B) Is associated with the lives of persons important in our past;

(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(D) Has yielded, or may be likely to yield, information important in prehistory or history.

The fact that a resource is not listed in, or determined to be eligible for listing in the CRHR, not included in a local register of historical resources . . ., or identified in a historical resources survey . . . does not preclude a lead agency from determining that the resource may be a historical resource [Title 14 CCR Section 15064.5(1)].

The term "unique archaeological resource" has the following meaning under CEQA:

An archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historical event or person [Public Resources Code Section 21083.2(g)].

A project with an effect that may cause a substantial adverse change in the significance of a historical resource or unique archaeological resource is a project that may have a significant effect on the environment (California 1999:14). Effects on cultural properties that qualify as historical resources or unique archaeological resources can be considered adverse if they involve physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired.

The cited statutes and guidelines specify how cultural resources are to be managed in the context of projects such as those proposed by the City. Briefly, archival and field surveys must be conducted, and identified cultural resources must be inventoried and evaluated in prescribed ways. Sites that may contain human remains important to Native Americans must be identified and treated in a sensitive manner, consistent with state law (i.e., Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98), as reviewed below.

> In the event that human remains are encountered during project development and in accordance with the Health and Safety Code Section 7050.5, the County Coroner must be notified if potentially human bone is discovered. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with Public Resources Code Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and associated grave goods.

Prehistoric and historical resources deemed "historically significant" must be considered in project planning and development. As well, any proposed undertaking that may affect "historically significant" cultural resources must be submitted to the State Historic Preservation Officer (SHPO) for review and comment prior to project approval by the responsible agency (in this case the City) and prior to construction. Subsequent sections of the *CEQA Guidelines* detail methods by which significant effects may be mitigated, and discuss procedures for treatment of human remains discovered in the course of project development.

The State of California Office of Historic Preservation (OHP) administers the California Register program. As a recipient of federal funding, the OHP meets the requirements of the NHPA with a SHPO who enforces a designation and protection process, has a qualified historic preservation review commission, maintains a system for surveys and inventories, and provides for adequate public participation in its activities. As the recipient of federal funds that require pass-through funding to local governments, the OHP administers the Certified Local Government program for the State of California. The OHP also administers the California Register of Historical Landmarks and California Points of Local Historical Interest programs (APPS 2003:10).

2.4 LOCAL REGULATIONS THAT PERTAIN TO CULTURAL RESOURCES

Title 20 (Cultural Resources Ordinance), Chapters 20.05 through 20.45, of the Riverside Municipal Code is the primary body of local historic preservation laws. Title 20 established the authority for preservation, the composition and administrative requirements of the Cultural

Heritage Board, criteria for evaluating projects affecting cultural resources, and procedures for protecting and designating significant cultural resources (APPS 2003:10).

Title 20 recognizes four types of local designations as follows:

(A) Cultural Heritage Landmark: A cultural resource of the highest order of importance.

(B) Structure of Merit: A cultural resource which is important, but at a lesser level of significance than a Cultural Heritage Landmark.

(C) Historic District: A geographically defined area within Riverside that has a significant concentration of cultural resources that represent themes important in local history.

(D) Neighborhood Conservation Areas: Similar to a Historic District, but with structures/resources of somewhat lesser significance and/or lesser concentration of resources.

Heritage Landmark and Structure of Merit designations may be initiated by the Riverside City Council, Cultural Heritage Board, or property owner and are designated by resolution of the City Council. Historic District and Neighborhood Conservation Area designations may be initiated by petition of property owners as well as the above entities; these are also designated by resolution of the City Council.

The relationship of historic preservation planning to the City's other planning activities requires a comprehensive approach. Although it is not required in state planning law, a historic preservation component was included in the *Community Enhancement Element of the City of Riverside General Plan*, adopted in 1994. The *Historic Preservation Element of the City of Riverside General Plan* (APPS 2003), adopted in February 2003, was created specifically to complement the present and future goals of land use planning for the City.

3.0
ENVIRONMENTAL SETTING

3.1 INTRODUCTION

Bordered to the north by the Santa Ana River, the City's planning area is located in the inland valleys of western Riverside County (see Figure 1). As shown in Figure 2, the City's planning area includes highly urbanized regions of Riverside and its suburbs, including Highgrove, Belvedere Heights, Casa Blanca, Arlington, La Sierra, La Sierra Heights, and Arlanza, as well as the more rural areas to the south and east of the City that contain extant citrus groves and small ranchettes. In the following sections, the environmental setting of the City's study region is briefly reviewed, followed by a discussion of the study area's cultural setting. For the most part, the environmental setting has been summarized from Applied EarthWorks' (Æ's) work at Diamond Valley Lake (DVL) and on the Inland Feeder Pipeline Project (IFP), located approximately 37 km (23 mi) south and 26 km (16 mi) east of the City's Sphere of Influence, respectively (Goldberg et al. 2001; McDougall et al. 2003a).

3.2 CLIMATE AND VEGETATION

The Mediterranean climate of the study area is characterized by hot dry summers, cool moist winters, a semi-arid precipitation regime, and significant changes of temperature and moisture according to elevation and exposure.

Prehistorically, the vegetation in the inland valleys of western Riverside County that characterize the study area likely included representative species of three major plant communities: valley grassland, Riversidian sage scrub (the interior variant of the coastal sage scrub community), and chamise chaparral (Munz and Keck 1959). Restricted riparian communities would have also occurred near springs or in places where groundwater was close to the ground surface, as well as along the Santa Ana River, Tequesquito Arroyo, and the perennial streams flowing through some of the major canyons (e.g., Mockingbird Canyon, Box Springs Canyon, Sycamore Canyon, Cajalco Canyon, and Olsen Canyon). Depending upon elevation and climate, various species from these communities were available from early spring until winter, and the leaves, stems, seeds, fruits, roots, and tubers from many of these plant species formed an important subsistence base for the Native American inhabitants of the study area (Bean and Saubel 1972; Bean and Vane 2001; Bettinger 1974; Munz 1974).

Important species in the valley grassland community, prior to extensive grazing by domestic livestock and historic agricultural pursuits, may have included rye grass (*Leymus condensatus*), blue grass (*Poa secunda*), bent grass (*Agrostis* spp.), needlegrass (*Stipa* spp.), and three-awn (*Aristida divaricata*) (nomenclature follows Hickman [1993]). Pollen from prehistoric valley sediments at DVL indicate that members of the sunflower family (*Asteraceae*) also were important components of the vegetation (Anderson et al. 1998). At present, in areas not utilized

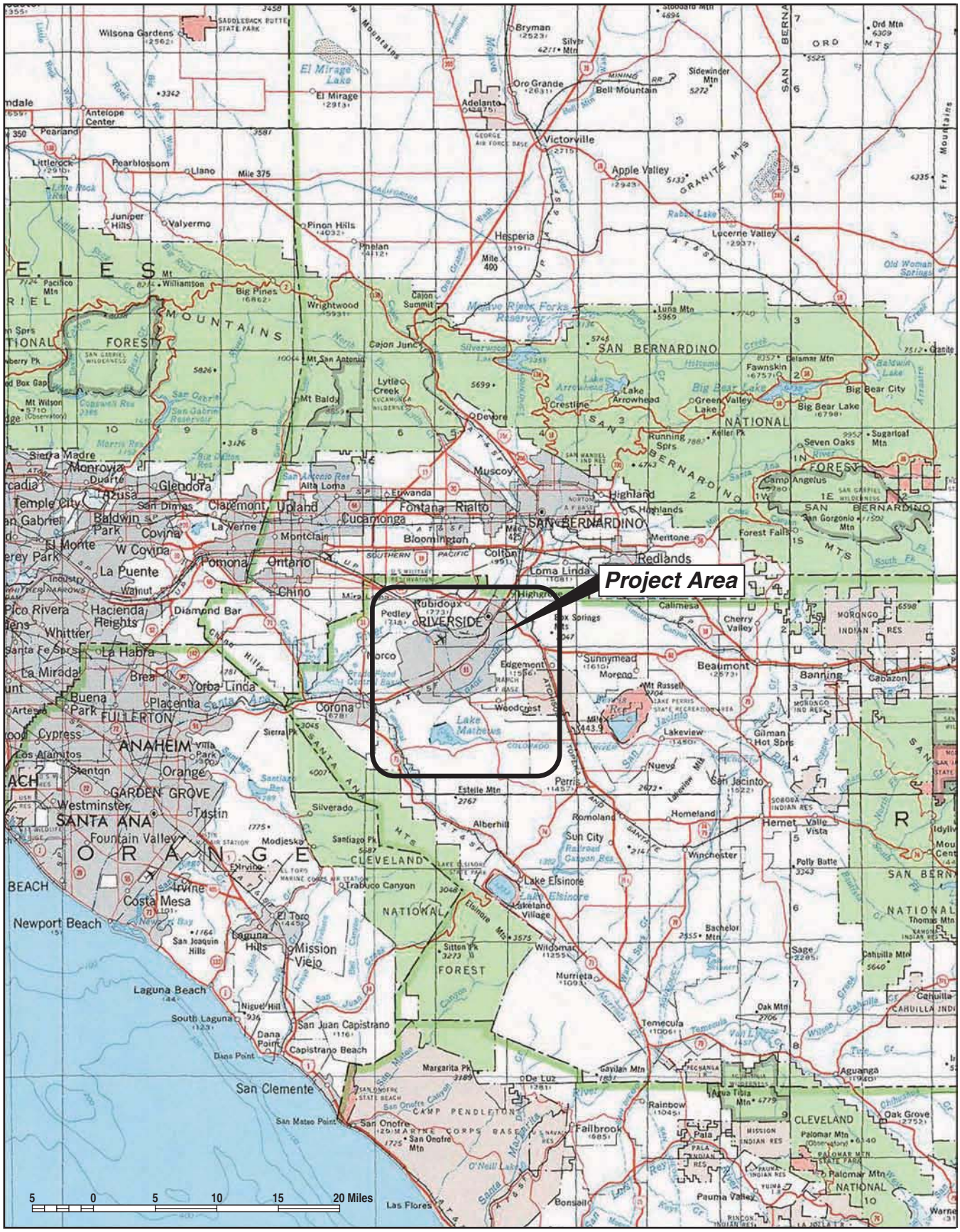


Figure 1 **General location of the City of Riverside General Plan project study area.**

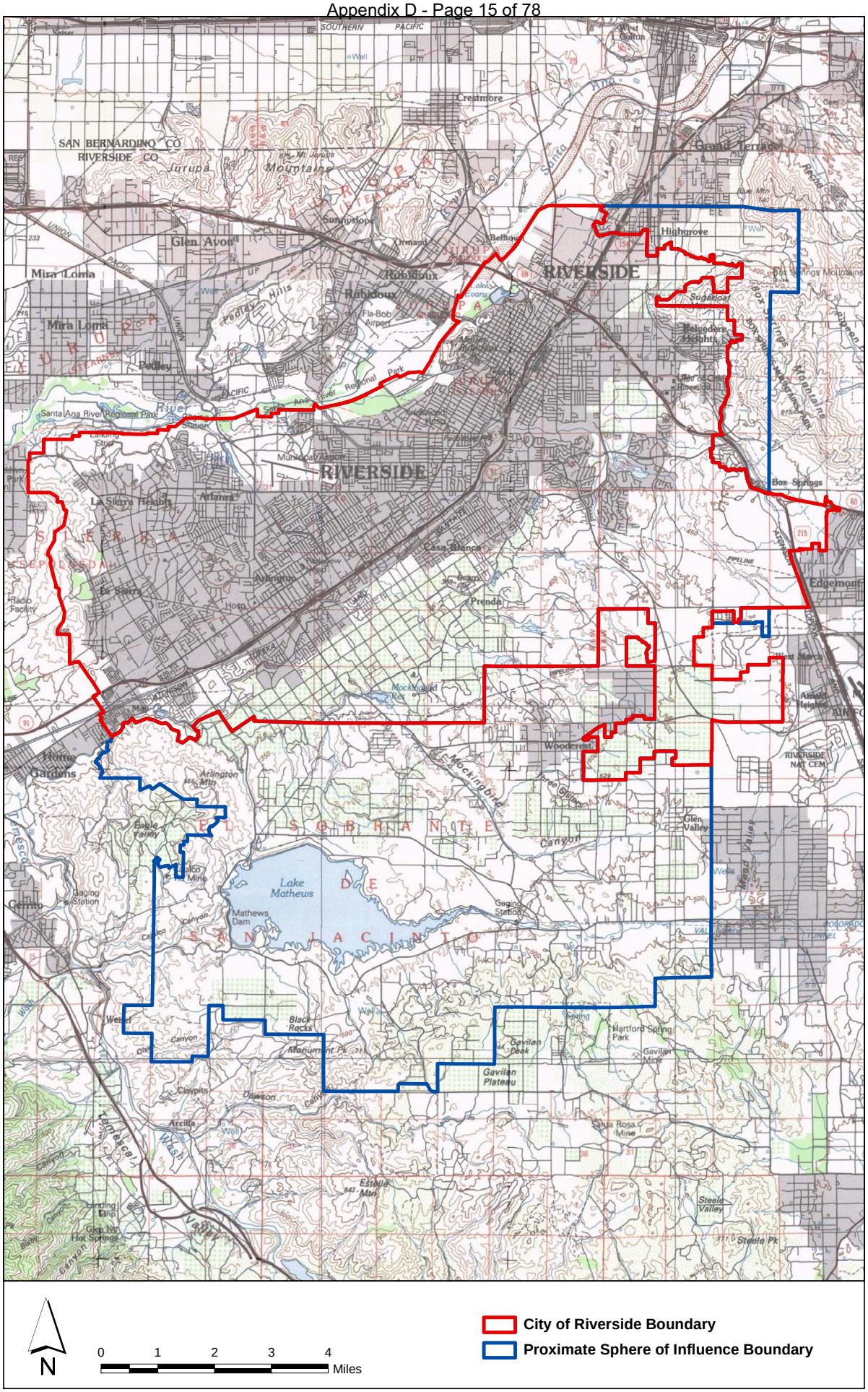


Figure 2 Location of the City of Riverside Core Area and proximate Sphere of Influence.

for agriculture or devoted to residential and commercial development, the valley grassland community is dominated by exotic species such as filaree (*Erodium cicutarium),* tansy mustard *(Descurainia pinnata),* tumble mustard (*Sisymbrium altissimus*), foxtail fescue (*Vulpia myuros*), barleys (*Hordeum* spp.), wild oats (*Avena* spp.), rye grass (*Lolium* spp.), cheat or brome grass (*Bromus* spp.), vinegar weed *(Trichostema lanceolatum*), and dove weed (*Eremocarpus setigerus*).

Currently, the Riversidian sage scrub community occurs on the hillslopes and granitic inselbergs that are scattered throughout the study area. This vegetation type likely occurred in these habitats during prehistoric times as well. Important perennials in this community are California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), black sage (*Salvia melifera*), white sage (*S. apiana*), brittle-bush (*Encelia farinosa*), spiny redberry *(Rhamnus crocea*), yellow bush penstemon (*Penstemon antirrhinoides*), bee plant (*Scrophularia californica*), orange bush monkey flower (*Mimulus longiflorus*), mesa prickly-pear (*Opuntia littoralis*), and valley cholla (*O. parryi*). Isolated stands of Our Lord's Candle (*Yucca whipplei*) are also present.

At slightly higher elevations, the chamise chaparral community borders the valleys on north-facing slopes, which are somewhat sheltered from direct sunlight and, hence, retain greater soil moisture. Dominant shrubs are chamise (*Adenostoma fasiculatum*), sugar bush (*Rhus ovata*), and buck brushes (*Ceanothus* spp.). Clumped stands of scrub oak (*Quercus dumosa*), coastal live oak (*Q. agrifolia*), spiny redberry, and holly-leaf cherry (*Prunus ilicifolia*) occur sporadically within this community where soil moisture is somewhat greater.

Where water is plentiful, the dominant species of the riparian community include willows (*Salix* spp.), cottonwood (*Populus fremontii*), and western sycamore (*Plantanus racemosa*), with an understory of mule fat (*Baccharis salicifolia*), nettle (*Urtica gracilis*), ragweed (*Ambrosia psilostachya*), and smartweed (*Ploygonum* spp.), as well as dense stands of the same plant species present in the immediately adjacent plant communities. In marshy or poorly drained areas, such as in the vicinity of Tequesquito Arroyo and along the Santa Ana River, species such as cattail (*Typha latifolia*), tule (*Scirpus* spp.), tule potato (*Sagittaria latifolia*), and wire grass (*Juncus* spp.) occur with saltbush (*Atriplex* spp.), salt grass (*Distichilis spicata*), smooth tarplant (*Hemizonia pungens* ssp. *laevis*), and pulsey (*Heliotropium curassavicum*) predominating in more alkaline habitats in the study area.

Other species found in several of the plant communities mentioned above include elderberry (*Sambucus mexicana*), goosefoot (*Chenopodium* spp.), blue dicks (*Dichelostemma capitatum*), Parry's larkspur (*Dephinium parryi*), chia (*Salvia columbariae*), coastal paintbrush (*Castilleja affinis*), common lomatium (*Lomatium utriculatum*), finger-leaved morning glory (*Calystegia macrostegia*), wild onion (*Allium* spp.), night shade (*Solanum xanti*), miniature lupine (*Lupinus bicolor*), silver buckwheat (*Eriogonum elongatum*), wild celery (*Apiastrum angustifolium*), legumes (Fabaceae), golden yarrow (*Eriophyllum confertiflorum*), Mariposa lily (*Calochortus* spp.), and amaranth (*Amaranthus blitoides*).

Farther to the north and east on the lower slopes of the San Bernardino and San Jacinto mountains, respectively, chamise chaparral gradually grades upward into manzanita chaparral and woodland communities, extending between 3,500 to 5,000 ft (1,067 to1,524 m) amsl. Other species include redshank or ribbon wood (*Adenostoma sparsifolium*), chamise, elderberry,

chokecherry, antelope bush (*Purshia glandulosa*), scrub oak, interior live oak, manzanita (*Arctostaphylos* spp.), and buckthorn (*Rhamnus* spp.).

In higher elevations of the San Bernardino and San Jacinto mountains montane forest occurs between approximately 5,000 to 7,000 ft (1,524–2,134 m) amsl. This zone is composed primarily of coniferous forests containing scattered oak (*Quercus* spp.), as well as willows and cottonwood along stream courses. Common species include ponderosa pine (*Pinus ponderosa*), Jeffery pine (*P. jeffreyi*), Coulter pine (*P. coulteri*), incense cedar (*Calocedrus decurrens*), manzanita, mountain mahogany (*Cercocarpus ledifolius*, *C. betuloides*) and, in protected areas, bigcone spruce (*Pseudotsuga macrocarpa*).

3.3 FAUNA

The faunal resources (mammalian) of the study area are described in the context of the three major vegetation communities that likely existed in the study area prior to extensive grazing by domestic livestock, historic agricultural pursuits, and extensive residential and commercial development. This is followed by a general discussion of the avifauna, reptiles, and amphibians found in the study area. The data presented herein have been compiled from the faunal species represented in the archaeological records of the DVL project area (McKim 2001), supplemented from data presented in Bettinger (1974) from archaeological studies at Lake Perris.

3.3.1 Valley Grassland Community

With very few exceptions, the valley floor is currently utilized almost entirely for residential and commercial development, transportation corridors, citrus orchards, ranches, and plowed agricultural crop-lands, which have been in existence since late 1880s when the valleys were first settled by non-Native peoples. Prior to historical development, the valley floors and the lower slopes of the hills bordering the valleys were intensively grazed by domesticated livestock (cattle and sheep) since the late 1700s. These practices have had large impacts on the composition and character of valley grassland vegetation community and, subsequently, on the types and relative numbers of faunal species that inhabit this community. Prehistorically, the valley floor was likely occupied by open grasslands dominated by perennial bunch-grasses and forbs, as well as native riparian communities where water was plentiful. Today, when left unplowed, the valley floor quickly becomes occupied by a dense cover of winter-sprouting, non-native annual grasses and forbs.

Fauna that likely occurred in abundance in the native valley grassland community included herbivorous and granivorous species tolerant of sparse vegetation cover and burrowing species that require relatively deep, friable soils such as pocket gophers (*Thomomys* sp.), and kangaroo rats (*Dipodomys* spp.). Of those species recovered in abundance in the prehistoric cultural assemblages, the valley grassland community would have been preferred by the black-tailed jackrabbit (*Lepus californicus*), pocket gophers, and kangaroo rats. Other common species such as the desert cottontail (*Sylvilagus audubonii*) would have made extensive use of valley grassland, but probably would have preferred valley edge areas where vegetative cover is more easily accessible. The Beechey ground squirrel (*Spermpophilus beecheyi*) would have also preferred the valley edge, as well as rocky outcrops and knolls on the valley floor. These last two species currently appear to exist in superabundance as the result of modern human activity,

which has increased suitable protective cover and den or burrow sites (e.g., abandoned irrigation pipes, road cuts, under buildings, etc.,), as well as providing wheat for hoarding ground squirrels.

Larger mammals found in the valley grassland community would have included carnivores and omnivores preying upon the abundant rodents, particularly the ubiquitous coyote (*Canis latrans*) and badger (*Taxidea taxus*), as well as the long-tailed weasel (*Mustela frenata*), striped skunk (*Musetela frenata*), and gray fox (*Urocyon cinereoargenteus*). Mule deer (*Odocoileus hemionus*) would have been encountered occasionally along the valley edges and near springs, but rarely on the open valley floor. Pronghorn antelope (*Antilocarpa americana*), although uncommon in the archaeological assemblages and currently extinct in this portion of Riverside County, would have been encountered exclusively on the open valley floor and near springs. Several species of mice (*Peromyscus* sp., *Reithrodontomys* sp., *Onychomys* sp.), as well as the California meadow vole (*Microtus californicus*) prefer grasslands and would have been abundant. However, these are quite rare in the archaeological record and may not have been important prehistoric subsistence resources.

3.3.2 Riversidian Sage Scrub Community

Occurring on the south-facing hillslopes and the lower portions of the north-facing hillslopes bordering the valleys, fauna common to the Riversidian sage scrub community include species with greater browse and cover requirements and include fewer numbers of granivorous and fossorial (burrowing) mammals owing to the shallow and rocky soils. Among the faunal taxa common in the archaeological assemblages, black-tailed jackrabbit are common in the more open aspects of the sage scrub community, but less common than in the grassland community of the valley floor. Desert cottontails are probably more common in the sage scrub than in valley grasslands, particularly at the interface between the two habitat types. Brush rabbits (*Sylvilagus bachmani*) are uncommon, but may be occasionally found in the denser aspects of the sage scrub community and along the interfaces with the chamise chaparral community found further up the hillslopes.

Wood rats (*Neotoma* sp.) are common in the sage scrub community around rock outcrops and along drainages, but are virtually absent from the valley grassland community. Pocket gophers are also common, but considerably less so than in the valley grasslands. The Pacific kangaroo rat (*Dipodomys agilis*) occupies the sage scrub community, whereas the Stephen's kangaroo rat *(D. stephensi*) and San Bernardino kangaroo rat (*D. merriami parvus*) occupy the valley grasslands and probably occurred in greater numbers than the Pacific kangaroo rat in prehistoric times. The Riversidian sage scrub community also harbors several species of mice (e.g., *Perognathus maniculatus*) that rarely appear in the archaeological record of the area and probably existed in slightly less abundance than those found in the valley grasslands. Larger mammals found in the sage scrub community include mule deer, coyote, bobcat (*Lynx rufus*), weasel, and striped skunk.

3.3.3 Chamise Chaparral Community

On the north-facing hillslopes, chamise (*Adenotsoma fasciculatum*) composes nearly pure stands, forming dense, nearly impenetrable, thickets, which are especially fire-prone and exhibit a faunal species diversity much lower than the vegetation communities described above. After a fire, chamise will quickly produce crown sprouts and proceed through a series of rapid growth stages,

with relatively short-lived herbaceous shrubs growing in height and providing a canopy cover; within five years, these shrubs subsequently die off and are replaced by chamise. During the chamise regrowth period, the numbers and diversity of plant and animal species in the chamise chaparral community is considerably higher and is likely comparable to that found in the Riversidian sage scrub community. Ethnographic and historical accounts describe the frequent use of fire by Native Americans (Lewis 1993), most likely to remove senescent stands of chamise chaparral and promote the growth of more useful herbaceous plant species and increase animal populations. Because of a very low diversity of plant species, the chamise chaparral community supports relatively few animal species and is primarily used as cover due to the dense thickets it forms.

Among those faunal taxa well represented in the archaeological assemblages of the general study region, mule deer make use of the chamise chaparral community for cover during periods of inactivity, but will forage primarily in the adjacent sage scrub community and the fringes of the valley grassland community, both containing a wider array of browse plants. Woodrats, particularly the dusky-footed woodrat (*Neotoma fuscipes*), also make use of these thickets as cover from aerial predators and as a source of building materials for their stick nests or middens. Brush rabbits also require dense thickets as cover and rarely venture more than 10 m (33 ft) from it; because of this and dietary requirements, brush rabbits will forage primarily in open areas within the chamise chaparral community and adjacent ecotonal habitats.

Avifauna characteristic of the study area, particularly the shrub dominated vegetation communities, include California quail (*Callipepla californica*), western scrub jay (*Aphelocoma coerulescens*), common raven (*Corvus corax*), bushtit (*Psaltriparus minimus*), wrentit *(Chamaea fasciata*), California thrasher (*Toxostoma redivivum*), California towhee (*Pipilo crissalis*), Bell's sage sparrow (*Amphispiza belli belli*), and California gnatcatcher (*Polioptila californica californica*). Greater roadrunner (*Geococcyx californianus*) is found both in the valley grassland and sage scrub communities. Common raptors include Great Horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*).

Reptiles include the coast horned lizard (*Phrynosoma coronatum*), western fence lizard (*Sceloporus occidentalis*), granite spiny lizard (*S. orcutti*), coastal rosy boa (*Lichanura trivirgata rosafusca*), red racer (*Masticophis flagellum*), striped racer (*M. lateralis*), gopher snake (*Pituophis melanoleucus*), California kingsnake (*Lampropeltis getulus*), southern Pacific rattlesnake (*Crotalus viridis*), and northern red-diamond rattlesnake (*C. ruber ruber*).

In and adjacent to wetland areas, the Pacific tree frog (*Hyla regilla*) and the western toad *(Bufo boreas*) can be found; the southwestern pond turtle (*Clemmys marmorata*) may have also occurred prehistorically.

4.0
CULTURAL SETTING

4.1 INTRODUCTION

Riverside's historic buildings, structures, objects, landscapes and neighborhoods, and prehistoric and historical archaeological sites are physical reminders of the ways in which early inhabitants and later citizens of Riverside used and developed the land. These cultural resources represent contexts or themes important in the history of the City; they not only provide a broad understanding of the City's settlement and development patterns, but also identify cultural resource types that reflect those patterns and give the City its unique character and identity.

In the following sections, the cultural history of western Riverside County is reviewed to provide a context for understanding the types, nature, and significance of the prehistoric, ethnographic, and historical cultural resources identified within the greater City of Riverside study region

4.2 PREHISTORIC CULTURAL SETTING

4.2.1 Introduction

This section describes the prehistoric cultural setting of the study area to provide a context for understanding the types, nature, and significance of the prehistoric cultural resources identified within the general study region. The data presented, herein, regarding the sequence of prehistoric use, adaptation, and occupation of the interior valleys and mountain localities that include Riverside's study area, are summarized from a synthesis of more than 10 years of archaeological research conducted at DVL as part of the Eastside Reservoir Project, located approximately 37 km (23 mi) southeast of the City's Sphere of Influence (Goldberg et al. 2001; McDougall et al. 2003b). To further understand the types and nature of the prehistoric cultural deposits identified in the study region within the frame of a wider geographical context, a review of the coastal (Wallace 1955, 1978; Warren 1968) and desert (Warren and Crabtree 1972; Warren 1980) regional chronologies to which most researchers have subscribed is also provided.

For the most part, the prehistory of inland valleys of southern California that characterizes the City's study area has been less thoroughly understood than that of the adjacent desert and coastal regions. Prior to the DVL cultural resources studies, no comprehensive synthesis had been developed specifically for the interior valley and mountain localities of cismontane southern California that characterize the study region surrounding the City. The lack of an adequate culture history for this portion of California can be attributed to at least three major factors: (1) the nature and scope of investigations in the region, where research has been concentrated for the most part at single sites or on specific problems; (2) the complex historical sequence of investigations and discoveries, combined with a tendency on the part of many authors to explain similarities in assemblages to cultural diffusion; and (3) the confusion of typological and chronological terminology, which has led to ill-defined units that alternately describe time

periods, tool morphology, social groupings, or technological adaptations (see Goldberg and Arnold 1988).

Two regional chronologies are widely cited in the archaeological literature for the prehistory of the coastal regions of southern California (Wallace 1955, 1978; Warren 1968). These chronologies are generalized temporal schemes based on the presence or absence of certain artifact types; both chronologies span the known prehistoric occupation of coastal southern California. The units used by Wallace are "horizons" or "periods," which are extensive in space but restricted in time. The units employed by Warren are "traditions," which may be spatially restricted but display temporal continuity. A more recent chronological synthesis for coastal southern California has been provided by Koerper and Drover (1983). This synthesis employs Wallace's (1955) horizon terminology, but uses radiometric data to order stylistic changes observed in the artifact assemblages, which are interpreted as temporal indications of cultural change over time.

For the desert regions of southern California, Warren and Crabtree also constructed a chronology based on the temporal concept; they used projectile points as period markers and radiocarbon assays to provide absolute dates (Warren and Crabtree 1972). Eight years later Warren (1980), in his overview of the Amargosa-Mojave Basin Bureau of Land Management Planning Units, presented a slightly modified version of the earlier Warren-Crabtree chronology. In this chronology, Warren (1980) retained the temporal period as the basic unit, but changed some of the absolute dates.

In the absence of absolute chronological indicators for most inland sites, researchers have generally employed typological cross-dating of artifact types from either coastal or desert sequences, often as the sole means for assigning age to archaeological sites within the interior valleys of southern California, including western Riverside County. However, two large reservoir projects, first the Perris Reservoir Project (O'Connell et al. 1974), and then most recently, the DVL Project (Goldberg et al. 2001), generated large data sets that have built upon one another to provide a basis for resolving some of these regional discrepancies. Thus, the following discussion of the prehistoric cultural setting for the City's study region is drawn from the cultural sequence recently developed for the DVL study area. This chronology is based first on artifact cross dating and geomorphological interpretations, and then refined with radiocarbon and obsidian hydration dates (Onken and Horne 2001; Robinson 1998, 2001). The resultant chronology draws heavily on a cultural sequence defined by Warren (1984) that is based largely on archaeological work conducted in the Colorado and Mojave Deserts.

However, because Warren's chronology used temporal period names that suggest links to the Mojave Desert, these were replaced in the DVL chronology by value-neutral terms.

4.2.2 Paleoindian Period (ca. 12,000–9500 B.P.)

The Paleoindian Period is marked by deglacial climatic changes that began by about 13,000 before present (B.P., [i.e., 1950]) (Gosse et al. 1995; Mix 1987; Sowers and Bender 1995). In the desert interior, the change from glacial to postglacial ecosystems began by at least 11,700 B.P. (Spaulding 1995), but took millennia to complete. Paleoclimatic and paleoecological data suggest that until about 7500 B.P. the prevailing westerly air flow pattern weakened, while the desert interior received moist monsoonal flow from the southeast (Davis and Sellers 1987;

Spaulding and Graumlich 1986). This monsoonal flow was blocked from reaching the inland valleys of western Riverside County by the Transverse and Peninsular ranges (Spaulding 2001). This resulted in the interior deserts having considerably higher levels of effective moisture than present. Thus, the desert interior was apparently less arid than cismontane southern California during this period, and possessed an abundance of water sources and relatively productive ecosystems (Van Devender et al. 1987).

Warren's (1968, 1980) earliest interval of southern California prehistory is the "San Dieguito Tradition," beginning 10,000 B.P. and best defined in the coastal San Diego area (True 1958). Wallace (1978) calls this interval "Period I: Hunting" and considers it to begin about 12,000 B.P. Further to the east, the "San Dieguito Tradition" is relatively coeval to the "Lake Mojave Period," an expression of the so-called "Western Pluvial Lakes Tradition," presumed to begin somewhat earlier than 9500 B.P. and lasting to perhaps 7000 B.P. in the southwestern Great Basin (Basgall and Hall 1993; Warren 1980, 1984). Wallace (1978:27) noted the close correspondence between the "Western Pluvial Lakes Tradition" and the "San Dieguito Tradition" and suggested that the two traditions most likely represent regional variants of an early hunting tradition that prevailed over a wide geographical area.

Both coastal and desert region designations for the early Holocene refer to a long period of human adaptation to environmental changes brought about by the transition from the late Pleistocene to the early Holocene geologic periods. As climatic conditions became warmer and more arid, Pleistocene megafauna perished abruptly between 13,000 and 10,000 B.P. Human populations responded to these changing environmental conditions by focusing their subsistence efforts on the procurement of a wider variety of faunal and floral resources.

These early occupants of southern California are believed to have been nomadic large-game hunters whose tool assemblage included percussion-flaked scrapers and knives; large, well-made fluted, leaf-shaped, or stemmed projectile points (e.g., Lake Mojave, Silver Lake); crescentics; heavy core/cobble tools; hammerstones; bifacial cores; and choppers and scraper planes. Both Warren and Wallace suggest that the absence of milling tools commonly used for seed preparation indicates that an orientation toward hunting continued throughout this phase.

Nonetheless, based on ethnographic models developed for hunting-gathering groups throughout the world, populations of this phase undoubtedly exploited plant resources as well. Indeed, most Lake Mojave deposits investigated in the southwestern Great Basin have yielded some amount of milling equipment, usually large slabs with ephemeral wear and handstones, implying regular, albeit limited, use of vegetal resources (Basgall and Hall 1993:19). Although intact stratified sites dating to this period are very scarce, the limited data do suggest that the prehistoric populations of this period moved about the region in small, highly mobile groups, with a wetland-focused subsistence strategy based on hunting and foraging. Sites dating from this interval have generally been found around early Holocene marshes, lakes, and streams which dominated much of the landscape. There is also some evidence that these early groups may have been semisedentary and used marine as well as floral resources along certain areas of the southern California coast (Gallegos 1987; Koerper et al. 1991).

As shown above, traditional theories have often stereotyped these terminal Pleistocene/early Holocene populations as highly mobile microbands with a wetland-focused subsistence strategy based on hunting and foraging. However, recent studies in South America at Monte Verde in

southern Chile (Dillehay 1989, 1997; Meltzer et al. 1997), Monte Alegre in the Brazilian Amazon (Roosevelt et al. 1996), and in the high Andes (Bruhns 1994; Lynch 1980), as well as archaeological evidence from North America show that human populations in the New World had settled in more diverse environments, and had developed a much wider range of cultures and adaptations during this period than previously supposed (Moratto 1998:5).

Thus, given the current knowledge, one would expect to find archaeological sites in California dating to the Latest Pleistocene and Early Holocene (Moratto 1998:8). These sites may yield only meager evidence of human activity, or they may be richly endowed with flaked and ground stone tool kits, ecofacts, and possibly evidence of habitation structures. Such sites may be found in large, protected caves situated above floodplains but near economically important resources in coastal, lakemarsh, and valley/riparian environments. Other areas that may be expected to contain archaeological components of late Pleistocene age include quarry sites where high quality toolstone could be obtained, as well as stable landforms above high stands of pluvial lakes, along ridge systems and in mountain passes likely to have served as travel routes, and stable, old surfaces along the coast where marine encroachment was minimal during the past 15,000 years (Moratto 1998:10–11).

No archaeological sites dating to the Paleoindian Period have been identified within the vicinity of the City's study region. However, the regional lack of archaeological evidence dating to this period may be due to adverse climatic conditions which appear to have prevailed throughout cismontane southern California during this time. As was noted above, the desert interior may have been more suitable to prehistoric occupation than the interior valleys of southern California during this time period. Assuming that early human population densities were low and that people were dispersed over the landscape primarily in small mobile groups, there may have not been sufficient population pressure to force occupation of environmentally marginal areas that may have characterized much of the current study region. It is more likely that Paleoindian populations in southern California were centered on the coastal or interior desert regions or around the few large, reliable, drought-resistant water sources present within the inland valley areas, such as those that existed at Lake Elsinore (Grenda 1997), Mystic Lake in the San Jacinto Valley (McDougall et al. n.d.), and possibly in the Cajalco Basin which now forms Lake Mathews (McDougall et al. 2003b).

4.2.3 Early Archaic Period (ca. 9500–7000 B.P.)

The Early Archaic period saw a continuation of the weather patterns described above for the latest Pleistocene/Early Holocene period, with the desert interior apparently much more favorable for human occupation than the cismontane valleys of southern California. It has been postulated that small, highly mobile groups still traveled over a wide home range utilizing highly portable tool kits to procure and process critical resources, with brief and anticipated intervals of seasonal sedentism. However, because of the arid conditions within the interior valley areas, prehistoric use of the general study area would still have been negligible; populations would still have favored the coastal or interior desert regions. Nonetheless, those populations exploiting the interior valleys would still have been tethered to the few reliable, drought-resistant water sources such as Lake Elsinore, Mystic Lake, and possibly the Cajalco Basin (Goldberg et al. 2001).

Archaeological sites documented within the vicinity of the City's study area dating to the Early Archaic or containing meager evidence suggestive of sporadic use during this time period are

rare, supporting the hypothesis of negligible prehistoric use of the inland valley areas of Riverside County during this period. Within the DVL study area, only two site components are firmly dated to the Early Archaic. One component includes a single human burial at CA-RIV-5786 dating to 7380 ± 300 B.P. and capped by several large, highly shaped metates (McDougall 1995). The second is the lower cultural component at CA-RIV-5086, a small temporary camp dated with obsidian hydration data and stratigraphic information to the Early Archaic; this component contained a relatively sparse scatter of flaked and ground stone artifacts and faunal remains, but no cultural features, suggesting that CA-RIV-5086 was initially utilized as a resource extraction locale, possibly situated adjacent to a wetlands environment during the Early Archaic period.

Although much of the data gathered during the DVL studies seem to corroborate the notion of sporadic use of the study region by small, highly mobile bands utilizing highly portable tool kits during the Early Archaic, the data from CA-RIV-5786, and one other site (CA-RIV-6069) investigated recently, seem to contradict this theory. Identified during the Metropolitan Water District's Inland Feeder Pipeline Project, CA-RIV-6069 is situated on an alluvial fan emanating north from the Lakeview Mountains in western Riverside County, just above the floor of the San Jacinto Valley and south of Mystic Lake; numerous springs are present along the mountain front overlooking the embayment (McDougall et al. n.d.). The cultural deposits at CA-RIV-6069 were encountered at depths ranging from 1.5 m (5 ft) to 3.9 m (13 ft) below the modern ground surface; the vertical distribution of cultural materials and features documented indicate that two distinct cultural strata representing two periods of cultural occupation are present. A more intensive cultural occupation was encountered between approximately 2.7 m (9 ft) to 3.9 m (13 ft) below the modern ground surface; eight radiocarbon assays from cultural features identified in this lower component range from 7940 to 8370 B.P. A less intensive period of site use is represented by materials and features encountered between 1.5 (5 ft) to 2.4 m (8 ft) below the ground surface; charcoal recovered from an intact fire hearth within the upper component was assayed to 2230 B.P., or to the Late Archaic Period. These data suggest that the lower component at CA-RIV-6069 is the oldest prehistoric cultural deposit ever investigated in the greater San Jacinto Valley, and among the oldest deposits ever investigated in inland southern California.

Emergency data-recovery excavations in a portion of CA-RIV-6069 yielded an extensive assemblage of flaked and ground stone tools, marine and terrestrial faunal remains, and bone and shell tools and ornaments. Additionally, 15 discrete cultural features were identified, including intact fire hearths, ground stone artifact caches, and concentrations of artifacts, fire-altered rock, and unmodified manuported cobbles representing remnants of former activity areas; 12 of these cultural features were encountered within the lower cultural component. It should also be noted that the lower component identified at CA-RIV-6069 yielded 37 intentionally molded and fired ceramic objects, possibly the oldest ceramic industry identified to date in the Western Hemisphere (McDougall et al. n.d.). As well, the presence of numerous cultural features at CA-RIV-6069, and the extreme degree of fragmentation, fire-alteration, and reuse/recycling of large, highly-shaped ground stone implements suggests fairly intensive, residential use (either repeated or long term) of CA-RIV-6069 during the Early Archaic. The presence of several artifact caches suggest that site reuse was anticipated. Thus, CA-RIV-6069 may have been a destination point with a predictable resource base that was located on a scheduled, seasonal collecting round. Resource predictability, and the planning depth and organizational characteristics necessary to

take full advantage of it, fostered expectations of site reoccupation and longer-term residential occupations.

One other site containing an Early Archaic component worthy of note is CA-RIV-2798/H, or the Lake Elsinore Site. CA-RIV-2798/H is situated at the mouth of the outlet channel of Lake Elsinore, one of the only natural lakes in southern California. Data-recovery excavations at the site, conducted in 1993 by Statistical Research, Inc., revealed stratified cultural deposits attaining depths of nearly 3 m a(10 ft) and containing a fairly large assemblage of flaked stone tools (bifaces, unifaces, projectile points, small flake tools, and crescents); a variety of ground stone implements were also collected (Grenda 1997). Documented features include several fire hearths and hearth clean-out refuse deposits, rock clusters, and ground stone caches. Of the eight radiometric assays available for the site, one assay of 8400 ± 60 B.P. from marine shell, coupled with the crescents, suggests that the initial occupation of the Lake Elsinore site may have occurred during the later portion of the Early Holocene (Grenda 1997:279). Two additional radiometric assays (4800 ± 60 B.P. and 4530 ± 80 B.P.) and six dart points, as well as several cultural features indicate that the site occupation intensified during the Middle Holocene; during subsequent periods of the Late Holocene, site occupation apparently became more sporadic and less intensive (Grenda 1997:279–284).

In sum, few sites dating to the Early Archaic have been documented within the regional study area, supporting the theory of negligible use of the inland areas of southern California at this time because of arid conditions. Many of these sites contain only scant evidence of Early Archaic use in the form obsidian hydration rind measurements, suggesting ephemeral site use by small, highly mobile groups. However, some sites dating to this time period do contain evidence of fairly sedentary residential occupations, and evidence that site reuse was anticipated, suggesting a predictable availability of water and other critical resources. These sites have been found invariably near large, drought-resistant, inland water sources, and may have been destination points on a scheduled, seasonal round.

4.2.4 Middle Archaic Period (ca. 7000–4000 B.P.)

The Middle Archaic saw a reversal of the weather patterns which had prevailed throughout much of cismontane southern California for several millennia. By about 6000 B.P., local environmental conditions ameliorated while conditions in the deserts deteriorated, reaching maximum aridity of the postglacial period (Antevs 19552; Hall 1985; Haynes 1967; Mehringer and Warren 1976; Spaulding 1991, 1995). Spaulding (2001) proposes that a westerly air flow pattern returned to southern California, while the monsoonal weather patterns in the deserts retreated. As a result, the inland areas may have seen increased effective moisture, while the interior deserts, no longer receiving moist monsoonal flow and now in the rainshadow of the Transverse and Pennisular Ranges, became quite arid. This suggests that cismontane southern California, including the inland valleys of western Riverside County, may have been a relatively more hospitable environment than the interior deserts during the middle Holocene.

Due to both the amelioration of the local environmental conditions and the deterioration of the conditions in the interior deserts, it was postulated that the inland areas of cismontane southern California would see an increase in prehistoric use and occupation after about 6000 B.P. as compared to the earlier periods (Goldberg et al. 2001). This hypothesis appears to have been validated by the DVL studies, where at least 19 archaeological localities were dated to the

Middle Archaic. These Middle Archaic components include several intensively used residential bases and/or temporary camps containing abundant cultural debris including temporally diagnostic artifacts (Pinto and Silver Lake projectile points, crescents), at least nine complex lithic scatters which appear to have functioned as resource extraction and processing sites, and one human burial covered with large rocks and ground stone artifacts. In addition, evidence of ephemeral Middle Archaic use is present at several sites in the form of isolated radiocarbon-dated features and/or sparse scatters of obsidian debitage dated by obsidian hydration methods. The more intensively used residential locations occur along alluvial fan margins, while less intensively used areas tend to be situated on arroyo bottoms or upland benches (Goldberg et al. 2001).

In coastal southern California, the early traditions gave way to what Warren refers to as the "Encinitas Tradition" by about 7000 to 8000 B.P.; Wallace's "Period II: Food Collecting" also would be subsumed under this tradition. Inland San Diego County sites dating to this period have been assigned to the "La Jolla/Pauma Complex" by True (1958). This interval has been described frequently as the "Milling Stone Horizon" because of the preponderance of milling tools in the archaeological assemblages of sites dated to this era (Basgall and True 1985; Kowta 1969; Wallace 1955).

In the coastal and inland regions of southern California, this period of cultural development is marked by the technological advancements of seed grinding for flour and possibly the first use of marine resources, such as shellfish and marine mammals. The artifact inventory of this period is similar to that of the previous period and includes crude hammerstones, scraper planes, choppers, large drills, crescents, and large flake tools. This assemblage also includes large leaf-shaped projectile points and knives; manos and milling stones used for hard-seed grinding; and likely nonutilitarian artifacts, such as beads, pendants, charmstones, discoidals, spherical stones, and cogged stones (Kowta 1969; True 1958; Warren et al. 1961).

Although sites assigned to this stage of cultural development are similar in many respects, their content, structure, and age can vary. This variability is largely due to geographical differences between the coast and interior; the primary difference between the archaeological assemblages of coastal and inland sites appears to be related to subsistence. Coastal occupants gathered fish and plant resources, while hunting was generally less important (projectile points are rare). The inland occupants primarily collected hard seeds and hunted small mammals; therefore, projectile points are more common in inland assemblages. King (1967:66–67) suggests that the coastal sites probably represent more permanent occupations than are found in the interior, since coastal inhabitants were sustained by more reliable and abundant food resources. A more mobile subsistence round was likely necessary for inland inhabitants. It is possible, too, that inland and coastal sites of this period represent seasonal movement by the same groups of people.

In the desert regions of southern California, the "Pinto Period" succeeded the "Lake Mojave Period," beginning at approximately 7000 B.P. and lasting to 4000 or 3500 B.P. Relatively recent paleoecological and paleohydrological evidence suggests maximum aridity in the desert regions between ca. 7000 and 5000 B.P., with amelioration beginning at approximately 5500 B.P. and continuing through 4000 B.P. (Spaulding 1991, 1995). As an adaptive response to these changing climatic conditions, the Pinto Period is characterized by necessary shifts in prehistoric subsistence practices and adaptations, with greater emphasis placed on the

exploitation of plants and small animals than the preceding Lake Mojave Period, as well as a continued focus on artiodactyls (Warren 1980, 1984).

The distinctive characteristics of the "Pinto Basin Complex" as defined by Campbell and Campbell (1935) are projectile points of the Pinto series, described by Amsden (1935) as weakly shouldered, indented-base projectile points that are coarse in manufacture as well as form. Other diagnostic artifact types of this period include: large and small leaf-shaped bifaces; domed and heavy-keeled scrapers; numerous core/cobble tools; large blocky metates evincing minimal wear and small, thin, extensively used milling slabs; and shaped and unshaped manos. Throughout most of the California desert region, sites containing elements of the Pinto Basin Complex (e.g., those in the Pinto Basin, Tiefort Basin, Salt Springs, and Death Valley) are small and usually limited to surface deposits suggestive of temporary and perhaps seasonal occupation by small groups of people (Warren 1984:413).

Interestingly, one site discovered during the DVL studies evinces purely Lake Mojave and Pinto period materials. This site, CA-RIV-5045, also known as the Diamond Valley Pinto Site, is very unique in that Pinto and Lake Mojave materials are found within well-stratified, radiometrically defined cultural deposits. In addition to the numerous dart projectile points recovered indicative of the Pinto period (i.e., Pinto-series and Silver Lake-series), these deposits contain abundant and diverse faunal assemblages, an extensive array of flaked stone tools and ground stone implements, as well as intact cultural features ascribable to specific periods of occupation. Radiometric data, feature types, and artifact/ecofact assemblage characteristics indicate that CA-RIV-5045 was occupied most intensively between 6200–5600 B.P., and functioned as a winter-time residential base during this period (McDougall 2001).

As was noted earlier, it was posited that cismontane southern California would see an increase in human activity after about 6000 B.P. in response to changing environmental conditions. At this time, local environmental conditions ameliorated and conditions in the interior deserts reached the maximum aridity of the postglacial period. The number of sites dating to the Middle Archaic documented at the DVL certainly increased during this period, and it is plausible that the apparent increase in human use and occupation of the DVL study area during the Middle Archaic is related to both the amelioration of the local environment and the deterioration of the desert interior (Goldberg et al. 2001).

The distribution of sites and variety of site types (i.e., residential bases, temporary camps, and ephemeral resource extraction and processing sites) dating to the Middle Archaic at the DVL suggest that overall use of the study area likely conformed to a rest-rotation collecting strategy involving relatively brief intervals of sedentism during the midwinter ebb of yearly productivity, followed by warm-season residential movements through a series of resource procurement camps in a seasonal round (Goldberg and Horne 2001). A key feature of rest-rotation collecting is a reliance on stored foods during the interval of winter sedentism. Logistic mobility, or the collection and transport of critical resources to the home residential base, also played an important role in resource procurement, especially during the interval of seasonal sedentism and consumption of stored foods. Another key feature of this strategy is the regular rotation of settlements on a yearly or multiyearly basis to new areas to avoid the declining rates of return associated with continuous exploitation of the same areas.

It is of interest that although the indices used to measure residential mobility for the Early and Middle Archaic components documented at the DVL study area indicate that these early components evince a more mobile land-use strategy than later periods, and that the Middle Archaic strategy registers more mobile than the Early Archaic strategy, most data convincingly show that neither of these early periods can be characterized as fully mobile. The fragmentation of bottom grinding stones (i.e., metates, milling slabs), ranging between 80 and 100 percent for nearly all DVL components throughout prehistory, clearly indicates that occupations were fairly sedentary or that sites were consistently reused, with ground stone being cached and reused until it was no longer functional (Klink 2001a). In addition, the occurrence of artifact and toolstone caches at several Middle Archaic sites suggests that site reuse was anticipated (Horne 2001).

4.2.5 Late Archaic Period (ca. 4000–1500 B.P.)

The Late Archaic Period was one of cultural intensification in southern California. The beginning of the Late Archaic coincides with the Little Pluvial, a period of increased moisture in the region. Effective moisture continued to increase in the desert interior by approximately 3600 B.P., and lasted throughout most of the Lake Archaic. This ameliorated climate allowed for more extensive occupation of the region. By approximately 2100 B.P., however, drying and warming increased, perhaps causing resource intensification.

At the DVL study area, 23 archaeological localities show evidence that their primary use was during the Late Archaic, while eight others yielded evidence of some activity during the period. Late Archaic site types documented within the DVL study area include residential bases with large, diverse artifact assemblages, abundant faunal remains, and cultural features, as well as temporary bases, temporary camps, and task-specific activity areas. In general, sites showing evidence of the most intensive use tend to be on range-front benches adjacent to permanent water sources such as perennial springs or larger streams, while less intensively used locales occur either on upland benches or on the margins of active alluvial fans (Goldberg 2001).

Evidence from the DVL also suggests increased sedentism during this period, with a change to a semi-sedentary land-use and collection strategy. The profusion of features, and especially refuse deposits in Late Archaic components, suggests that seasonal encampments saw longer use and more frequent reuse than during the latter part of the Middle Archaic, with increasing moisture improving the conditions of southern California after ca. 3100 B.P. (Horne 2001; Spaulding 2001). Drying and warming after ca. 2100 B.P. likely extracted a toll on expanding populations, influencing changes in resource procurement strategies, promoting economic diversification and resource intensification, and perhaps resulting in a permanent shift towards greater sedentism (Goldberg 2001).

Technologically, the artifact assemblage of this period was similar to that of the preceding Middle Archaic; new tools were added either as innovations or as “borrowed” cultural items. Diagnostic projectile points of this period are still fairly large (dart point size), but also include more refined notched (Elko), concave base (Humboldt), and small stemmed (Gypsum) forms (Warren 1984). Late in the period, Rose Spring arrow points appeared in the archaeological record in the deserts, reflecting the spread of the bow and arrow technology from the Great Basin and the Colorado River region. However, this projectile point type was not found at the DVL study area, and there is no evidence suggesting that the bow and arrow had come into use at this time in the inland regions of southern California.

Concerning the cultural sequences for Late Archaic coastal sites, for the period after about 5000 B.P., Warren (1968) and Wallace (1978) diverge in their chronological sequences for the coastal regions of southern California. Warren's "Encinitas Tradition" includes all areas outside the Chumash territory of the Santa Barbara coastal zone and continues until approximately 1250 B.P. Wallace, on the other hand, identifies a transition beginning approximately 5000 B.P., marking the onset of "Period III: Diversified Subsistence." In his original 1955 sequence, Wallace said this period, generally referred to as the "Intermediate Horizon," was largely based on changes in the archaeological assemblages of sites from the Santa Barbara coastal region. This horizon is characterized by a greater variety of artifacts, suggesting a greater variety of utilized food resources. Although this interval of human occupation in coastal southern California is poorly defined and dated because of the paucity of representative sites, many researchers in southern California have retained Wallace's original "Intermediate Horizon" as a classification for sites dating between 5000 and 1500 B.P.

The subsistence base during this period broadened. The technological advancement of the mortar and pestle may indicate the use of acorns, an important storable subsistence resource. Hunting also presumably gained in importance. An abundance of broad, leaf-shaped blades and heavy, often stemmed or notched projectile points have been found in association with large numbers of terrestrial and aquatic mammal bones. Other characteristic features of this period include the appearance of bone and antler implements and the occasional use of asphaltum and steatite. Most chronological sequences for southern California recognize the introduction of the bow and arrow by 1500 B.P., marked by the appearance of small arrow points and arrow shaft straighteners.

Some archaeologists have suggested that the changes in the coastal artifact assemblages dating to this period were the result of an influx or incursion of "Shoshonean" people from interior desert areas to the coastal regions (Rogers 1929; Wallace 1978). However, there is virtually no agreement among researchers as to the timing of the initial Shoshonean incursion into the study region; estimates generally range from 1000 to more than 6000 years ago, and few researchers acknowledge or question the assumption that Shoshoneans arrived to the study region and replaced some other cultural group (Goldberg and Arnold 1988:50–56). Other archaeologists suggest that cultural transition from the earlier "Milling Stone Horizon" to the succeeding "Intermediate Horizon" coastal and inland assemblages reflects progressive economic changes (e.g., trade) rather than population replacement (King 1982; Koerper 1981; Moratto 1984:164).

In general, cultural patterns remained similar in character to those of the preceding horizon. However, the material culture at many coastal sites became more elaborate, reflecting an increase in sociopolitical complexity and increased efficiency in subsistence strategies (e.g., the introduction of the bow and arrow for hunting). The settlement-subsistence patterns and cultural development during this period are not well understood because of a lack of data; however, the limited data do suggest that the duration and intensity of occupation at the base camps increased, especially toward the latter part of this period.

In the eastern desert regions of southern California, the "Gypsum Period" (ca. 4000 to 1500 B.P.) is generally coeval with Wallace's "Intermediate Horizon." A trend toward increasing effective moisture, which began in the late middle Holocene, culminated in a pronounced pluvial episode between approximately 3700 and 3500 B.P. At that time, a number of basins in the Mojave and Owens river drainages supported perennial lakes (Enzel et al. 1992). No comparable events are

evident earlier in the paleohydrological record, developed largely since Warren's (1984) work, that date to 5000 to 4500 B.P., the dates that encompass Warren's so-called "Little Pluvial." After the end of pluvial conditions (ca. 3500 B.P.), conditions typified by greater effective moisture appear to have persisted until approximately 3,000 years ago. An episode of aridity exceeding that of the present may have occurred about 2500 B.P., but there is evidence for increased effective moisture again between approximately 2000 and 1400 years B.P. (Spaulding 1990, 1995).

In addition to diagnostic projectile points, Gypsum Period sites include leaf-shaped points, rectangular-based knives, flake scrapers, T-shaped drills and, occasionally, large scraper planes, choppers, and hammerstones (Warren 1984:416). Manos and milling stones are also common. A technological innovation introduced during this period was the mortar and pestle, used for processing acorns and hard seeds, such as those derived from the hollyleaf cherry and mesquite pod. This correlates with a warming and drying trend that began around 2100 B.P., which appears to have resulted in resource intensification. In addition, the frequencies of grinding tools show increasing importance of plant foods throughout the Late Archaic, with a substantially greater emphasis after 2000 B.P. (Goldberg 2001). Other artifacts include arrow shaft smoothers, incised slate and sandstone tablets and pendants, bone awls, *Olivella* shell beads, and *Haliotis* beads and ornaments. A wide range of perishable items dating to this period was recovered from Newberry Cave, including atlatl hooks, dart shafts and foreshafts, sandals and S-twist cordage, tortoise-shell bowls, and split-twig animal figurines. The presence of both *Haliotis* and *Olivella* shell beads and ornaments and split-twig animal figurines indicates that the California desert occupants were in contact with populations from the southern California coast, as well as the southern Great Basin (e.g., Arizona, Utah, and Nevada).

Technologically, the artifact assemblage of this period is similar to that of the preceding Pinto Period; new tools also were added either as innovations or as "borrowed" cultural items. Included are the mortar and pestle, used for processing hard seeds (e.g., mesquite pods), and the bow and arrow, as evidenced by the presence of Rose Spring projectile points late in this period. Ritual activities became important, as evidenced by split-twig figurines (likely originating from northern Arizona) and petroglyphs depicting hunting scenes. Finally, increased contact with neighboring groups likely provided the desert occupants important storable foodstuffs during less productive seasons or years, in exchange for valuable lithic materials such as obsidian, chalcedonies, and cherts. The increased carrying capacity and intensification of resources suggests higher populations in the desert with a greater ability to adapt to arid conditions (Warren 1984:420).

4.2.6 Saratoga Springs Period (ca. 1500–750 B.P.)

Because paleoenvironmental conditions were little changed from the preceding period, cultural trends in the early portion of the Saratoga Springs Period were, in large part, a continuation of the developments begun during the end of the Late Archaic Period. However, the Medieval Warm, a period of even more persistent drought, began by 1060 B.P., and conditions became significantly warmer and drier. These climatic changes were experienced throughout the western United States (Jones et al. 1999; Kennett and Kennett 2000), although the inland areas of cismontane southern California may have been less affected than the desert interior. The Medieval Warm continued through the first 200 years of the Late Prehistoric Period until approximately 550 B.P. (Spaulding 2001).

Firm evidence of Saratoga Springs Period occupation was documented at seven site components within the DVL study area, while three other sites exhibit evidence of ephemeral use at this time. Six other localities within the DVL study area yielded either obsidian with hydration bands suggesting Saratoga Springs age or Saratoga Springs projectile points (a large triangular form associated with use of the bow and arrow which began to appear in the DVL study area at this time) but without evidence of sustained site use during this period. The focal shift of prehistoric activity from alluvial fan margins to mountain-front benches adjacent to permanent water sources, which was initiated during the Late Archaic, is also evidenced in the Saratoga Springs site locations (Goldberg 2001).

Within the DVL study area, the Saratoga Springs Period is seemingly marked by a reduction in the number of refuse deposits and, to a slightly lesser extent, hearths. Interestingly, when accounting for sample size, the frequency of artifact and toolstone caches was more than doubled during the Saratoga Springs Period from the preceding Late Archaic, while the frequency of human remains reached the highest point of any time in the archaeological record. Midden-altered sediments also appear for the first time during this period (Horne 2001).

However, it is of interest that most Saratoga Springs components identified within the DVL study area actually date to the Medieval Warm Interval; only one component did not. When components dating to the Medieval Warm segment of the Saratoga Springs Period are segregated and combined with Medieval Warm components from the Late Prehistoric Period, it reveals that the frequency of refuse deposits and artifact and toolstone caches during the Medieval Warm is slightly higher than during the Late Archaic and much higher than during the latter portion of the Late Prehistoric Period. The frequency of human remains (all of which are unburned) during the Medieval Warm is also much higher than during the Late Archaic and Protohistoric Period; no human remains were found in components of the Late Prehistoric Period after the Medieval Warm Interval (Horne 2001).

During the DVL studies, it was anticipated that intensive use of the inland areas of cismontane southern California during the Medieval Warm may have been curtailed altogether owing to inhospitable climate and concomitant decline in water and food sources. However, while land-use and procurement strategies experienced profound changes at this time, the response to deteriorating conditions was not abandonment of the inland areas, but rather intensification. Apparently, climatic conditions of warming and drying that may have begun ca. 2100 B.P., toward the end of the Late Archaic, had already triggered an intensification process that established productive strategies for dealing with resource stress. With the onset of the Medieval Warm, those strategies were further refined and intensified (Goldberg 2001).

Not only did the data indicate that the DVL study area was used on at least a semi-permanent basis during the Medieval Warm Interval, but that residential bases show evidence (e.g., refuse deposits, midden development) that activities intensified at those settlements. People were also intentionally caching toolstone and ground stone tools, suggesting that they anticipated returning to the same locations. Characteristics of the DVL ground stone assemblages from the Medieval Warm demonstrate that plant foods were more important than in any other prehistoric period; plant processing intensified and acorns apparently became an important staple (Klink 2001a). The faunal assemblages also show that resource stress was accommodated with similar strategies by intensifying the use of lagomorphs and by further expanding diet breadth, adding animals (i.e. medium-sized carnivores) to the diet that were rarely consumed during other periods of

prehistory (McKim 2001). The most abundant evidence of trade also occurs in the Medieval Warm components identified at the DVL, suggesting that this was another mechanism for dealing with resource stress (Goldberg 2001).

Throughout much of the California desert regions to the east, the Saratoga Springs Period saw essentially a continuation of the Gypsum Period subsistence adaptation. Unlike the preceding period, however, the Saratoga Springs Period is marked by strong regional cultural developments, especially in the southern California desert regions, which were heavily influenced by the Hakataya (Patayan) culture of the lower Colorado River area (Warren 1984:421-422). Specifically, turquoise mining and long distance trade networks appear to have attracted both the Anasazi and Hakataya peoples into the California deserts from the east and southeast, respectively, as evidenced by the introduction of Buff and Brown Ware pottery and Cottonwood and Desert Side-notched projectile points. The initial date for the first Hakataya influence on the southern Mojave Desert remains unknown; however, it does appear that by about 1000 to 1100 B.P. the Mojave Sink was heavily influenced, if not occupied by, lower Colorado River peoples.

Lake Cahuilla is believed to have refilled the Coachella Valley around 1450 B.P., and was the focus of cultural activities such as exploitation of fish, water fowl, and wetland resources during this period. Desert people, speaking Shoshonean languages, may have moved into southern California at this time; the so-called "Shoshonean Intrusion." Brown and Buff Ware pottery first appeared on the lower Colorado River at about 1200 B.P., and started to diffuse across the California deserts by about 1100 B.P. (Moratto 1984:425). Associated with the diffusion of this pottery were Desert Side-notched and Cottonwood Triangular arrow projectile points dating to about 800 to 850 B.P., suggesting a continued spread of Hakataya influences.

However, about 1060 B.P., environmental conditions became notably warmer and drier. This period of intense drought, the Medieval Warm, extended throughout the Southwest, and led to the withdrawal of Native American populations from marginal desert areas to more reliable, drought-resistant water sources such as the Colorado River and Lake Cahuilla, the episodic presence of which was not climatically controlled but dependent upon natural discharges from the Colorado River, and which experienced two, if not three, high stands during the Medieval Warm Interval (Waters 1983).

Along the southern California coastal regions, reliance on the bow and arrow for hunting, along with the use of bedrock mortars and milling slicks, mark the beginning of the tradition denoted as the "Late Prehistoric Horizon" by Wallace (1955) and the "Shoshonean Tradition" by Warren (1968), dating from about 1500 B.P. to the time of Spanish settlement (approximately A.D. 1769). Late prehistoric coastal sites are numerous. Diagnostic artifacts include small triangular projectile points, mortars and pestles, steatite ornaments and containers, perforated stones, circular shell fishhooks, and numerous and varied bone tools, as well as bone and shell ornamentation. Elaborate mortuary customs, as well as generous use of asphaltum and the development of extensive trade networks, are also characteristic of this period.

4.2.7 Late Prehistoric Period (ca. 750–410 B.P.)

The Medieval Warm extended into the Late Prehistoric Period, ending about 550 B.P. The cultural trends and patterns of land use that characterized the Medieval Warm Interval, including

the portion that extends into the earlier part of the Late Prehistoric Period, were discussed above. At the end of the Medieval Warm, however, and lasting throughout the ensuing Protohistoric Period (410–150 B.P.), a period of cooler temperatures and greater precipitation ushered in the Little Ice Age during which time ecosystem productivity greatly increased along with the availability and predictability of water (Spaulding 2001).

Also during this period, Lake Cahuilla began to recede (Waters 1983), and the large Patayan populations occupying its shores began moving eastward to the Colorado River basin or westward into areas such as Anza Borrego, Coyote Canyon, the Upper Coachella Valley, the Little San Bernardino Mountains, and the San Jacinto Plain (Wilke 1976:172–183). The final desiccation of Lake Cahuilla, which had occurred by approximately 370 B.P. (A.D. 1580), resulted in a population shift away from the lakebed into the Peninsular Ranges and inland valleys to the west, and the Colorado River regions to the east.

With the return of more mesic conditions after approximately 550 B.P., resulting in less resource stress, the DVL studies show that people returned to a less intensive, semi-sedentary land-use strategy similar to that identified for the Late Archaic Period. Within the DVL study area, evidence of intensive occupation dating to the Late Prehistoric Period occurs at five residential sites comprising 16 separate components; all of these coincide with sites that were occupied during earlier periods, and all are situated on elevated bedrock benches near active springs and overlook the valley floor (Goldberg 2001).

By segregating those components dating to the Medieval Warm Interval from other Late Prehistoric components, the differences between land-use strategies for these periods can be demonstrated. The DVL studies show that after the Medieval Warm Interval there was a quite unexpected reduction in the number and frequency of refuse deposits, as well as fire-altered rock weight and midden development. The number and frequency of artifact and toolstone caches were also reduced, while hearth features were slightly more common. Rock art also first appeared in association with Late Prehistoric components which post-date the Medieval Warm Interval. The decrease in the number of artifact and toolstone caches and the first appearance of rock art during this period suggests that residential sites may have been occupied year-round (Horne 2001).

Mortars and pestles and other grinding tools also declined in importance after the Medieval Warm in the DVL site components, suggesting that the intensive procurement and processing of acorns and other plant foods was no longer as critical as previously; this pattern is further supported by a decline in the effort expended in shaping grinding tools (Klink 2001a). A reduction in emphasis on plant foods, and especially acorns, which require intensive preparation, likely accounts for the reduction in refuse deposits, fire-altered rock weights, and midden development at the end of the Late Prehistoric. It is possible that the portable milling toolkit was supplemented substantially by bedrock milling features; however, bedrock features cannot be dated, and so cannot be assigned to any particular time period(s). Percentages of projectile points also increased somewhat after the Medieval Warm; Cottonwood Triangular points began to appear in inland assemblages at this time, and Obsidian Butte obsidian became much more common, suggesting an increased focus on large mammals. However, the lower ratio of late-stage bifaces indicates that hunting methods returned to random-encounter strategies, rather than the logistical forays of the preceding period (Klink 2001b). Of particular note, faunal assemblages produced an anomalously high lagomorph index after the Medieval Warm,

suggesting a very wet climatic regime with dense undergrowth well suited to cottontails (McKim 2001). Finally, the percentage of nonutilitarian artifacts declined considerably, suggesting that trade was no longer critical for assuring food supplies (Klink 2001c).

4.2.8 Protohistoric Period (ca. 410–180 B.P.)

The ameliorated, productive conditions of the Little Ice Age continued throughout the Protohistoric Period. Generally speaking, sedentism intensified during the Protohistoric Period, with small, but apparently fully sedentary villages forming. Increased hunting efficiency (through use of the bow and arrow) and widespread exploitation of acorns and other hard nuts and berries (indicated by the abundance of mortars and pestles) provided reliable and storable food resources. This, in turn, promoted greater sedentism. Related to this increase in resource utilization and sedentism are sites with deeper middens, suggesting central-based wandering or permanent habitation. These would have been the villages, or rancherias, noted by the early nonnative explorers (True 1966, 1970).

Within the DVL study region, the most striking change in material cultural in this period was the local manufacture of ceramic vessels and ceramic smoking pipes. Although pottery was known in the Colorado Desert as long ago as 800 B.P., ceramic technology in the project region appears to date to approximately 350 B.P. Also during this interval, abundant amounts of obsidian were imported into the region from the Obsidian Butte source, located in the southeastern Salton Sea Basin and exposed by the dessication of Lake Cahuilla. In addition, Cottonwood Triangular points were supplemented by Desert Side-notched points during this period. Late in this period, some European trade goods (i.e., glass trade beads) were added to the previous cultural assemblages (Meighan 1954).

Based on work in the San Luis Rey River Basin in northern San Diego County, Meighan (1954), True (1970), and True et al. (1974, 1991) have defined two Late Prehistoric/Protohistoric Period complexes that are worthy of mention. The "San Luis Rey I Complex" existed from approximately 600 to 250 B.P., and is typified by grinding implements, small triangular projectile points with concave bases, stone pendants, *Olivella* shell beads, quartz crystals, and bone tools. The "San Luis Rey II Complex," lasting from about 250 to 150 B.P., is very similar, but with the addition of ceramic vessels (including cremation urns), red and black pictographs, glass beads, metal knives, and steatite arrow straighteners. True et al. (1974) believe that the San Luis Rey complexes developed out of the earlier La Jolla/Pauma cultural substratum, and are the prehistoric antecedents to the historically known Luiseño Indians.

The Hakataya influence in coastal and inland southern California regions appears to have diminished during the late Protohistoric Period when the extensive trade networks along the Mojave River and in Antelope Valley appear to have broken down and the large village sites were abandoned (Warren 1984:427). Warren (1984:428) suggests that the apparent disruption in trade networks may have been caused by the movement of the Colorado River basin Chemehuevi populations southward across the trade routes during late Protohistoric Period.

Within the DVL study area, all five village clusters located on elevated bedrock surfaces near active springs and overlooking the valley floor that were occupied during the Late Prehistoric Period saw continued occupation in the Protohistoric Period. Most archaeological data from the DVL site components dating to the Protohistoric Period indicate that a fully sedentary land-use

strategy was adopted during this period. Given the spatial coincidence of the Protohistoric villages with residential sites of the Late Prehistoric Period, this sedentism appears to have been a further intensification of patterns established in the earlier period. At that time, resource stress did not appear to have been an issue; resource niche widths were expanded, and intensive resource processing that had been required during the Medieval Warm Interval appeared not to have been necessary. However, even though the climatic conditions of the Little Ice Age afforded a very productive environment during both the Late Prehistoric and Protohistoric periods, land-use strategies intensified during the later period. The use of plant food increased, as did the intensity of the processing effort. The Protohistoric Period exhibited the highest ranks for fire-altered rock and midden development, as well as rock ring foundations for brush dwellings, storage facilities, and ceremonial areas with rock art and rock enclosures; overall, there was a fluorescence of feature types and numbers at this time (Horne 2001). The faunal data for this period indicate a decrease in faunal diversity, and signify a reduction in diet breadth as well as greater intensification (McKim 2001).

The intensification in land use during the Protohistoric Period seen in the DVL assemblages mirrors changes that occurred at the end of the Late Archaic when it is hypothesized that the collecting strategy evolved from rest-rotation to semi-sedentary. Climatic degradation causing resource stress, beginning about 2100 B.P., is thought to have triggered that shift. If the environment during the Protohistoric Period was just as productive as during the earlier portion of the Little Ice Age (Late Prehistoric Period), what then accounts for land-use intensification at this time? Apparently resources were stressed again, but not by deteriorating productivity of the environment, but rather by population growth which likely led to competition for food, and possibly water and fuel resources. While preceding periods of stress could have been relieved by expansion of territory and diet breadth, increasing populations would have precluded the opportunity for territory expansion. Therefore, it is hypothesized that the shift to a fully sedentary strategy was brought about by population stress, which itself was initiated during the Late Prehistoric Period when the environment was productive and populations were very successful at exploiting that productivity (Goldberg 2001).

Other archaeological patterns exhibited by the DVL Protohistoric components were likely a result of sedentism and protection of territories. As it is today, logistical mobility would have become essential for provisioning fully sedentary communities. With lower temperatures during the Little Ice Age but no source of fuel wood in or near the DVL study area, procurement of fuel may have become an increasingly important element of logistical provisioning. Although there was a fluorescence of feature types and numbers at the DVL sites dating to the Protohistoric Period, the number of artifact and toolstone caches reached an all-time low; toolstone and artifact caches would no longer have been required because there were year-round occupants at residential bases. Due to increased territoriality, resource intensification would have been required because territorial and resource niche-width expansion was no longer a viable option. Likewise, along with increasing territorial circumscription would have come the inevitable fact that residential bases were occupied longer than the inhabitants had originally anticipated; moving the residential base may no longer have been an option. As well, trade and ceremonial gatherings with other groups would have helped maintain social relationships and ensure food resources. Finally, sedentism and the need to protect critical resources from competitors may have eventually led to conflict. Protohistoric patterns of raw material procurement indicate that desert materials (obsidian and chert) gained prominence, while other relatively closer sources of exotic raw materials from the west (basalt, andesite, rhyolite, metavolcanic rock, and Piedra de

Lumbre "chert") were little used, suggesting that territorial boundaries, at least to the west, had become established. While there was no direct evidence of physical conflict at any of the DVL sites, the locations of villages on elevated bedrock surfaces overlooking the valley may have been designed to afford views of intruders; an increase in projectile points may reflect a need for defensive weapons (Goldberg et al. 2001).

4.3 ETHNOHISTORIC CULTURAL SETTING AND ETHNOGRAPHY

4.3.1 Introduction

Archival and published reports suggest that the City's study region is situated within the westernmost extent of traditional Cahuilla territory, near the southern boundary of the Serrano territory; it is also possible that the Luiseño may have occupied the study region during the post-contact period. All of these cultural groups belonged to nonpolitical, cultural nationalities speaking languages belonging to the Takic branch of the Shoshonean family, a part of the larger Uto-Aztecan language stock. (Bean 1978:576).

In the following sections, specific aspects of Cahuilla, Serrano, and Luiseño ethnography and ethnohistory are explored. This information has been summarized from reports entitled *Ethnographic Overview of the Inland Feeder Pipeline Project* (Bean and Vane n.d.) and *Eastside Reservoir Phase III Ethnography and Ethnohistory* (Bean and Vane 2001); interested readers are encouraged to review these very thorough documents.

4.3.2 Social Structure

Prior to the Mission Period (i.e., prior to 1769), the Cahuilla, Serrano and Luiseño had nonpolitical, nonterritorial patrimoieties that governed marriage patterns as well as patrilineal clans and lineages. The words for these moieties mean "Coyote" and "Wildcat."

These cultural groups had political-ritual-corporate units (clans) composed of three to 10 lineages, distinctly different, named, claiming a common genitor, with one lineage recognized as the founding lineage (Bean 1978:580; Bean and Vane n.d.:13). Clans owned a large territory in which each lineage owned a village site and specific resource areas. Clan lineages cooperated in large communal subsistence activities (e.g., animal drives and hunts, controlled burning), and in performing rituals. Founding lineages often owned the office of ceremonial leader, the ceremonial house, and a ceremonial bundle (Bean and Vane 2001:V.A-2-5).

4.3.3 Subsistence

The Cahuilla, Serrano, and Luiseño were, for the most part, hunting, collecting, and harvesting peoples. Clans were apt to own land in valley, foothill, and mountain areas, providing them with the resources of many different ecological niches. Individual lineages or families owned specific resource areas within the clan territory.

Although any given village had access to less than the full panoply of necessary resources, briskly flourishing systems of trade and exchange gave them access to the resources of their neighboring villages and of distant peoples. Rules that forbade marriage to anyone related

within five generations or belonging to the same moiety ensured that everyone had relatives living in many ecozones, an important arrangement because relatives were invited to ceremonies. The ceremonial exchange of gifts between hosts and guests under the direction of the chiefs and shamans at such events provided a way for drought-stricken groups to get food in exchange for treasure goods. Thus, oscillations in the subsistence goods supply were offset by "banking" human effort in the production of treasure goods.

As in most of California, acorns were a major staple, but the roots, leaves, seeds, and fruit of many other plants were also used. Fish, birds, insects, and large and small mammals were available. Mountain sheep (*Ovis canadensis*), deer, and antelope were some of the large mammals hunted. Now extinct in this part of California, antelope were once numerous in the area (Harrington n.d.). The San Jacinto Valley is on the Pacific Fly-way for migratory birds; hence, ducks, geese, and other migratory birds would land on the small lakes and could be caught. Mountain lion, black bear, grizzly bear, deer, and wild boar were hunted there in historic times (Quimby 1975:37).

To gather these food resources and to prepare them for eating, the Cahuilla, Serrano, and Luiseño had an extensive inventory of equipment. The throwing stick and bow and arrow were the most important hunting tools for killing game, but snares, traps, slings, decoys, disguises, and hunting blinds were also part of the hunting technology. For fishing, nets, traps, spears, hooks and lines, and fish poisons were used. Many villages had access to creeks and rivers and to ancient Lake Cahuilla until its last dessication about 400 to 450 years ago, and during subsequent brief stands during the mid-1800s. Gathering required few tools: poles for shaking down pine nuts and acorns, cactus pickers, chia hooks, seed beaters, digging sticks and weights for digging sticks, and pry bars. Material culture items associated with transportation were mainly used to move food and included burden baskets, carrying nets, game bags, and saddle pads.

Food was usually stored in large storage baskets. Pottery ollas and baskets treated with asphaltum were also used to store and carry water and seeds. Wood, clay, and steatite were used to make jars, bowls, and trays. Skin and woven grass were used to make bags. Food processing required hammers and anvils for cracking nuts; mortars and pestles for grinding acorns and other hard nuts and berries; manos and metates for grinding seeds and berries; winnowing shells and baskets; strainers; leaching baskets and bowls; knives made of stone, bone, wood, and carrizo cane; bone saws; and drying racks made of wooden poles to dry fish. Basket mortars, with asphaltum used to attach an open-bottomed basket to a mortar, were important for food processing. Food was served in wooden and gourd dishes and cups and in basket bowls that were sometimes tarred. Wood, shell, and horn were used for spoons.

4.3.4 Shelter

Cahuilla, Serrano, and Luiseño shelters were made of brush, although some were wattled and plastered with adobe mud. In prehistoric times, these shelters are believed to have been dome-shaped; during post-contact times they tended to be rectangular. The entry way into the shelter was usually covered with hides or woven mats, and one or more holes were left open at the roof peak for smoke to escape. Most of the domestic activities were preformed outside the shelters within the shade of large, expansive ramadas. Within each village, the chief's house was the

largest and was usually next to the ceremonial house. Each village also had a men's sweat house and several granaries (Bean 1978:578; Bean and Vane 2003 n.d.:7–13).

4.3.5 Religion, World View, and the Sacred

The Cahuilla, Serrano, and Luiseño, like other California Indians, understand the universe in terms of power, and power, believed to be sentient and to have will, was assumed to be the principal causative agent for all phenomena. Unusual natural phenomena are viewed as especially sacred, being the repositories of concentrations of power. Mountain tops, and especially particular mountain tops, are held sacred, as are unusual rock formations, springs, and streams. Rock art sites are sacred, having been the sites of ceremonies. Burial and cremation sites are also sacred, as are many other places of residual power. In addition, various birds, but especially eagles, condors, hawks, and other birds of prey and their symbolic representations, are revered as sacred beings of great power and were sometimes ritually killed and mourned in mortuary ceremonies similar to those for human elites. For this reason, bird cremation sites are sacred.

Because of these strong beliefs, rituals were a constant factor in the life of every Native American individual. Some rituals were scheduled and routine (e.g., birth, puberty, death, mourning, and the eagle ritual and first fruits rites), while others were sporadic and situationally performed (e.g., deer ceremony, bird dance, enemy songs, and the rain ritual) (Bean and Vane 2001:VII.A-3-10).

4.3.6 The Proto-Historic/Pre-Reservation Period

Although the Spanish began establishing missions in California in 1769, the Native Americans living in the localized study region likely had very little direct contact with the non-native settlers until the turn of the century (Bean and Vane 2001:MS-7). The establishment of Mission San Gabriel in 1771 would eventually have the most direct impact on the native inhabitants of western Riverside County. Mission San Gabriel, like other California missions, began baptizing people who lived in the immediate vicinity of the mission; however, as time went on the Mission Fathers went further and further away in search of converts.

Research into the baptismal and other records of Mission San Gabriel, indicates that the native peoples who occupied and used the general study area during the late 1700s and early 1800s spoke the Cahuilla, Serrano, and Lusieño languages, and were reportedly forcibly brought into Mission San Gabriel and baptized during the 1810s. Consequently, these traditional Indian communities were left economically devastated because significant portions of the labor force were removed; there were fewer people to hunt and collect food, to take care of the sick, young, and elderly, to defend territorial rights against other native groups or poachers, and to authenticate the culture’s stories and traditions (Bean and Vane 2001:MS-7). Unfortunately, the Indians at the missions did not fair much better. Although there was always a reliable source of food and shelter, Indian life at the mission was foreign and often very cruel. As well, life expectancy for the “converts” was cut short by disease and strenuous labor, and most were forced to abandon their traditional customs, beliefs, and rituals.

Mexico established its independence from Spain in 1821, and secularization of the California missions began towards the end of the 1820s. During the late 1820s and early 1830s, many of

the mission-established ranchos continued to prosper, employing many Indian laborers to tend livestock. On August 17, 1833, the Mexican Congress passed the Secularization Act which placed all mission property into the charge of civil administrators. On orders from the President of the Republic, Governor Figueroa of California issued his decree in August, 1835 requiring the restructuring of 10 designated missions into pueblo towns and the redistribution of mission lands into private ownership (Elliot 1883:27). In the resulting shuffle and land grab, the Native inhabitants of western Riverside County who had been supported by Franciscan paternalism were not entirely cut free without cultural protection. The former Mission Indians became the most vulnerable victim populations, and their numbers were rapidly decimated by disease and culture shock. Many Indians surviving on rancherias throughout the valleys apparently experienced mainly a change of masters, from padre to Californio ranchero. This relationship of Californio "padrón" and Indian stock tender worked as well as any system could for the aboriginal population. Large numbers of the Indians that had worked on the missions, however, were forced to leave and fend for themselves. Some moved to the pueblos and worked as laborers, skilled workers, or domestic servants, while others tried to find work at the ranchos as vaqueros (cowboys) or work in the vineyards and orchards. Quite understandably, however, many Indian "converts" joined the non-missionized Indian groups in the inland mountain and desert regions (Bean and Vane 2001:IX.C-10). It should be noted that the main scourge of these Native Americans was disease, more than violence or physical abuse (Arnold et al. 1987).

By the 1840s, many of the Indian populations in southern California had experienced years of extreme social stress and were estranged from their traditional cultural practices and peoples. It was a time of social, economic, and cultural readjustment for them and their leaders; contagious diseases had decimated their populations; many had lost their traditional lands and political autonomy; and others had been enslaved (Bean and Vane 2001:MS-8). In 1848, gold was discovered in California, and by the end of 1849 more than 40,000 people had arrived in the state by ship alone. In addition, people came overland from eastern United States, Sonora, and Mexico. Many of these new comers had no regard for the Indians or their concerns, and they would displace, kill, and use the Indians to suit their own interests (Bean and Vane 2001:IX.D-21). Although the major impact of this invasion was on northern California, the Indians of southern California were also affected.

California became a member of the United States in 1850. The 1850s, therefore, was a critical decade for Native Americans in southern California, in that they now were under the rule of a country with very different attitudes, philosophies, and strategies regarding the development of land; the Americans firmly believed in Manifest Destiny and that it was morally right to change or abolish any cultural ways that were inconsistent with those of the United States (Bean and Vane 2001:IX.E-1).

Because of the land ownership issues and ongoing conflicts between the new settlers and the Indians, the United States appointed three commissioners to make treaties with the various Indian groups in California. In 1852 a treaty was signed by Cahuilla, Serrano, and Luiseño leaders at Temecula. In this treaty, the Indian chiefs and captains acknowledged the sovereignty of the United States, and promised to refrain from acts of hostility and aggression against its citizens, to live at peace among and between themselves, and to conform to the laws and regulations of the Indian Bureau. In return, the United States was to set aside for them a considerable territory, and to furnish them with specified supplies of food, clothing, livestock, supplies and equipment as well as to provide school teachers and skilled craftsmen to teach them

what they needed to know. Although the Indians abided by the terms of this treaty, it was never ratified or recognized by the United States government (Bean and Vane 2001:IX.E-12-13).

More and more settlers arrived in southern California through the late 1850s, 1860s, and 1870s. Indians who had established farms often lost them to settlers, and those who lived and worked on the large ranchos were usually evicted. By the 1870s, Indian agents and inspectors sent by the United States government filed report after report with recommendations as to where Indian reservations might be put in western Riverside County. In 1875, President U. S. Grant began setting aside reservations, although many changes would be made to his original executive orders due to faulty surveys.

The San Manuel Indian Reservation, located in the foothills of the San Bernardino Mountains, north of the community of Highland, was established in 1891 for members of the Serrano cultural group. The Morongo Indian Reservation, situated along Interstate 10 near Banning at the western edge of the San Gorgonio Pass, was established in 1908 and is home to both Cahuilla and Serrano peoples. The Cahuilla Indian Reservation, centered along Cahuilla Creek and Cahuilla Mountain in the Santa Rosa range, was established in 1875. Earlier that year, the Temecula Indians, largely composed of Luiseño Indians, were evicted from their traditional village at Temecula and were eventually settled in 1882 at the Pechanga Indian Reservation, approximately five miles southeast of their original village. The Soboba Indian Reservation, located north of the San Jacinto River at the base of the San Jacinto Mountains, was later established in 1883; this reservation is composed largely of Cahuilla, Luiseño, and Serrano peoples.

4.3.7 Prehistoric and Ethnohistoric Cultural Resource Types

The fertile valleys and canyons fed by the Santa Ana River and its tributaries and sheltered by Mount Rubidoux and the Box Springs Mountains were home to the Cahuilla and Serrano Indians, and possibly the Luiseño Indians, who had inhabited the area for many hundreds, if not thousands, of years.

Prehistoric and ethnohistoric archaeological sites likely to be found within the City's planning area include: villages represented by residential bases with house features (stone and/or adobe), storage features, human burials and cremations, rock art (pictographs and/or petroglyphs); temporary encampments represented by flaked and ground stone scatters with fire hearths and possibly storage features; resource procurement and processing sites represented by bedrock milling stations, tool stone quarries, flaked and ground stone artifact scatters, and/or hunting blinds; trails demarked by cairns and possibly rock art; isolated cultural features such as rock art, intaglios, and/or shrines; isolated flaked or ground stone artifacts; and traditional cultural landscapes/sacred places that may include important gathering or collecting places, springs, mountain tops or rock outcroppings, burial grounds, etc.

4.4. HISTORICAL CULTURAL SETTING

The historical background of the general Riverside study area is best presented by adhering to the familiar divisions of local history which have become standardized in the area literature. Beginning with the Spanish Mission Period in 1769, the progression moves rapidly through the

poorly documented Mexican Rancho Period into the American Period. The following historical setting for the City's study area is summarized and paraphrased from documents recently prepared for the City and Riverside County, including the *Historic Preservation Element of the City of Riverside General Plan* (APPS 2003) and the *Existing Setting Report for the Riverside County Integrated Project* (LSA 2000). This information was supplemented by data collected during studies completed for the Metropolitan Water District of Southern California at Lake Mathews (McDougall et al. 2003b).

4.4.1 Native American and Early European Settlement (Pre-1830s)

In California, the historical period is generally associated with the founding of the first mission, *San Diego de Alcata*, in 1769. However, in Riverside County, its entrance into the historic record did not occur until 1772 when Lieutenant Pedro Fages, the military governor of San Diego in search of deserting soldiers, inadvertently crossed the San Jacinto Valley, immediately east of the City's Sphere of Influence (LSA 2000:4.6-21; Priestly 1972:x). Later in 1774, Juan Bautista de Anza and his expedition left the Mission in Tubac (near present day Tucson) and headed west seeking an overland route to Alta California. Heading north and west, de Anza skirted the Santa Rosa Mountains and made his way up through Coyote Canyon (Brown 1985; LSA 2000:4.6-21). The following day, de Anza descended into the San Jacinto Valley, likely passing through Riverside's Sycamore Canyon and Tequesquite Arroyo, and camped near what is now Pedley Meadows.

Cultural resource types for this period may include protohistoric archaeological sites and sacred places similar to those described above for Native American sites. Very little evidence of early European settlement should exist with the City's study area; however, if present, it may be documented through written histories and evidenced in archaeological sites and artifacts (APPS 2003:12).

4.4.2 Spanish Mission Period (1769–1833)

Although de Anza's vivid portrayal of the expedition created enthusiasm for future travelers into Alta California, early settlement in Riverside County was slow and sporadic. During the Mission Period of California history (1769–1833), Riverside County proved to be too far inland to establish missions or asistencias.

Leandro Serrano is credited to be the first non-native to settle in the Riverside County area. In 1818, Serrano obtained permission from priests at the San Luis Rey Mission in northern San Diego County to settle "five leagues of land in the Temescal," located just southwest of the City's Sphere of Influence in the Temescal Valley. Later in 1821, Native American neophytes from San Gabriel Mission established Rancho San Gorgonio near Banning and Beaumont, several miles east of the City's Sphere of Influence (LSA 2000:4.6-27).

4.4.3 Mexican Rancho Period (1834–1848)

After Mexico successfully overthrew Spanish rule in 1821, the Mexican government passed the Secularization Act in 1833. Passage of this act resulted in reorganization of the missions into parish churches wherein the former missions lost their vast land holdings to the hands of private Mexican citizens and released their neophyte Native American "workers" to fend for themselves.

During the resultant Rancho Period (1834–1848), ranchos were predominately devoted to the cattle industry and large tracts of land were devoted to grazing.

Until the Goldrush of 1849, livestock and horticulture dominated the economics of California (Beattie and Beattie 1939; Brown 1985; Ingersoll 1904; LSA 2000:4.6-27). Sixteen ranchos were granted in Riverside County, with the first of these, Rancho Jurupa, granted to Juan Bandini in 1839. Encompassing approximately 32,000 acres, Rancho Jurupa was centered west of Norco and east of the Prado Basin along the Santa Ana River, west of the of the City's Core Area of Influence.

Settlement continued to develop through the years along the Santa Ana and San Jacinto rivers. With the influx of new settlers, some of the larger ranchos were subdivided into smaller parcels. Among the new settlers was Louis Rubidoux who purchased 6,700 acres in the center of Rancho Jurupa. After his death in 1868, a portion of his ranch would become part of Riverside Colony (Brown 1985; LSA 2000:4.6-27).

In addition to Juan Bandini and Louis Rubidoux, other early rancheros and land grant holders included Cornelius Jenson, Benjamin Ables, Arthur Parks, and J. H. Stewart. Across the Santa Ana River to the northwest were two Spanish-speaking towns, Agua Mansa and La Placita, settled by migrants from New Mexico. All of these settlements were established in the area prior to John W. North's establishment of the Riverside Colony in 1870 (APPS 2003:12).

Historic resource property types characteristic of the Mission and Rancho periods in the City's planning area may include adobe dwellings, archaeological sites, artifacts, and cultural landscapes that echo the Spanish Mission and California Ranchero periods of California history; these are generally documented through written histories and are evidenced in archaeological sites and cultural landscapes (APPS 2003:12).

4.4.4 American Period (1848–present)

With the signing of the Treaty of Guadalupe Hidalgo in 1848, ending the Mexican American War, California entered into the American Period and, in 1850, became a recognized U.S. state. In 1858 the first Butterfield Stage carried overland mail from Missouri through Temecula to Los Angeles. Although this stage route provided a relatively reliable, fast link to the rest of the nation, the catastrophic floods of 1862 and the smallpox epidemic of 1862–1863 which took thousands of lives in southern California did little to encourage settlement in Riverside County. Additionally, after the deluge in the winter of 1862–1863, almost no rain fell in southern California until the February, 1864, by which time thousands of livestock had died from hunger and thirst. One estimate based on census data showed a loss of some 71 percent of the total cattle in Los Angeles County (Cleland 1941:180). Considering that cattle-ranching had been the dominant occupation of the Californio residents of the Riverside and San Bernardino valleys up to this time, the impact of this series of catastrophes can be easily imagined. Still, through the 1860s to 1870s, the greater Riverside area continued to draw settlers and tradesmen; however, growth in the county remained slow until after the Civil War and the completion of the transcontinental railroad.

By 1869, several land speculators and developers arrived in southern California. Judge John Wesley North and a group of associates and co-investors from Tennessee hoped to develop a silk

growing colony on a portion of the former Jurupa Rancho. This included the settlement of the "Mile Square," which included the present location of Riverside, then located in San Bernardino County (Patterson 1996; Riverside Municipal Museum n.d.). The colony was named the "California Silk Center Association" but failed shortly after it was organized.

In the fall of 1870, John North, Charles Felton, John Broadhurst, James Greves, John Stewart, and Tom Cover, as superintendent of canal construction, formed the Southern California Colony Association. Within a few months, the new colonists voted to name their "colony" Riverside; laid out on a square mile plan, North's vision included small-scale farms fed by Cover's irrigation ditch. The first plantings for the new colony included citrus, wine and raisin grapes, almonds, walnuts, and reportedly opium poppy (Brown 1985; LSA 2000:4.6-28). The site of John North's original home in Riverside is preserved as John North Park.

The most important event of the 1870s was the arrival of the Southern Pacific Railway into nearby Colton, four miles to the north (Raup 1940:35), resulting in an influx of new settlers. During the 1870s, land to the south and east of the original "Mile Square" was settled by homesteaders, among whom were Samuel Cary Evans and William T. Sayward, who established the Hartshorn Tract and the Riverside Land and Irrigating Company. Evans was also a banker and land speculator who soon gained a monopoly over the community's water rights (Patterson 1996). The Riverside Land and Irrigating Company soon turned to Matthew Gage, a recent Canadian immigrant who began improving the area in regards to water systems; he helped establish a 23-mile long canal system, known as the Gage Canal, that would provide a readily available water supply to the eastern plain of Riverside and foster settlement to the area (Patterson 1996). With this much needed water supply, the settlers could focus on irrigation and agriculture. Perhaps one of the most influential early settlers in Riverside during this period was Eliza Tibbets who planted the first two navel orange trees, acquired from Brazil, in the Riverside colony. Mrs. Tibbets' oranges flourished and provided the bud grafts for the Washington Navel Orange, setting the foundation for Riverside's hugely successful citrus industry that included oranges, lemons, and limes (Brown 1985; LSA 2000:4.6-28).

In approximately 1880, several Chinese countrymen founded the first Riverside Chinatown in the block bounded by Main and Orange, and 8th and 9th streets. Of all the immigrants flooding into southern California at the time, the Chinese, in particular, were noteworthy in their knowledge of picking and packaging of citrus, a skill they brought with them from their homeland. Chinese immigrants also worked as house servants and cooks, and formed the major work force in digging the Gage Canal. Several thousand Chinese were also involved in constructing the California Southern Railroad in 1882 and the Santa Fe Railroad through Riverside in 1885; these workers flooded into Riverside's Chinatown. The presence of a Chinatown in the commercial district of Riverside, however, aroused considerable alarm among the Anglo businessmen, ensuing in a long fight to evict the immigrants. Thus, due to growing consternation among Anglo businessmen and unemployed Anglos, the Chinese immigrants in Riverside agreed to move their settlement out of the downtown district to a 6.3 acre site in Tequesquite Arroyo, bounded by Tequesquito Avenue on the south, Brockton Street on the east, Pine Street on the west, and the steep arroyo slope on the north. In 1888 the Quong Nim and Company purchased and acquired title to Riverside's new Chinatown. While no longer visible because it has been buried beneath several feet of fill sediments at the request of the last Chinese owner, George Wong, Riverside's Chinatown housed and catered to approximately 2,500 Chinese laborers until the 1920s.

By 1883, when Riverside incorporated as a city, it became one of the wealthiest cities in the United States due to its growing citrus industry. With the completion of the Gage Canal in 1886, the colony of Riverside grew at a remarkable rate; land sales and bumper citrus harvests created a very wealthy corporate class. Buildings such as the Loring Opera House, the Riverside National Bank, and the Glenwood Mission Inn were symbols of the City's economic growth. Also during the 1880s, a railroad depot was constructed along the east side of the Riverside Colony, with citrus packing houses situated along the railroads; citrus groves extended to the south and east, with residential areas being intermingled within the groves. Street grids, following government survey lines, were set out, with the city expanding from its original mile-square lot, to 52 square miles; this expansion included the annexation of smaller communities to the east and southeast (Patterson 1996).

Historic property types characteristic of the early colonization and subsequent growth of the city include houses and churches, agri-industrial buildings, railroad structures, cultural institutions and parks, bridges and street patterns, early water distribution features and canals, and land-use patterns. Earlier houses were typically vernacular, wood frame, one or two story structures with a simple rectangular or "L" plans and gable roofs. Ornamentation, utilizing styles of Queen Ann, Stick, Eastlake, Italianate, and Greek, Gothic, and Colonial revivals, was usually confined to the porches and at the gable peaks. Commercial structures were usually brick with cast iron storefronts, while agri-industrial buildings were either brick or wood frame (APPS 2003:13–14).

During the land boom of the 1880s, the Santa Fe and Southern Pacific Railroads fed the land grab with their rate wars; on March 10, 1886, it cost only $23 to travel from New York to southern California (Dumke 1970:25). The land boom dramatically increased the competition among the various community water companies and irrigation projects. By incorporating, the various water companies solidified their older claims and acquired capital. In 1887, the State Legislature passed the Wright Irrigation District Law which authorized the issue of local bonds to finance water development. These bonds became popular investments and water companies proliferated.

By the late 1880s and early 1890s, conflicts and discontent between the cities of Riverside and San Bernardino led to the establishment of a new county. Portions of the Temecula and San Jacinto Valleys (then in San Diego County) joined with the residents of Riverside to form a new county seat in May 1893, leading to the formation of Riverside County. Also in 1893, a group of Riverside growers formed the Pachappa Orange Growers Association; within a year, the exchange became known as Sunkist Growers, Inc. In 1900, two of Sunkist's local "exchanges" combined to form the Arlington-Heights Exchange. Soon after the turn of the century, Riverside credited itself in having formed the most successful agricultural cooperative in the world, the California Fruit Growers Exchange, known by its trademark, *Sunkist* (APPS 2003:144, LSA 2000:4.6-29).

In 1906, the Regents of the University of California established the Citrus Experiment Station in the eastern portion of the city. A world class research institution, the Citrus Experiment Station was later moved to the present campus of the University of California, Riverside. Early citriculture required labor-intensive man-power, resulting in a huge influx of immigrants from all over the world, including eager, but poor, immigrants from China, Japan, Italy, and Mexico, and later the Dust Bowl of America during the Great Depression. As a result, Riverside developed a substantial ethnic community, including Chinatown, the predominately Hispanic community of

Casa Blanca, as well as settlements of Japanese and Korean immigrants. Many of these individuals assisted in the development and advancement of citrus packing concepts, machinery, rail shipments, as well as the techniques for scientific growing, mechanized packing, and pest management. Further, citrus laborers and railroad workers living in the community could often obtain small parcels of land from the growers, who hoped to retain a permanent labor supply (California Department of Parks and Recreation 1988).

Historic resource property types associated with the Riverside's immigration and ethnic diversity are primarily residential buildings and neighborhoods that were constructed in areas that were close to work activities of the inhabitants. These buildings are mostly vernacular, with many having modest stylistic features such as full front porches, bay windows, and ornamental detailing of the period in which they were constructed (APPS 2003:14-15).

Riverside continued to grow throughout the 1900s, with the citrus industry continuing to grow as well. By the 1910s, growers associations began constructing worker housing to attract additional laborers (California Citrograph 1910). Many of these worker or labor camps were located in the Arlington Heights vicinity, near what is now Canyon Crest. Also in 1910, William Childs, Frank A. Tetley, and W.B. Merriman formed a partnership to develop 200 acres of land, known as the Monte Vista Nursery, northeast of Riverside in the Canyon Crest area, and which utilized water from the nearby Gage Canal (Olivier et al. 1999).

Soon after the turn of the century, Frank A. Miller, who had arrived in Riverside during its late colonial years, became the City's preeminent community builder and promoter. For the first three decades of the twentieth century, Miller strove to create a Protestant version of the California Mission Period for the City through carefully crafted symbols and themes. His first and most noteworthy effort came in the form of the New Glenwood Hotel (later known as the Mission Inn), first opened in 1876 as a 12-room guest house. Through the years Miller added to the building and made the Mission Inn a shrine to California's Spanish heritage. The Mission Inn made Riverside the center for the emerging Mission Revival Style in southern California and made the City the desired residential, cultural, and recreational destination of the wealthy railroad set of the early twentieth century; the City also supported an opera house, theater, symphony, and several golf courses (APPS 2003:15).

Historic resource property types characteristic of Riverside's period of boosterism and cultural development are characterized by its Spanish Colonial past as idealized in the Mission Inn as well as in numerous civic and commercials buildings constructed in the City's downtown. Other property types also encompass references to American Colonial Revival in residential buildings and Beaux Arts Classicism in major civic and institutional buildings (APPS 2003:15).

Later development in the Riverside area included the subdivision of portions of Arlington Heights in the late 1920s, and the subsequent addition of Camp Haan, later March Field, March Air Force Base, and March Air Reserve Base, east of the City. After World War I, Riverside County prospered; previously undeveloped areas were subdivided and residential tracts were developed. During World War II, the local citrus industry (i.e., Food Machinery Corporation, Hunter Engineering, the Rohr Corporation, the Lilly Tulip Corporation, and Bourns Incorporated) joined with the military to construct water landing crafts for the war effort (Riverside Museum Press n.d.).

Following World War I, early historic resource property types are represented by Arts and Crafts styles, including the California Bungalow, two-story Craftsman, Prairie, and English cottage/Tudor Revival. In addition, styles that referenced the American Colonial period and French, Spanish-Italian Renaissance, and English architecture were also popular. Beaux Arts Classicism reached its peak in the post World War I period civic architecture, while Gothic Revival and Spanish Colonial Revival influenced designs for churches (APPS 2003:16).

Riverside's second major boom in residential development occurred in the post World War II period with the development of affordable suburban housing tracts with nearby commercial centers. In 1954, another expansion of the City occurred with the addition of 39 square miles within the City limits. This expansion was followed by the construction of several highways under the Interstate Highway Act of 1956, whereby State Route 91 and U.S. Route 60 were built. Also in the mid-1950s, the University of California selected Riverside as the site for an undergraduate liberal arts college. Growing out of the original Citrus Experiment Station, the University of California at Riverside is now a world-renowned research center for plant pathology, citrus cultivation, and other disciplines (APPS 2003:16).

Historic resource property types characteristic of the post World War II years include tracts of post-war vernacular style houses. These one-story residences were modest in size and typically had wood or stucco siding and attached garages; the tracts themselves were designed with curving street patterns. Commercial centers built during this period include the Brockton Arcade (APPS 2003:17).

Located within Riverside's southernmost Sphere of Influence, the Cajalco Basin and its history are worthy of mention. The Cajalco Basin, now inundated by Lake Mathews, was named for the old Cajalco tin mine located in the Temescal Mountains to the west. There are conflicting reports as to exactly when tin was first extracted from the Cajalco/Temescal deposits. Some sources claim that the Cajalco Mine was claimed originally by Daniel Sexton, a jack-of-all-trades who arrived in California via the Santa Fe Trail with the Workman Rowland party in 1841 (LeCount and Weber 1992). Purportedly, the location of the tin deposits was passed down to Sexton in 1856 by Native Americans who were not only aware of the mineral, but considered it to be medicinal. Other sources allege that Mexican miners mistook the tin ore for silver (Swope and Rosenthal 1996). It is known, however, that the land was leased to S. C. Bruce in 1860 by Don Abel Stearns, who was the owner of El Rancho Sobrante de San Jacinto at that time, explicitly for the exploration of tin (Swope and Rosenthal 1996). Over the next five years, Don Abel Stearns regained control of the Cajalco Mine and ran a small-scale operation known as the Temescal Mining Company (Chaput 1985). As reported by J. W. Furness (1928), the Cajalco Tin Mine may have been the site of the first tin discovery in the United States.

Between the years 1868 and 1892, ownership of the mine changed hands several times, but finding the ore to be of low-grade and too expensive to process lucratively, all ventures failed. Fueled by the nation's increasing demand for a domestic supply of tin to feed the tinplate industry, several exploratory efforts followed over the years. This cycle of exploration and abandonment reached its peak in 1942 when the Dodge Construction Company set up a state-of-the-art 100-ton mill and processed 1,400 tons of surface vein material. However, similar to the circumstances encountered by the previous mine owners, the low-grade ore was found to be too expensive to process and the operation ceased in 1945. In 1960, the property was acquired by

the Lake Mathews Farming Company of Corona, and was converted to agricultural uses (Swope and Rosenthal 1996; McDougall et al. 2003b).

In addition to mining, the Cajalco Basin became the site of agricultural colonization starting around 1917 and lasting until 1935. The Lawrence Holmes colony venture was an agricultural enterprise centered around the production of carob. Holmes was convinced that carob bean products could be used to relieve potential world food shortages (LeCount and Weber 1992; Patterson 1976). Holmes sold tracts of up to 20 acres with specially propagated carob trees (*Ceratonia siliqua*) at $450 per acre, which included the preparation of soil, planting, budding, and care of the trees, as well as the payment of taxes for four years (Gunther 1984). To process and market both his and his client's carob products, Holmes formed the Carob Growers Product Company (LeCount and Weber 1992; Patterson 1976). Holmes campaigned for the Metropolitan Water District of Southern California (Metropolitan), ignorant to the fact that the District had chosen the Cajalco Basin to be the site of their largest reservoir. Using its power of Eminent Domain, Metropolitan acquired Holmes' property in 1935 for construction of the reservoir now known as Lake Mathews (Gunther 1984).

5.0
STUDY METHODS AND RESULTS

5.1 INTRODUCTION

A variety of sources was consulted as part of the project's cultural resources investigation. Included were archaeological cultural resources records and literature housed at the Eastern Information Center (EIC) of the California Historical Resources Information System, at the University of California, Riverside, Department of Anthropology. Information pertaining to the City's historical structures and natural features was gathered primarily from two documents recently prepared for the City and Riverside County, including the *Historic Preservation Element of the City of Riverside General Plan* (APPS 2003) and the *Existing Setting Report for the Riverside County Integrated Project* (LSA 2000), supplemented with data gathered from several national and state historical resources websites.

Based on data gathered during the literature and records searches, the archaeological sensitivity was evaluated and subsequently ranked for both the City's 50,580-acre Core Area of Influence and 40,968-acre Sphere of Influence. Although the City's sensitivity for historical structures and natural features has been documented previously (APPS 2003; LSA 2000), a brief review of these historical resources is provided below, followed by a detailed discussion of the study methods utilized to derive the resultant archaeological sensitivity rankings.

5.2 CULTURAL RESOURCES LITERATURE AND RECORDS SEARCH

In regards to historical structures and natural features, the City of Riverside, in 1977, was one of the first cities in California to enter into an agreement with the State Office of Historic Preservation to conduct a historic resources survey. As a result of these surveys, conducted between 1977 and 1980, more than 6,000 properties had been documented; of these, approximately 1,200 had been recorded on the State Historic Resources Inventory forms. As of 1980 the City designated 40 buildings as local landmarks as well as 27 Cultural Heritage Board objects. In 2000 a historic resources survey was completed for the Eastside and Casa Blanca neighborhoods, resulting in the recordation of approximately 1,400 additional structures on State Historic Resources Inventory Forms. As of 2002, the City had recorded 108 City Landmarks, more than 1,000 Structures of Merit, nine Historic Districts, three Neighborhood Conservation Areas, and 20 National Register of Historic Places properties (APPS 2003:9). Currently, the City's only designated archaeological resource is the Chinatown site. The following Historic Districts and Neighborhood Conservation Areas have been designated in the City:

Historic Districts
Seventh Street (estab. 1980)
Prospect Place (estab. in 1986)
Rosewood Place (estab. in 1986)
Wood Streets (estab. in 1986)

Neighborhood Conservation Areas
Old Magnolia (estab. in 1981)
Twogood Orange Grove Tract (estab. 1981)
Wood Streets (estab. in 1981)

Mission Inn (estab. in 1986, City Center District)
Mount Rubidoux (estab. in 1987)
Heritage Square (estab. in 1988, Mile Square East District)
Seventh Street East (estab. in 1989)
Colony Heights (estab. in 1998, portion of the Mile Square West District)

Two new Historic Districts have also been proposed for designation after a resurvey of the "Mile Square" area was completed in 2000 in conjunction with the Downtown Specific Plan: Mile Square Northwest and Mile Square Southwest (APPS 2003:8, 26).

Based on data gathered from the *Historic Preservation Element of the City of Riverside General Plan* (APPS 2003) and the *Existing Setting Report for the Riverside County Integrated Project* (LSA 2000), Table 1 lists the historical structures and natural features in the City's Core Area and Sphere of Influence recognized at the national, state, and local levels.

For prehistoric and historical archaeological resources, a literature and records search of the general project location was completed by two Applied EarthWorks archaeologists at the EIC between July 16 and July 21, 2003. For purposes of this investigation, maps examined for the entire 91,548 acre study area included the Riverside West, Riverside East, Fontana, San Bernardino South, Corona North, Lake Mathews, and Steele Peak 1:24,000-scale U.S.G.S. topographic maps. Data gathered included plotting the locations of all previously identified archaeological sites, a listing of all manuscript files pertaining to cultural resources studies, and estimations regarding previous archaeological survey coverage per square mile.

Results of the archaeological literature and records search at the EIC indicate that more than 310 cultural resources investigations have been completed within the City's study area; due to the sheer volume of documents and budgetary constraints, copies of the reports were not gathered at the EIC. These cultural resources studies resulted in the identification and documentation of approximately 826 prehistoric and historical archaeological sites. Specifically within the City's Core Area of Influence, 538 prehistoric sites, 51 historical sites, and five sites containing both prehistoric and historical remains have been documented; within the City's Sphere of Influence an additional 223 prehistoric sites, eight historical sites, and one site containing both prehistoric and historical remains have been documented. Again, due to the sheer volume of site records and budgetary constraints, copies of these site records were not gathered at the EIC. However, a sample of 60 archaeological site records was randomly selected for review.

Prehistoric archaeological site types are predominately bedrock milling stations containing bedrock milling slicks and mortar cups. Other prehistoric site types include: flaked and ground stone scatters; lithic quarry locations exploited for stone tool manufacture; and several large village locations containing flaked and ground stone tools, bedrock milling features, pictographs and petroglyphs, and house pit features. Historical archaeological site types include: numerous canals and canal remnants (e.g., Pedley Canal, Gage Canal, Upper/Lower Riverside Canal, Evans Pellistier Ditch) and associated pumphouses dating to the late 1800s and early 1900s; mines (e.g., Cajalco Tin Mine, Quartz Queen [Indian Queen] Mine); Riverside's Chinatown; Pacific Electric Railway transfer stations; and historical structural remains associated with former homestead locations. It should be noted that other types of historical archaeological resources, such as buried hollow features containing historical refuse deposits, are often associated with standing historical structures.

Table 1 Historical Cultural Resources within the City of Riverside's Core Area and Sphere of Influence

RESOURCE NAME*	NRHP	NHL	CRHL	CPHI	SHP	RCHL	RCL	HABS/HAER
Adair House	X							
African Methodist Episcopal Church	X							
Agua Mansa Bell	X							
All Souls Universalists Church	X							
Arcade Building							X	
Arlington Branch Library and Fire Hall	X						X	
Arlington Heights Citrus Landscape								X
Armory Hall	X							
Batkin-Chrysler House							X	
Benedict Castle	X						X	
Benjamin Rockhold House								X
Bonnett Building							X	
Buena Vista Bridge							X	
Buena Vista Drive	X						X	
California Citrus Heritage Recording Project								X
California Citrus State Historic Park					X			
Chicago White Sox Redwood Tree							X	
Citrus Experiment Station				X		X		
Citrus Machinery Pioneering				X		X		
Collier House							X	
Collins-Seaton House							X	
Cornelius and Mercedes Jenson Ranch			X			X		
Cressman House							X	
De Anza Crossing of Santa Ana River			X				X	
Devine House							X	
Edgewild							X	
Estudillo House							X	
Evans Adobe	X						X	
Evergreen Cemetery and Riverside Mausoleum							X	
Fairmont Park	X						X	
Fairmont Park Bandshell	X						X	
First Christian Church Parsonage								X

Table 1 Historical Cultural Resources within the City of Riverside's Core Area and Sphere of Influence

RESOURCE NAME*	NRHP	NHL	CRHL	CPHI	SHP	RCHL	RCL	HABS/HAER
First Church of Christ Scientist	X						X	
First Congregational Church of Riverside	X			X		X	X	
Former Rouse's Department Store							X	
Former University Heights Junior High School							X	
Former YMCA Building							X	
Fox Theater							X	
Fruit Exchange	X							
Gage Irrigation Canal							X	X
Grant School Fountain	X						X	
Greystone House	X						X	X
Hammer-Wallihan House							X	
Harada House	X	X					X	
Hartree Grove							X	
Harwood Hall House							X	
Heritage House	X						X	
Hole Mansion							X	
Hoover House							X	
Horse Chesnut Tree							X	
Irvine House							X	
Jarvis House							X	
Jensen Alvarado Ranch	X		X			X		
John Brodhurst House							X	
John W. North Park				X		X	X	
La Altalya	X							
La Placita del Los Trujillos	X							
Lake Mathews								X
Lerner Building							X	
Loring Block	X							
Loring Building							X	
Loring Opera House and Masonic Temple				X		X	X	
Louis Rubidoux House			X	X		X		
M.H. Simon Undertaking Chapel	X						X	

Table 1 Historical Cultural Resources within the City of Riverside's Core Area and Sphere of Influence

RESOURCE NAME*	NRHP	NHL	CRHL	CPHI	SHP	RCHL	RCL	HABS/HAER
Magnolia United Presbyterian Church							X	
Main Street Clock	X							
Masonic Temple	X							
McIntyre House							X	
Mission Court Bungalows	X							
Mission Inn	X	X	X	X		X	X	
Mitchell House							X	
Montezuma Bald Cypress Trees							X	
Moulton House							X	
Mount Rubidoux				X		X	X	
Mount Rubidoux Cross	X							
National Orange Company Packing House								X
Native Sycamore Tree							X	
Neighbors of Woodcraft	X							
New Jerusalem Church							X	
Newman Park and the De Anza Statue							X	
North Park	X						X	
Old City Hall							X	
Old YWCA Building	X							
Orchard House							X	
Palm Elementary School							X	
Palm Grove							X	
Parent Naval Orange Tree	X		X			X	X	
Pergolas	X							
Peter Weber House	X							
Presbyterian Church	X							
Raeburn							X	
Riverside Art Museum							X	
Riverside Baptist Temple	X							
Riverside Chinatown	X			X		X	X	
Riverside City College Quadrangle							X	
Riverside County Courthouse				X		X	X	

Table 1 Historical Cultural Resources within the City of Riverside's Core Area and Sphere of Influence

RESOURCE NAME*	NRHP	NHL	CRHL	CPHI	SHP	RCHL	RCL	HABS/HAER
Riverside Federal Post Office	X							
Riverside Municipal Auditorium	X						X	
Riverside Municipal Museum							X	
Riverside-Arlington Heights Fruit Exchange	X							
Robert Bettner House							X	
Rockledge							X	
Rooselvelt Palm							X	
Rubidoux Grist Mill			X	X		X		
Rumsey House	X							
San Pedro, LA & Salt Lake Railroad Depot	X							
Seventh Street							X	
Sherman Indian Museum							X	
Sherman Institue Administration Building	X							
Shiels House							X	
Stone House							X	
Streeter House	X							
Sutherland Fruit Company	X							
Trujillo Adobe				X		X	X	
Union Pacific Depot							X	
University Heights Junior High School	X						X	
Universalist-Unitarian Church							X	
Victoria Avenue	X						X	
Victoria Bridge	X						X	X
Waite House							X	
Ward House							X	
WCTU Fountain	X							
Weber House							X	
White Park	X						X	
William Childs House	X						X	
Woman's Improvement Club	X							

***Sources:**
City of Riverside General Plan (Riverside 1994)
Historic Preservation Element (APPS 2003)
Existing Setting, Riverside County Integrated Project (LSA 2000)
CA Department of Parks and Recreation Website
National Register of Historic Places Website
National Historical Landmarks Website
CA Department of Parks and Recreation Website
CA Office of Historic Preservation Website

Acronyms:
NRHP: National Register of Historic Places
NHL: National Historic Landmark
CRHL: California Registered Historical Landmark
CPHI: California Point of Historical Interest
SHP: State Historical Park
RCHL: Riverside County Historical Landmark
HABS/HAER: Historic American Building Survey/Historic American Engineering Record

5.3 ARCHAEOLOGICAL RESOURCES SENSITIVITY RESULTS

As stated in Chapter 1, the purpose of this document is to update the *City of Riverside General Plan* adopted by the City Council on September 13, 1994. The *Historic Preservation Element of the City of Riverside General Plan* (APPS 2003) was recently adopted by the City's Planning Department on February 18, 2003. Although, these two documents provide sufficient data regarding the City's historical sites, structures, features and natural resources, very little information is provided in these documents concerning the City's archaeological resources. Thus, the primary objective of this section is to provide the City with a sensitivity ranking for archaeological resources throughout the City's 91,548-acre planning area.

Several steps were completed in the archaeological sensitivity study. Initially, the archaeological survey coverage for each section of land (i.e., 640 acres) within the City's planning area was estimated during the archaeological literature and records search at the EIC. The resulting survey coverage was then ranked as Low, with zero or 30 percent of that square mile having been surveyed previously for cultural resources, Medium, with 31 to 75 percent of that square mile having been surveyed previously, and High, with 76 to 100 percent of that square mile having been surveyed previously. The resultant map of the City's planning area is depicted in Figure 3.

As shown, much of the urbanized regions within the City's planning area have had very little archaeological survey coverage, likely because many of these areas consisted of a "built environment" prior to the enactment of environmental laws requiring archaeological resources surveys in the mid-1970s. Other areas with little or no survey coverage include mountainous areas (e.g., the Box Springs Mountains) and extant citrus groves where no development activities have been undertaken since the mid-1970s (see Figure 2). Areas with "Medium" survey coverage are scattered throughout the City's planning areas and are predominately adjacent to those areas with minimal or no survey coverage adjacent to the urbanized areas. Interestingly, areas ranked as having "High" survey coverage are those areas adjacent to the City proper where recent residential communities have been established, such as the community of La Sierra, portions of the Sycamore Canyon area east of the community of Edgemont, portions of Mockingbird Canyon, and areas along Cajalco Creek and surrounding Lake Mathews. It should be noted that although Lake Mathews was constructed during the 1950s, recent Metropolitan Water District projects at Lake Mathews required lowering the lake level by several hundred feet; due to the newly exposed surfaces, Metropolitan hired a consultant to survey these areas and document the numerous prehistoric and historical sites that were exposed (see McDougall et al. 2003b).

The second step in the sensitivity ranking process involved plotting the location of all previously recorded archaeological sites on the appropriate 1:24,000-scale U.S.G.S. topographic maps (i.e., Riverside West, Riverside East, Fontana, San Bernardino South, Corona North, Lake Mathews, and Steele Peak). Based on known archaeological site distributions in each section of land within the City's planning area, known site densities were then ranked as being either Low, with zero to six archeological sites per square mile, Medium, with seven to 20 archaeological sites per square mile, or High, with more than 21 archeological sites per square mile. As shown in Figure 4, site densities are highest in the well-watered canyons and stream courses found in Mockingbird Canyon and Sycamore Canyon, located south and southeast of the City, as well as

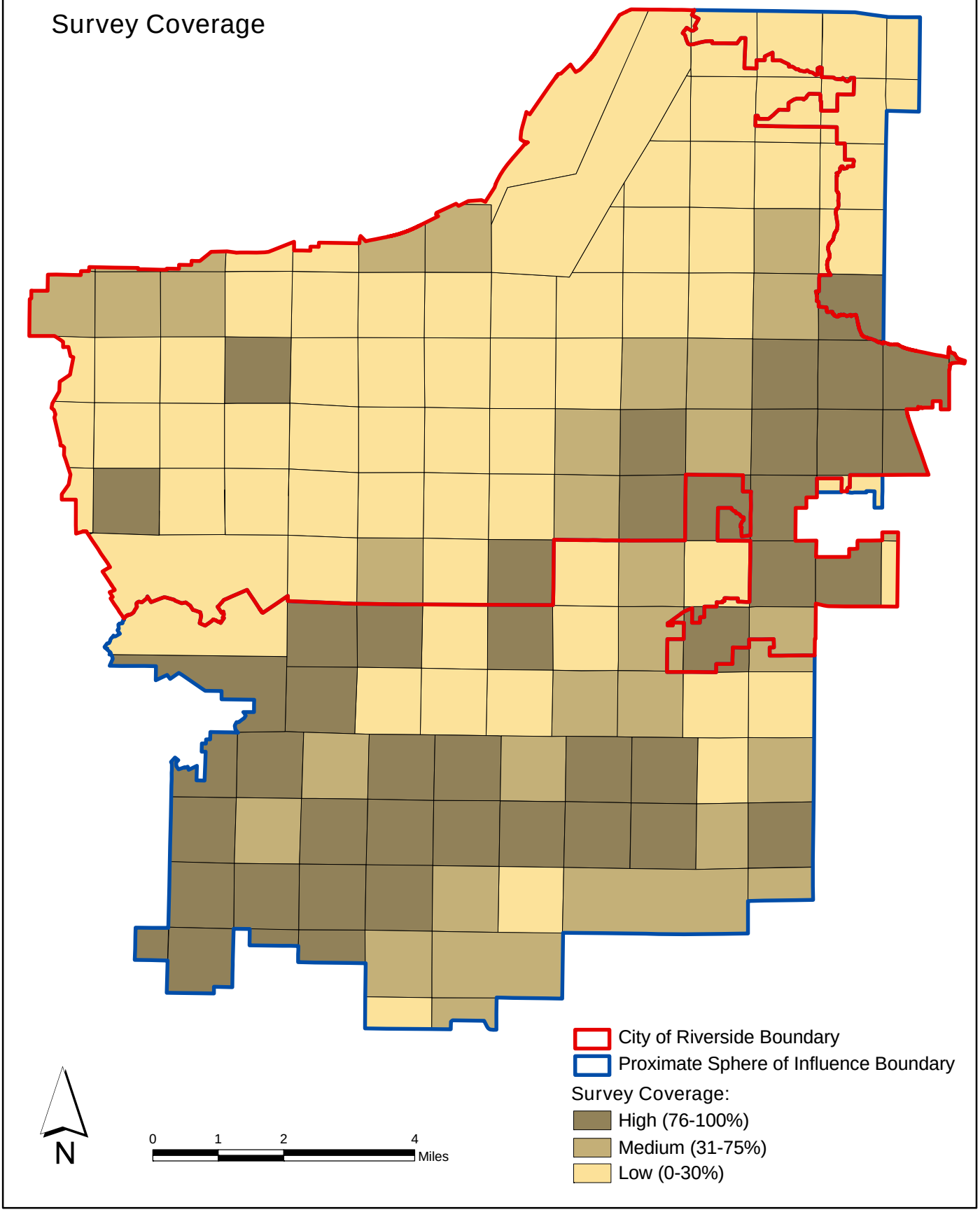


Figure 3 **Survey coverage for the City of Riverside Core Area and proximate Sphere of Influence.**

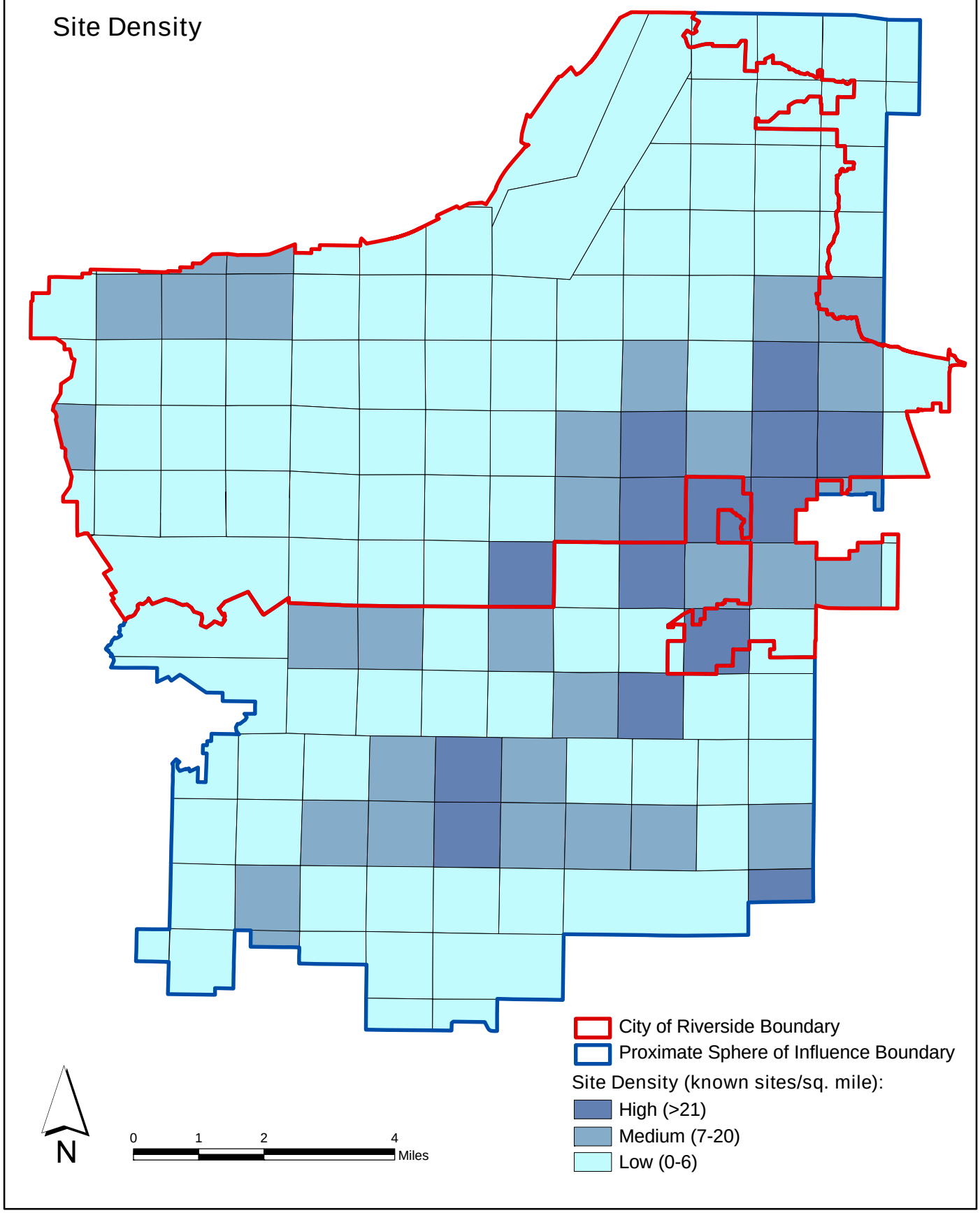


Figure 4 Known archaeological site density for the City of Riverside Core Area and proximate Sphere of Influence.

the well-watered water courses found within the Cajalco Creek canyon, a portion of which is now Lake Mathews, and Olsen Canyon southwest of Lake Mathews (see Figure 2). As shown in Figures 3 and 4, those areas having the highest survey coverage also contain the highest known archaeological site densities.

The third step in the sensitivity ranking process involved characterizing the archaeological sensitivity based on previous survey coverage and archaeological site density. As shown in Figure 5, the resultant rankings are Unknown, Low, Medium, and High. Areas classified as "Unknown" are primarily those areas that were urbanized prior to the mid 1970s, as well as extant citrus groves surrounding the urbanized, built environment (see Figure 2). Remaining classifications are self-explanatory. It should be noted that areas classified as "Unknown" likely contain buried archaeological deposits dating to the City's prehistoric and historical periods.

The final step in the sensitivity ranking process involved examining the U.S.G.S. topographic maps to determine where prehistoric archaeological cultural resources would be likely to be found based on environmental conditions such as the presence of reliable water sources, topography, and important vegetation communities. As shown in Figure 6, the resultant rankings for the geographical sensitivity are Unknown, Low, Medium, and High. Again, areas classified as "Unknown" are those areas confined to the City's downtown area that were urbanized during the early and mid-1900s where the current environmental conditions may not reflect the original environmental conditions. Remaining classifications are self-explanatory. As stated above, historical archaeological resources, such as buried hollow features containing historical refuse deposits, are often associated with standing historical structures or the former location of historical structures. It should also be noted that areas classified as "Unknown" likely contain buried archaeological deposits dating to the City's prehistoric and historical periods.

In summary, the literature and records searches indicate that much of the City's planning area has a fairly high sensitivity for containing prehistoric archaeological resources, historical archaeological resources, and historical resources.

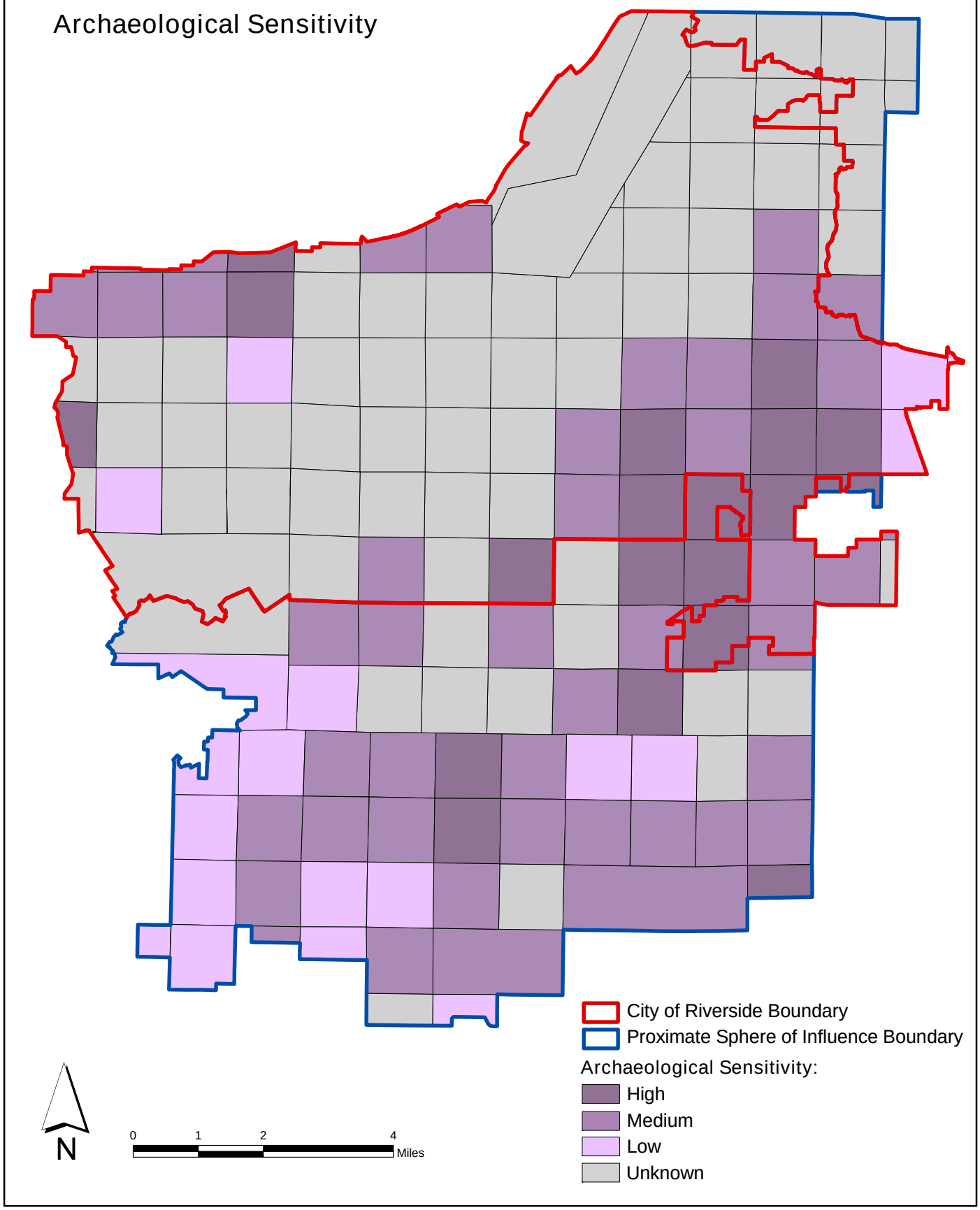


Figure 5 **Archaeological sensitivity, based on survey coverage and known site density, for the City of Riverside Core Area and proximate Sphere of Influence.**

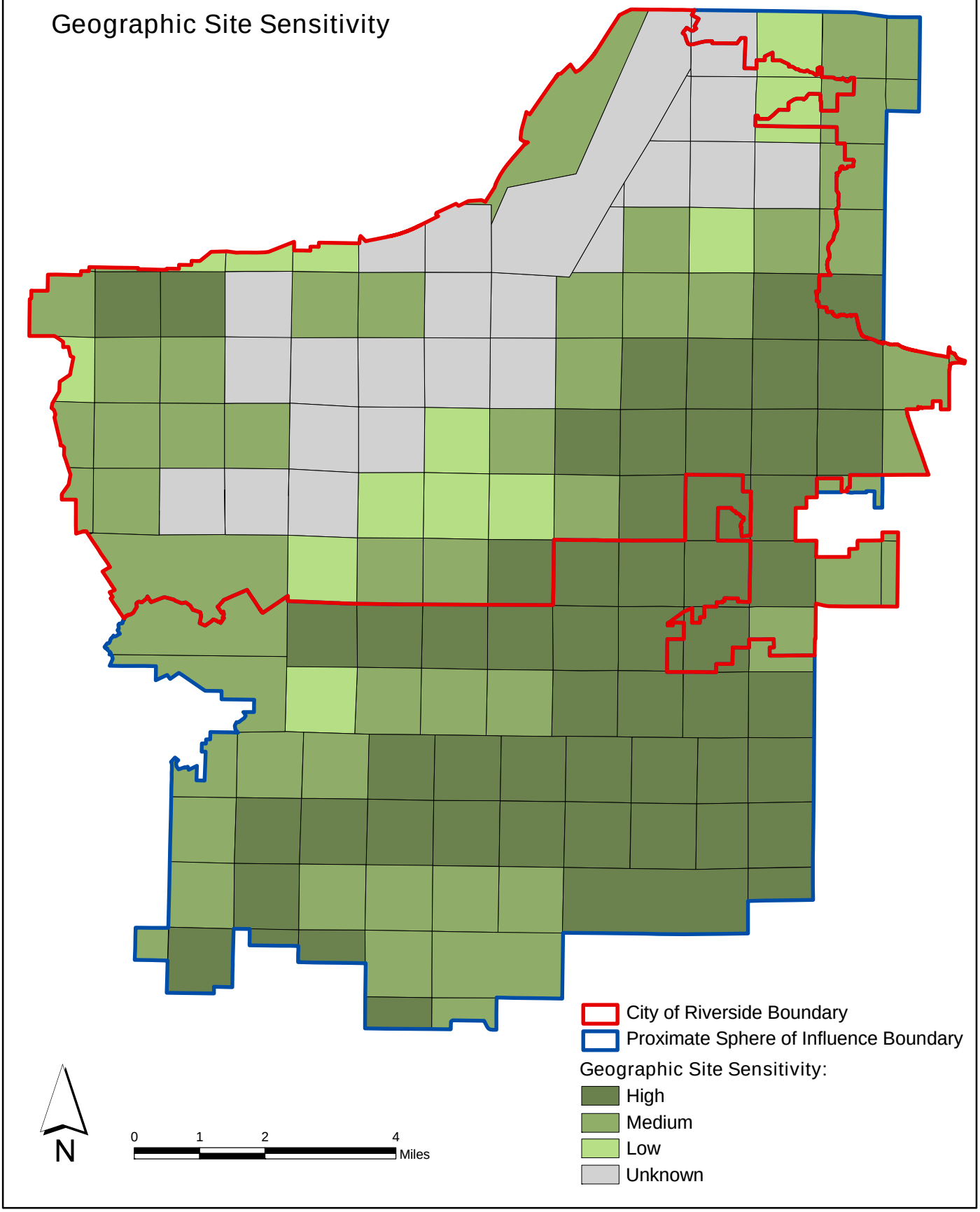


Figure 6 Geographic archaeological site sensitivity for the City of Riverside Core Area and proximate Sphere of Influence.

6.0
POTENTIAL IMPACTS TO CULTURAL RESOURCES AND RECOMMENDED MITGATION MEASURES

6.1 INTRODUCTION

In this final chapter, the potential impacts to cultural resources within the City's 91,548-acre planning area are reviewed. Because the General Plan Update does not directly address specific projects proposed by the City, these impacts are described generically. Following this discussion are standard mitigation measures that would reduce the level of most impacts to cultural resources to a level of insignificance.

6.2 POTENTIAL IMPACTS TO CULTURAL RESOURCES

Three basic impacts to cultural resources may occur through the implementation of projects proposed by the City: (1) Destruction of known prehistoric and historical archaeological resources; (2) the potential to disturb Native American human remains; and (3) adverse changes in the elements of historical structures, features, and landscapes that make them significant resources. Each of these impacts is described more fully below.

6.2.1 Destruction of Known Archaeological Resources

Based on what is known of the histories of local Native American groups and previously recorded archaeological sites, significant archeological resources are known to exist within the City's planning area. If the City proposes to construct projects within undeveloped portions of the City's planning area, there would likely be a substantial increase in population, residential and non-residential structures, and associated infrastructure. Thus, implementation of the City's proposed projects would require disturbance on vacant lands (e.g., grading and trenching activities) that may cause the destruction of known significant archaeological resources, as defined in the CEQA Guidelines, Section 15064.5 (California 1999).

As stated in Chapter 2.2.3, a project with an effect that may cause a substantial adverse change in the significance of an archaeological resource is a project that may have a significant effect on the environment (California 1999:14). Effects on an archaeological resource deemed to be significant could be considered adverse if they involve physical demolition, destruction, or alteration of the resource or its immediate surroundings such that the significance of a resource would be materially impaired. Thus, significant prehistoric and historical archaeological resources must be considered in the City's project planning and development process, and any proposed City project that may affect significant archaeological cultural resources must be submitted to the State Historic Preservation Officer (SHPO) for review and comment prior to project approval by the City and prior to construction.

6.2.2 The Potential to Disturb Native American Human Remains

As shown in Chapters 4 and 5, numerous archaeological studies within the City's planning area have revealed the presence of Native American human remains. Although most have been associated with former residential village locations, isolated burials and cremations have also been found in many locations. If the City proposes to construct projects in currently undeveloped areas of the City's planning area, disturbance on vacant lands could have the potential to disturb or destroy buried Native American human remains, including those interred outside of formal cemeteries. Consistent with state laws protecting these remains (i.e., Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98), sites containing Native American human remains must be identified and treated in a sensitive manner.

6.2.3 Adverse Changes in the Significance of Historical Resources

As shown in Chapter 5, the City was visited and permanently settled by Euro-Americans since the eighteenth century, and, as a result, significant historical structures and other historical features exist with the City's planning area. Future City development will undoubtedly occur in areas that may contain significant historical structures and features. Although the City has policies to protect and minimize adverse impacts to historical structures and features, the potential exists for significant impacts to these resources to occur as a result of development projects proposed by the City, as defined in the CEQA Guidelines, Section 15064.5 (California 1999).

Again, a project with an effect that may cause a substantial adverse change in the significance of a historical structure or feature is a project that may have a significant effect on the environment (California 1999:14). Effects on a historical structure or feature deemed to be significant could be considered adverse if they involve physical demolition, destruction, relocation, or alteration of the historical resource or its immediate surroundings such that the significance of the resource would be materially impaired. Thus, significant historical resources must be considered in the City's project planning and development process.

6.3 RECOMMENDED MITIGATION MEASURES

In the following paragraphs, standard mitigation measures are recommended that would reduce impacts to most cultural resources affected by proposed City development. As shown below, Mitigation Measures 1, 2, 3, and 4 pertain to archaeological resources and sites containing Native American human remains; Mitigation Measure 5 pertains to historical structures and features.

6.3.1 Cultural Resources Mitigation Measure 1

The City should actively pursue a comprehensive survey program to identify and document prehistoric and historical archaeological sites and sites containing Native American human remains. Although a comprehensive survey program may not be economically feasible by the City, the City should require that areas slated for development or other ground disturbing activities be surveyed for archaeological resources by qualified individuals who meet the

Secretary of the Interior's Standards and Guidelines regarding archaeological activities and methods prior to the City's approval of project plans (48 CFR 44716–44742). If potentially significant prehistoric archaeological resources are encountered during the archaeological survey, the City should require that the project proponent consult with Native American Heritage Commission in Sacramento to acquire a list of local Native Americans who may have an interest in these resources; consultation within these Native Americans should also be undertaken.

6.3.2 Cultural Resources Mitigation Measure 2

Avoidance is the preferred treatment for known prehistoric and historical archaeological sites and sites containing Native American human remains. Where feasible, project plans should be developed to avoid known archaeological resources and sites containing human remains. Where avoidance of construction impacts is possible, capping of theses resources with sterile sediments and avoidance planting (e.g., planting of prickly pear cactus) should be employed to ensure that indirect impacts from increased public availability to these sites are avoided. Where avoidance is selected, archaeological resource sites and sites containing Native American human remains should be placed within permanent conservation easements or dedicated open space areas.

6.3.3 Cultural Resources Mitigation Measure 3

If avoidance and/or preservation in place of known prehistoric and historical archaeological resources and sites containing Native American human remains are not feasible management options, the following mitigation measures should be initiated:

a. Prior to the issuance of a grading permit for a project, the City's consultant should develop a Phase II (i.e., test-level) Research Design detailing how the archaeological resources investigation will be executed and providing specific research questions that will be addressed through the Phase II Testing Program. In general terms, the Phase II Testing Program should be designed to define site boundaries further and to assess the structure, content, nature, and depth of subsurface cultural deposits and features. Emphasis should also be placed on assessing site integrity and the site's potential to address regional archaeological research questions. These data should be used to address the California Register of Historical Resources (CRHC) and National Register of Historic Places (NRHP) eligibility for the cultural resource and make recommendations as to the suitability of the resource for listing on either Register. The Research Design should be submitted to the City's Cultural Heritage Board for review and comment. For sites determined ineligible for listing on either the CRHR or NRHP, execution of the Phase II Testing Program would suffice as mitigation of project impacts to this resource.

b. A participant-observer from the appropriate Native American Band or Tribe should be used during archaeological excavations involving sites of Native American concern.

c. After approval of the Research Design and prior to the issuance of a grading permit, the City's consultant should complete the Phase II Testing Program as specified in the Research Design. The results of this Program should be presented in a technical

report that follows the County of Riverside's Outline for Archaeological Testing. The Phase II Report should be submitted to the City's Cultural Heritage Board for review and comment.

d. If the cultural resource is identified as being potentially eligible for either the CRHR or NRHP, and project designs cannot be altered to avoid impacting the site, a Phase III Data Recovery Program to mitigate project effects should be initiated. The Data Recovery Treatment Plan detailing the objectives of the Phase III Program should be developed and contain specific testable hypotheses pertinent to the Research Design and relative to the sites under study. The Phase III Data Recovery Treatment Plan should be submitted to the City's Cultural Heritage Board for review and comment.

e. After Approval of the Treatment Plan, the Phase III Data Recovery Program for affected, eligible sites should be completed. Typically, a Phase III Data Recovery Program involves the excavation of a statistically representative sample of the site to preserve those resource values that qualify the site as being eligible for listing on the CRHR or NRHP. Again, a participant-observer from the appropriate Native American Band or Tribe should be used during archaeological data-recovery excavations involving sites of Native American concern. At the conclusion of the Phase III Program, a Phase III Data Recovery Report should be prepared, following the County of Riverside's Outline for Archaeological Mitigation or Data Recovery. The Phase III Data Recovery Report should be submitted to the City's Cultural Heritage Board for review and comment.

f. All archaeological materials recovered during implementation of the Phase II Testing or Phase III Data Recovery programs would be subject to processing, including cleaning, detailed description, and analysis, as appropriate. Following completion of laboratory and analytical procedures, all project-related collections should be suitably packaged and transferred to a curation facility that meets the standards of 36 CFR 79 for long-term storage. Materials to be curated include archaeological specimens and samples, field notes, feature and burial records, maps, plans, profile drawings, photo logs, photographic negatives, consultants' reports of special studies, and copies of the final technical reports. It should be noted that provisions of the Native American Graves Protection Repatriation Act (NAGPRA) pertaining to Native American burials, sacred objects, and objects of cultural patrimony would come into effect when ownership of the collections transfer to a curation repository that receives federal funding.

g. The project proponent should bear the expense of identification, evaluation, and treatment of all cultural resources directly or indirectly affected by project-related construction activity. Such expenses may include, pre-field planning, field work, post-field analysis, research, interim and summary report preparation, and final report production (including draft and final versions), and costs associated with the curation of project documentation and the associated artifact collections. On behalf of the City and the project proponent, the final technical reports detailing the results of the Phase II Testing or Phase III Data Recovery programs should be submitted to the EIC of the CHRIS for their information and where it would be available to other researchers.

6.3.4 Cultural Resources Mitigation Measure 4

The following mitigation measures should be implemented to reduce project-related adverse impacts to archaeological resources and sites containing Native American human remains that may be inadvertently discovered during construction of projects proposed in the City's General Plan Update:

a. In areas of archaeological sensitivity, including those that may contain buried Native American human remains, a registered professional archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all project-related ground disturbing activities that extend into natural sediments in areas determined to have high archaeological sensitivity.

b. As the lead agency, the City should include in their mitigation plan provisions for the identification and evaluation of archaeological resources inadvertently discovered during construction, per California Environmental Quality Act (CEQA) 15064.5 (f). If buried archaeological resources are uncovered during construction, the City's mitigation plan should state that all work must be halted in the vicinity of the discovery until a registered professional archaeologist can visit the site of discovery and assess the significance of the archaeological resource. If the archaeological resource is determined to be a potentially significant cultural resource, the City should also include in their mitigation plan provisions for the preparation and implementation of a Phase IIII Data Recovery Program, as well as disposition of recovered artifacts, in accordance with Mitigation Measure 3(d–g), above.

c. In the event of an accidental discovery of any human remains in a location other than a dedicated cemetery, the steps and procedures specified in Health and Safety Code 7050.5, *State CEQA Guidelines* 15064.5(e), and Public Resources Code 5097.98 must be implemented. Specifically, in accordance with Public Resources Code (PRC) Section 5097.98, the Riverside County Coroner must be notified within 24 hours of the discovery of potentially human remains. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with PRC Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains within 48 hours of notification. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and associated grave goods within 24 hours of notification. Whenever the NAHC is unable to identify a MLD, or the MLD fails to make a recommendation, or the landowner or his or her authorized representative rejects the recommendation of the MLD and the mediation provided for in subdivision (k) of PRC Section 5097.94 fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance.

It should be noted in the event that Native American human remains are inadvertently discovered during the City's project-related construction activities, there would be unavoidable significant adverse impacts to these resources. Implementation of the Cultural Resources Mitigation Measures 1, 2, 3, and 4 would, however, reduce impacts to other types of archaeological resources to a level of insignificance.

6.3.5 Cultural Resources Mitigation Measure 5

In regards to the City's historical structures and features, the Historic Preservation Goals set forth in the recently adopted *Historic Preservation Element of the City of Riverside General Plan* (APPS 2003:21-23) include the following:

a. Goal 1: To use historic preservation principals as an equal component in the planning and development process;

b. Goal 2: To continue an active program to identify, interpret, and designate the City's cultural resources;

c. Goal 3: To promote the City's cultural resources as a means to enhance the City's identity as an important center of Southern California history;

d. Goal 4: To fully integrate the consideration of cultural resources as a major aspect of the City's planning, permitting, and development activities;

e. Goal 5: To ensure compatibility between new development and existing cultural resources;

f. Goal 6: To actively pursue funding for a first-class historic preservation program, including money needed for educational materials, studies, surveys, staffing, and incentives for preservation by private property owners; and

g. Goal 7: To encourage both public and private stewardship of the City's cultural resources.

The historic preservation policies listed in the Historic Preservation Element (APPS 2003: 21-23) fully address these goals.

7.0
REFERENCES CITED

Amsden, C. A.
1935 The Pinto Basin Artifacts. In The Pinto Basin Site: An Ancient Aboriginal Camping Ground in the California Desert, edited by E. W. C. Campbell and W. H. Campbell, pp. 33–51. *Southwest Museum Papers* No. 9.

Anderson, R. S., S. J. Smith, and P. A. Koehler
1998 *Paleoenvironments of the Domenigoni and Diamond Valleys*. Report prepared by Northern Arizona University, Flagstaff. Report submitted to Dames & Moore and Applied EarthWorks, Inc., on behalf of the Metropolitan Water District of Southern California, Los Angeles, CA.

Antevs, E.
1952 Climatic History and the Antiquity of Man in California. *University of California Archaeological Survey Reports* 16:23–31. Berkeley, CA.

Architectural Preservation Planning Services (APPS)
2003 *Historic Preservation Element of the City of Riverside General Plan*. Report prepared by Architectural Preservation Planning Services, Pasadena, CA. Report submitted to the City of Riverside Planning Department, Riverside, CA.

Arnold, J. E., A. Q. Duffield, R. S. Greenwood, R. P. Hampson, and T. M. Van Bueren with contribution by B. E. Lander
1987 *Archaeological Resources of the Seven Oaks Dam Project, Upper Santa Ana River Locality*. Prepared for U. S. Army Corps of Engineers, Los Angeles District, Los Angeles, California.

Basgall, M. E., and M. C. Hall
1993 *Archaeology of the Awl Site (CA-SBR-4562), Fort Irwin, San Bernardino County, California: An Early Holocene Residential Base in the North-Central Mojave Desert.* Report prepared by Far Western Anthropological Research Group, Inc., Davis CA. Report submitted to the U. S. Army Corps of Engineers, Los Angeles District Office, Los Angeles, CA.

Basgall, M. E., and D. L. True
1985 *Archaeological Investigations in Crowder Canyon, 1973–1984: Excavations at Sites SBR-421B, SBR-421C, SBR-421D, and SBR-713*. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA. Report submitted to the USDA Forest Service, Inyo National Forest, Bishop, CA.

Bean, L. J.
1978 Cahuilla. In *Handbook of North American Indians, Vol. 8 (California)*. William C. Sturtevant, general editor, Robert F. Heizer, volume editor. Smithsonian Institution, Washington, D.C.

Bean, L. J., and K. S. Saubel
1972 *TEMALPAKH, Cahuilla Indian Knowledge and Usage of Plants*. Malki Museum Press, Banning, CA.

Bean, L. J., and S. B. Vane
2001 *Eastside Reservoir Project Phase III: Ethnography and Ethnohistory*. Report prepared by Cultural Systems Research, Inc., Menlo Park, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

n.d.(?) *Ethnographic Overview of the Inland Feeder Pipeline Project*. Draft Report in preparation, Cultural Systems Research, Inc., Menlo Park, CA.

Beattie, G.W., and H. P. Beattie
1939 *Heritage of the Valley, San Bernardino's First Century*. San Pasqual Press, Pasadena, CA.

Bettinger, R. L.
1974 Environment and Ethnography at Perris Reservoir. In *Perris Reservoir Archaeology: Late Prehistoric Demographic Change in Southeastern California*, edited by J. F. O'Connell, P. J. Wilke, T. F. King, and C. L. Mix, pp.10–19. State of California Resources Agency, Department of Parks and Recreation Archaeological Reports No. 14, Sacramento, CA.

Brown, J. T.
1985 *Harvest of the Sun: An Illustrated History of Riverside County*. Windsor Publications, Northridge, CA.

Bruhns, K. O.
1994 *Ancient South America*. Cambridge University Press, Cambridge.

California, State of
1999 *CEQA: California Environmental Quality Act: Statues and Guidelines*. Governor's Office of Planning and Research, Sacramento, CA

Campbell, E. W. C., and W. H. Campbell
1935 The Pinto Basin Site: An Ancient Aboriginal Camping Ground in the California Desert. *Southwest Museum Papers* No. 9.

Chaput, D.
1985 The Temescal Tin Fiasco. *Southern California Quarterly* 67(1):1–24. Historical Society of Southern California.

Cleland, R. G.
1941 *The Cattle on a Thousand Hills, Southern California—1850–1870*. The Huntington Library, San Marino, California.

Davis, O. K., and W. D. Sellers
1987 Contrasting Climatic Histories for Western North America during the Early Holocene. *Current Research in the Pleistocene* 4:87–89.

Dillehay, T. D.
1989 *Monte Verde: A Late Pleistocene Settlement in Chile. Volume I: Paleoenvironment and Site Context*. Smithsonian Institution Press, Washington, D. C.

1997 *Monte Verde: A Late Pleistocene Settlement in Chile. Volume II: Archaeological Context*. Smithsonian Institution Press, Washington, D. C.

Dumke, G. S.
1970 *The Boom of the Eighties in Southern California*. The Huntington Library, San Marino, California.

Elliott, W. W.
1883 *History of San Bernardino and San Diego Counties with Illustrations*. Reprinted 1965, Riverside Museum Press, Riverside, California.

Enzel, Y., W. J. Brown, R. Y. Anderson, L. D. McFadden, and S. G. Wells
1992 Short-Duration Holocene Lakes in the Mojave River Drainage Basin, Southern California. *Quaternary Research* 38:60–73.

Furness, J. W.
1928 *Tin Mineral Resources of the United States*, Part 1, pp. 65–88. U.S. Bureau of Mines.

Gallegos, D. R.
1987 A Review and Synthesis of Environmental and Cultural Material for the Batiquitos Lagoon Region. In *San Dieguito–La Jolla: Chronology and Controversy* pp. 23–24. San Diego County Archaeological Society Research Paper 1.

Goldberg, S. K.
2001 Land Use, Mobility, and Intensification Evaluation and Refinement of the Model. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 14*. S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Goldberg, S. K., and J. E. Arnold
1988 *Prehistoric Sites in the Prado Basin, California: Regional Context and Significance Evaluation*. Report prepared by INFOTEC Research, Inc., Sonora, CA. Report submitted to the U.S. Army Corps of Engineers, Los Angeles District, Los Angeles, CA.

Goldberg, S. K., and M. C. Horne
2001 Revised Research Design for Eastside Reservoir Project Prehistoric Archaeology. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 2.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Goldberg, S. K., C. J. Klink, J. A. Onken, W. G. Spaulding, M. C. Robinson, M. C. Horne, and R. L. McKim
2001 *Metropolitan Water District of Southern California Eastside Reservoir Project Final Report of Archaeological Investigations, Vol. IV: Synthesis of Findings*. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Gosse, J. C., J. Klein, E. B. Evenson, B. Lawn, and R. Middleton
1995 Beryllium-10 Dating of the Duration and Retreat of the Last Pinedale Glacial Sequence. *Science* 268:1329–1333.

Grenda, D. R.
1997 *Continuity & Change: 8,500 Years of Lacustrine Adaptation on the Shores of Lake Elsinore*. Technical Series 59, Statistical Research, Inc., Tucson, AZ. Report submitted to the U. S. Army Corps of Engineers, Los Angeles District, Los Angeles, CA.

Gunther, J. D.
1984 *Riverside County, California, Place Names: Their Origins and Their Stories.* Rubidoux Printing Company, Riverside, CA.

Hall, S. A.
1985 Quaternary Pollen Analysis and Vegetational History of the Southwest. In *Pollen Records of Late Quaternary North American Sediments*, edited by V. Bryant, Jr. and R. Holloway, pp. 95–124. American Association of Stratigraphic Palynologists Foundation, Dallas, TX.

Haynes, C. V., Jr
1967 Quaternary Geology of the Tule Springs Area, Clark County, Nevada. In *Pleistocene Studies in Southern Nevada*, edited by H. M. Wormington and D. Ellis, pp. 15–104. Nevada State Museum Anthropological Papers, Reno, NV.

Hickman, J. C. (editor)
1993 *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley, CA.

Horne, M. C.
2001 Site Structure and Features. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 8.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Ingersoll, L. A.
1904 *Ingersoll's Century Annals of San Bernardino County, California 1764 to 1904.* Los Angeles, CA.

Jones, T. L., G. M. Brown, L. M. Raab, J. L. McVickar, W. G. Spaulding, D. J. Kennett, A. York, and P. L. Walker
1999 Environmental Imperatives Reconsidered: Demographic Crises in Western North America during the Medieval Climatic Anomaly. *Current Anthropology*, 40(2):137–170.

Kennett, D. J., and J. P. Kennett
2000 Competitive and Cooperation Responses to Climatic Instability in Coastal Southern California. *American Antiquity* 65:379–395.

King, C. D.
1982 *The Evolution of Chumash Society: A Comparative Study of Artifacts Used in Social System Maintenance in the Santa Barbara Channel Region Before A.D. 1804*. Ph.D. dissertation, Department of Anthropology, University of California, Davis. University Microfilms, Ann Arbor, MI.

King, T. F.
1967 *Test Excavations at MRN-375, the Palo Marin Site in Point Reyes National Seashore*. Society for California Archaeology, R. E. Schenk Memorial Archives of California Archaeology 17. San Francisco, CA.

Klink, C. J.
2001a Ground Stone Tool Production and Technological Strategies. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 10.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

2001b Flaked Stone Tool Production and Technological Strategies. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 9.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Klink, C. J. (continued)

2001c Artifact Assemblage Structure and Content. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 13.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Koerper, H. C.

1981 *Prehistoric Subsistence and Settlement in the Newport Bay Area and Environs, Orange County, California*. Ph.D. dissertation, University of California, Riverside. University Microfilms, Ann Arbor, MI.

Koerper, H. C., and C. E. Drover

1983 Chronology Building for Coastal Orange County: The Case from CA-ORA-119A. *Pacific Coast Archaeological Society Quarterly* 19(2):1–34.

Koerper, H. C., A. B. Schroth, and R. D. Mason

1991 Early Holocene Adaptations and the Transitional Phase Problem: Evidence from the Allan O. Kelly Site, Aqua Hedionda Lagoon. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by J. M. Erlandson and R. H. Colten, pp. 43–62. Perspectives in California Archaeology, Vol. 1. Institute of Archaeology, University of California, Los Angeles, CA.

Kowta, M.

1969 *The Sayles Complex: A Late Milling Stone Assemblage from the Cajon Pass and the Ecological Implications of Its Scraper Planes.* University of California Publications in Anthropology 6. Berkeley and Los Angeles, CA.

LeCount, L. J., and C. A. Weber

1992 *Lake Mathews Cultural Resources Reconnaissance Survey*. Report prepared by the Chambers Group, Irvine, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Lewis, H. T.

1993 *Patterns of Indian Burning in California: Ecology and Ethnohistory*. Ballena Press, Ramona, CA.

LSA Associates, Inc.

2000 *Existing Setting Report, Riverside County Integrated Project*. Report prepared by LSA Associates, Inc., Irvine, CA. Report submitted to the Riverside County Planning Department, Riverside, CA.

Lynch, T. F., editor

1980 *Guitarrero Cave: Early Man in the Andes*. Academic Press, New York.

McDougall, D. P.
1995 *Metropolitan Water District, Eastside Reservoir Project, Summary of Emergency Investigations of Historic Properties, Prehistoric Site CA-RIV-5786.* Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to Metropolitan Water District of Southern California, Los Angeles, CA.

McDougall, D. P.
2001 CA-RIV-5045: The Diamond Valley Pinto Site. In *Metropolitan Water District of Southern California, Eastside Reservoir Project Archaeological Investigations, Vol. II: Archaic and Late Prehistoric Occupation Sites*. S. K. Goldberg, general editor, pp. 8.1–8.94. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

McDougall, D. P., M. C. Horne, J. A. Onken, M. C. Robinson, R. S. Anderson, and R. Harro
2003a *Inland Feeder Pipeline Project Final Synthetic Report of Archaeological Findings, Riverside County, California*. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to Metropolitan Water District of Southern California, Los Angeles, CA.

McDougall, D. P., M. C. Horne, and J. Sander
2003b *Cultural Resources Survey of a Portion of the Lake Mathews Inundation Zone*. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

McDougall, D. P., M. C. Horne, J. A. Onken, P. Vandiver, W. G. Spaulding, R. McKim, and S. Anderson
n.d.(?) *Early Archaic Settlement and Subsistence in the San Jacinto Valley, Riverside County, California*. Draft report in preparation by Applied EarthWorks, Inc., Hemet, CA.

McKim, R. L.
2001 Faunal Assemblages: Vertebrate Faunal Remains. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 12.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Meighan, C. W.
1954 A Late Complex in Southern California Prehistory. *Southwestern Journal of Anthropology* 10(2):215–227.

1959 Archaeological Resources of Borrego State Park. *University of California Archaeological Survey Annual Report, 1958–1959.* Los Angeles, CA.

Meltzer, D. J., D. K. Grayson, G. Ardila, A. W. Barker, D. F. Dincauze, C. V. Hanes, Jr., F. Mena, L. Nuñez, and D. J. Stanford
1997 On the Pleistocene Antiquity of Monte Verde, Southern Chile. *American Antiquity* 62(4):659–663.

Mehringer, P. J., Jr., and C N. Warren
1976 Marsh, Dune, and Archaeological Chronology, Ash Meadows, Amargosa Desert, Nevada. In *Holocene Environmental Change in the Great Basin*, edited by R. Elston, pp. 120–150. Nevada Archaeological Survey Research Papers.

Mehringer, P. J., Jr., P.S. Martin, and C. V. Haynes, Jr.
1967 Murray Springs–A Mid-Postglacial Pollen Record from Southern Arizona. *American Journal of Science* 265:786–797.

Mix, A. C.
1987 The Oxygen-Isotope Record of Deglaciation. In *The Geology of North America*, edited by W. F. Ruddiman and H. E. Wright, Jr., pp. 111–136. Geological Society of America, Boulder, CO.

Moratto, M. J.
1984 *California Archaeology*. Academic Press, New York.

1998 Prospects for Pleistocene Archaeology in California. Paper presented at the Annual Meeting of the Society of California Archaeology, San Diego, CA.

Munz, P. A.
1974 *A Flora of Southern California.* University of California Press, Berkeley and Los Angeles, CA.

Munz, P. A., and D. D. Keck
1959 *A California Flora.* University of California Press, Berkeley, CA.

O'Connell, J. F., P. J. Wilke, T. F. King, and C. L. Mix (editors)
1974 *Perris Reservoir Archaeology: Late Prehistoric Demographic Change in Southeastern California.* State of California Resources Agency, Department of Parks and Recreation Archaeological Reports No. 14, Sacramento, CA.

Onken, J. A., and M. C. Horne
2001 Chronosequencing. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 3.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Patterson, T.
1976 "Maybe Early Carob King Wasn't So Crazy After All." *Riverside Press-Enterprise*, July 4, 1976.

Petra Resources, Inc.
1996 *Historical and Archaeological Assessment of Archival Resources CPA Cajalco Mine Project.* Draft report by K. K. Swope and J. Rosenthal of Petra Resources, Inc., Irvine, CA. Report submitted to Woodward-Clyde Consultants, Santa Ana, CA.

Priestly, H. I.
1972 *A Historical Political and Natural Description of California by Pedro Fages: Written for the Viceroy on 1775.* Translation and Introduction by Herbert Ingram Priestly. Ballena Press, Ramona, CA.

Raup, H. F.
1940 San Bernardino, California: Settlement and Growth of a Pass-Site City. *University of California Publications in Geography* 8(1). University of California Press, Berkeley and Los Angeles, California.

Robinson, M. C.
1998 *Arrow Points from the Eastside Reservoir Project: Typology and Chronology in the Late Prehistoric of Riverside County, California*. Unpublished Master's Thesis, University of Oregon, Eugene, OR.

2001 Units of Analysis. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 4.* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Rogers, D. B.
1929 *Prehistoric Man on the Santa Barbara Coast*. Santa Barbara Museum of Natural History Special Publications 1. Santa Barbara, CA.

Sowers, T., and M. Bender
1995 Climate Records Covering the Last Deglaciation. *Science* 269:210–214.

Spaulding, W. G.
1990 Vegetational And Climatic Development Of The Mojave Desert: The Last Glacial Maximum To The Present. In *Packrat Middens: The Last 40,000 Years Of Biotic Change*, edited by J. L. Betancourt, T. R. Van Devender, and P. S. Martin, pp. 166–199. University of Arizona Press, Tucson, AZ.

1991 A Middle Holocene Vegetation Record From The Mojave Desert And Its Paleoclimatic Significance. *Quaternary Research* 35:427–437.

1995 Environmental Change, Ecosystem Responses, and the Late Quaternary Development of the Mojave Desert. In *Late Quaternary Environments and Deep History: A Tribute to Paul S. Martin*, edited by D. Steadman and J. Mead. The Mammoth Site of Hot Springs, South Dakota, Inc. Scientific Papers, Volume 3. Hot Springs, SD.

Spaulding, W. G. (continued)
2001 Paleoenvironmental Context of the Study Area. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 5,* S. K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, CA. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, CA.

Spaulding, W. G., and L. J. Graumlich
1986 The Last Pluvial Climatic Episodes in the Deserts of Southwestern North America. *Nature* 320:441–444.

Swope, K. K., and J. Rosenthal
1996 *Historical and Archaeological Assessment of the Archival Resources, CPA Cajalco Mine Project*. Report prepared by Petra Resources, Inc., Irvine CA. Report submitted to Woodward-Clyde Consultants, Santa Ana, CA

True, D. L.
1958 An Early Gathering Complex in San Diego County, California. *American Antiquity* 23:255–263.

1966 *Archaeological Differentiation of Shoshonean and Yuman Speaking Groups in Southern California*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles, CA.

1970 *Investigations of a Late Prehistoric Complex in Cuyamaca State Park, San Diego County, California.* Archaeological Survey Monographs No. 1, University of California, Los Angeles, CA.

True, D. L., C. W. Meighan, and H. Crew
1974 Archaeological Investigation at Molpa, San Diego County, California. *University of California Publications in Anthropology* 11. Berkeley, CA.

True, D. L., R. Pankey, and C. N. Warren
1991 *Tom-Kav: A Late Village Site in Northern San Diego County, California and Its Place in the San Luis Rey Complex*. University of California Publications Anthropological Records, Volume 30. University of California Press.

Van Devender, T. R., R. S. Thompson, and J. L. Betancourt
1987 Vegetation History of the Deserts of Southwestern North America: The Nature and Timing of the Late Wisconsin-Holocene Transition. In *The Geology of North America*, edited by W. F. Ruddiman and H. E. Wright Jr., pp. 323–352. North America and Adjacent Oceans during the Last Deglaciation, vol. K-3. Geological Society of America, Boulder, CO.

Wallace, W. J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11:214–230.

Wallace, W. J. (continued)
1978 Post Pleistocene Archaeology, 9000 to 2000 B.C. In *California Indians*, edited by R.F. Heizer and M. A. Whipple, pp. 186–210. University of California Press, Los Angeles, CA.

Warren, C. N.
1968 Cultural Tradition and Ecological Adaptation on the Southern California Coast. *Eastern New Mexico University Contributions in Archaeology* 1(3):1–15.

1980 The Archaeology and Archaeological Resources of the Amargosa–Mojave Basin Planning Units. In *A Cultural Resources Overview for the Amargosa–Mojave Basin Planning Units*, by C. N. Warren, M. Knack, and E. von Till Warren. U.S. Bureau of Land Management, Cultural Resources Publications, Anthropology–History, Riverside, CA.

1984 The Desert Region. In *California Archaeology*, by Michael J. Moratto, pp. 339–430. Academic Press, New York and London.

Warren, C. N., D. L. True, and A. A. Eudey
1961 Early Gathering Complexes of Western San Diego County: Results of Interpretation of an Archaeological Survey. *Archaeological Survey Annual Report 1960–1961*, pp. 1–106. Institute of Archaeology, University of California, Los Angeles, CA.

Warren, C. N., and R. H. Crabtree
1972 The Prehistory of the Southwestern Area. In *Handbook of North American Indians, Volume 11: Great Basin*, pp. 183–193. Edited by W. C. Sturtevant. Smithsonian Institution, Washington, D. C.

Waters, M. R.
1983 Late Holocene Lacustrine Chronology and Archaeology of Ancient Lake Cahuilla, California. *Quaternary Research* 19: 373–387.

Wilke, P. J.
1976 *Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Riverside.

This Page Intentionally Left Blank

Riverside County Integrated Project



EXISTING SETTING REPORT

by LSA Associates, Inc.

Revised March 2000

TABLE OF CONTENTS

Section 1.0 - Introduction **1-1**

1.1 Introduction to the Riverside County Integrated Plan 1-1
- 1.1.1 General Plan 1-1
- 1.1.2 Multiple Species Habitat Conservation Plan (MSHCP) 1-4
- 1.1.3 Community Environmental and Transportation Acceptability Program (CETAP) 1-4

1.2 Jurisdictional Boundaries 1-4
- 1.2.1 Spheres of Influence 1-6
- 1.2.2 Unincorporated Communities and Communities of Interest 1-6
- 1.2.3 Economic Analysis Areas 1-8

1.3 Purpose of the Existing Setting Report 1-9

1.4. Document Format 1-9

Section 2.0 - Land Use **2-1**

2.1 Introduction 2-1
- 2.1.1 Historic Growth Patterns 2-1

2.2 Existing Land Use 2-1
- 2.2.1 Residential 2-5
- 2.2.2 Commercial 2-6
- 2.2.3 Industrial 2-7
- 2.2.4 Recreation and Open Space 2-8
- 2.2.5 Public Facilities 2-8
- 2.2.6 Other 2-9
- 2.2.7 Redevelopment Areas 2-9

2.3 Planned Land Use within Riverside County 2-11
- 2.3.1 Land Use Determination System for Unincorporated Areas Outside of Adopted Community Plans 2-13
- 2.3.2 Community Plans Adopted as Part of the Riverside County Comprehensive General Plan 2-15

2.4 Specific Plans and Development Agreements 2-20
- 2.4.1 Specific Plans 2-20
- 2.4.2 Development Agreements 2-20

Section 3.0 - Circulation and Transportation **3-1**

3.1 Introduction 3-1

3.2 Existing Transportation/Circulation Conditions 3-1
3.2.1 Existing Street and Highway System 3-2
3.2.2 Existing Public Transportation Systems/Services 3-26
3.2.3 Existing Rail Transportation System 3-29
3.2.4 Existing Non-Motorized Systems 3-30
3.2.5 Existing Aviation Systems 3-31
3.2.6 Existing Transportation Management 3-33
3.2.7 Existing Goods Movement 3-34
3.3 Planned Circulation System 3-38
3.4 Major Utility Corridors 3-43
3.4.1 Major Water Pipelines and Aqueducts 3-43
3.4.2 Major Natural Gas Pipelines 3-45
3.4.3 Major Electrical Transmission Lines 3-45

Section 4.0 - Open Space and Conservation 4-1

4.1 Introduction 4.1-1
4.2 Biological Resources 4.2-1
4.2.1 Biological Resources in Western Riverside County 4.2.1
4.2.2 Biological Resources in Eastern Riverside County 4.2-84
4.2.3 Literature Cited 4.2-103
4.3 Water Resources 4.3-1
4.3.1 Introduction 4.3-1
4.3.2 Watersheds 4.3-1
4.3.3 Water Quality 4.3-8
4.3.4 Location of Existing and Future Supplies 4.3-13
4.3.5 Capacity of Existing and Future Supplies to Support New Development 4.3-17
4.4 Agricultural Resources 4.4-1
4.4.1 Introduction 4.4-1
4.4.2 Prime Agricultural Soils 4.4-1
4.4.3 Agricultural Production 4.4-2
4.4.4 Williamson Act Land Preserves 4.4-4
4.4.5 Important Farmlands 4.4-4
4.5 Mineral Resources 4.5-1
4.5.1 Mineral Resource Zones 4.5-1
4.5.2 Existing Mineral Resources 4.5-4
4.6 Cultural and Paleontological Resources 4.6-1
4.6.1 Cultural Resources 4.6-1
4.6.2 Paleontological Resources 4.6-32
4.7 Parks and Recreation 4.7-1

4.7.1 Existing and Proposed Parks and Recreational Lands 4.7-1
4.7.2 Existing and Proposed (As of 1999) Trails 4.7-12
4.8 Visual Resources 4.8-1
4.9 Open Space Land Inventory 4.9-1
4.9.1 Managed Open Space Lands 4.9-2
4.9.2 Publicly Owned Open Space 4.9-3
4.9.3 Private Lands Committed to Long-Term Open Space 4.9-7
4.9.4 Existing Open Space Land Not Committed to Long-Term Open Space 4.9-9
4.9.5 Land Set Aside (or Otherwise Restricted) for the Protection of the General Public 4.9-9

Section 5.0 - Public Health and Safety 5-1

5.1 Introduction 5.1-1
5.2 Geotechnical Hazards 5.2-1
5.2.1 Faults 5.2-1
5.2.2 Major Earthquake Sources in Riverside County 5.2-13
5.2.3 Riverside County Seismicity 5.2-16
5.2.4 Fault Rupture 5.2-25
5.2.5 Expected Earthquake Analyses 5.2-25
5.2.6 Secondary Earthquake Hazards 5.2-32
5.2.7 Vulnerability of the Built Environment to Earthquake Hazards 5.2-40
5.2.8 HAZUS™ Earthquake Scenario Loss Estimations for Riverside County 5.2-55
5.2.9 Reducing Earthquake Hazards in Riverside County 5.2-69
5.3 Fire Hazards 5.3-1
5.3.1 Previous Fire Disasters 5.3-2
5.3.2 Fire Safety Regulations 5.3-4
5.3.3 HUD Study System 5.3-9
5.3.4 Prefire Management 5.3-12
5.3.5 Earthquake-Induced Fires 5.3-19
5.3.6 Postfire Effects 5.3-22
5.3.7 Fire Response Resources 5.3.25
5.4 Flood Hazards 5.4-1
5.4.1 Types of Flood Hazards 5.4-1
5.4.2 Previous Flood Disasters Affecting Riverside County 5.4-1
5.4.3 Flood Problem Areas 5.4-6
5.4.4 County Flood Control and Reservoir Projects 5.4-9
5.4.5 Dam Failure 5.4-13
5.4.6 Flood Hazard Reduction in Riverside County 5.4-20
5.5 Wind Erosion 5.5-1
5.5.1 Coachella Valley 5.5-3

5.6 Steep Slopes 5.6-1
5.6.1 Hillside Design Parameters 5.6-1
5.6.2 Hillside Management Programs in Other Agencies 5.6-7
5.6.3 Areas of Steep Slopes in Riverside County 5.6-9
5.6.4 Physiographic and Geologic Setting 5.6-11
5.6.5 Geology and Engineering Geology Coverages 5.6-12
5.6.6 Expansive Soils 5.6-15
5.6.7 Collapsible Soils 5.6-16
5.6.8 Ground Subsidence 5.6-16
5.7 Hazardous Materials 5.7-1
5.7.1 Definitions 5.7-1
5.7.2 Generators/Users of Hazardous Materials 5.7-4
5.7.3 Hazardous Materials Transport 5.7-10
5.7.4 Areas of Known Hazardous Materials Contamination 5.7-13
5.7.5 Hazardous Materials Emergency Response 5.7-15
5.8 Emergency Preparedness 5.8-1
5.8.1 Emergency Preparedness Planning in Riverside County 5.8-1
5.8.2 Emergency Management System 5.8-3
5.8.3 Mutual Aid 5.8-4
5.8-4 Critical Facilities 5.8-4

Section 6.0 - Housing 6-1

6.1 Introduction 6-1
6.2 Demographic Trends 6-1
6.2.1 Regional Growth 6-1
6.2.2 Age Composition 6-2
6.2.3 Race and Ethnicity 6-3
6.3 Employment Trends 6-4
6.3.1 Employment Characteristics 6-4
6.3.2 Housing Balance 6-7
6.4 Household Characteristics 6-8
6.4.1 Household Size 6-8
6.4.2 Household Income 6-9
6.5 Housing Inventory and Market Conditions 6-10
6.5.1 Housing Stock Profile 6-10
6.5.2 Vacancy Rates and Tenure 6-11
6.5.3 Age of Housing Stock 6-12
6.5.4 Housing Costs and Rents 6-13
6.6 Existing Housing Needs 6-15

6.6.1 Overcrowding 6-15
6.6.2 Households Overpaying for Housing 6-16
6.6.3 Special Needs Groups 6-17
6.7 Summary and Conclusions 6-19
6.7.1 Demographics 6-19
6.7.2 Employment 6-19
6.7.3 Housing Characteristics 6-19
6.7.4 Existing Housing Needs 6-20
6.7.5 General Trends 6-20

Section 7.0 - Air Quality 7-1

7.1 Introduction 7-1
7.2 Air Quality Standards 7-1
7.3 Existing Air Basins and Air Quality Management Districts 7-1
7.3.1 Climate/Meteorology 7-4
7.4 Existing Air Quality and Air Quality Trends 7-6
7.4.1 Air Pollution Constituents and Attainment Status 7-6
7.4.2 Existing Air Quality and Air Quality Trends 7-9
7.5 Air Quality Management 7-14
7.5.1 South Coast Air Basin and Salton Sea Air Basin 7-15
7.5.2 Mojave Desert Air Basin 7-15

Section 8.0 - Noise 8-1

8.1 Introduction 8-1
8.1.1 Characteristics of Sound 8-1
8.1.2 Measurement of Sound 8-1
8.1.3 Psychological and Physiological Effects of Noise 8-3
8.1.4 Land Use Compatibility with Noise 8-4
8.2 Overview of the Existing Noise Environment 8-6
8.2.1 Ambient Noise Survey 8-7
8.2.2 Existing Freeway and Highway Noise 8-7
8.2.3 Existing Railroad Noise 8-14
8.2.4 Existing Airport Noise 8-14
8.2.5 Existing Industrial/Commercial Noise Sources 8-31
8.3 Other Existing Major Noise Sources 8-33

Section 9.0 - Public Services and Facilities **9-1**

9.1 Introduction 9-1
9.1.1 Overview of Public and Semi-Public Services 9-1
9.1.2 Identification of the Services Evaluated in this Section 9-2
9.2 Regional Agencies 9-3
9.3 Countywide Facilities and Services 9-4
9.3.1 Fire Department 9-4
9.3.2 Sheriff's Department 9-8
9.3.3 Solid Waste Disposal 9-10
9.3.4 Parks and Recreation 9-11
9.3.5 Libraries 9-12
9.3.6 Hospitals and Medical Facilities 9-15
9.4 Evaluation of Services and Facilities by Fiscal Analysis Area 9-17
9.4.1 Fiscal Analysis Area 1: Northwestern Riverside County 9-17
9.4.2 Fiscal Analysis Area 2: Southwestern Riverside County 9-35
9.4.3 Fiscal Analysis Area 3: Central Riverside County 9-49
9.4.4 Fiscal Analysis Area 4: San Gorgonio Pass Area 9-62
9.4.5 Fiscal Analysis Area 5: Mountains (REMAP) Area 9-74
9.4.6 Fiscal Analysis Area 6: Coachella Valley 9-81
9.4.7 Fiscal Analysis Area 7: Eastern Desert and Palo Verde Valley 9-97

Section 10.0 - Environmental Regulations Management **10-1**

10.1 Endangered Species Act 10-1
10.1.1 Federal Endangered Species Act 10-1
10.1.2 California Endangered Species Act 10-1
10.2 Water Resources 10-2
10.2.1 Federal Laws 10-2
10.2.2 State Laws 10-4
10.2.3 Reclaimed Water Regulations 10-4
10.3 Cultural Resource Management 10-7
10.3.1 Regulatory Framework 10-7
10.3.2 Cultural Resource Management During Project Planning 10-8
10.4 Hazardous Materials Management 10-9

Section 11.0 - Bibliography **11-1**

11.1 General References 11-1
11.2 References Specific to Sections in this Report 11-2

11.2.1 Introduction 11-2
11.2.2 Land Use 11-2
11.2.3 Circulation and Transportation 11-2
11.2.4 Open Space and Conservation 11-3
11.2.5 Public Health and Safety 11-28
11.2.6 Air Quality 11-29
11.2.7 Noise 11-29

12.0 Definitions 12-1

12.1 Abbreviations 12-1
12.2 General Land Use Types 12-4
12.2.1 Residential 12-4
12.2.2 Commercial 12-4
12.2.3 Industrial 12-5
12.2.4 Recreation and Open Space 12-6
12.2.5 Public Facilities 12-7
12.2.6 Other Land Use Types 12-8
12.3 Roadway Classification Terms 12-8
12.4 General Terms 12-9

APPENDICES

Appendix A - Circulation
Appendix B - School Finance
Appendix C - Water Purveyors
Appendix D - Noise Level Analyses

List of Figures

1.1 Regional Location

2.1 1998 Generalized Land Use
2.2 Redevelopment Areas
2.3 Planned Land Uses
2.4 Community Plans
2.5 Adopted Specific Plans
2.6 Existing Development Agreements

3.1 Existing Roadways
3.2a-j Existing Conditions Roadway Classification and Levels of Service
3.3 Planned Roadways
3.4 Major Utility Transmission Lines

4.2.1 Natural Communities

4.3.1 Watershed Areas

4.4.1 Agricultural Resources

4.5.1 Mineral Resource Study Areas
4.5.2 Mineral Resources Areas

4.6.1 Regional Cultural Chronologies
4.6.2 Southern California Tribal Territories
4.6.3 Historical Resources
4.6.4 Archaeological Sensitivity Areas
4.6.5 Paleontological Sensitivity Areas

4.7.1 Parks and Recreation Areas

4.8.1 Riverside County
4.8.2 Visual Analysis Areas
4.8.3 Jurupa Valley and Eastvale Areas
4.8.4 Temescal Valley
4.8.5 Greater Elsinore
4.8.6 Southwest Area

4.8.7 Lake Mathews
4.8.8 Highway 74-79
4.8.9 Menifee Valley
4.8.10 Perris Valley
4.8.11 Lakeview and Nuevo
4.8.12 San Jacinto Valley
4.8.13 Reche Canyon and Lake Perris
4.8.14 San Gorgonio Pass
4.8.15 Riverside Extended Mountain Area
4.8.16 Coachella Valley
4.8.17 Eastern Riverside County

5.2.1 Mapped Faulting in Riverside County
5.2.2 Alquist-Priolo Earthquake Hazard Zone Map
5.2.3 Probabilistic Acceleration Contour Mapping for Riverside County
5.2.4 Earthquake Probability
5.2.5 Areas Susceptible to Liquefaction
5.2.6 Earthquake-Induced Slope Instability Map
5.2.7 Unreinforced Masonry Building
5.2.8 Precast Concrete-Frame Construction
5.2.9a Inventory of Hospital Locations
5.2.9b Inventory of Emergency Response Facilities
5.2.9c Inventory of School Locations
5.2.9d Inventory of Communication Facilities
5.2.9e Inventory of Dam Locations
5.2.9f Inventory of Highway Bridges
5.2.9g Inventory of Hazardous Materials
5.2.9h Inventory of Major Highway Locations
5.2.9i Rail Facilities, Available Water, Oil and Natural Gas Pipeline Inventory Data
5.2.10 Near Source Zone Regions Impacting Riverside County and UBC Zone Boundary
5.2.11 General Uniform Building Code Soil Types

5.3.1 Wildfire Susceptibility

5.4.1 100- and 500-Year Flood Hazard Zones
5.4.2 Dam Failure Inundation Zones

5.5.1 Types of Soil Movement
5.5.2 Wind Hazard Areas

5.6.1 Slope Illustration
5.6.2 Maximum Grades
5.6.3 Areas of Steep Slopes
5.6.4a Slumps
5.6.4b Falls
5.6.4c Slides
5.6.5 Areas of Documented or Susceptible to Subsidence

7.1 Riverside County Air Quality Basins

8.1 Common Noise Sources and Noise Levels
8.2 Land Use Compatibility for Community Noise Environments
8.3 Noise Monitoring Locations
8.4 Existing Noise Contours Along Freeways and Major Highways
8.5 Existing Noise Contours Along Freeways and Major Highways
8.6 Existing Noise Contours Along Freeways and Major Highways
8.7 Existing Noise Contours Along Freeways and Major Highways
8.8 Existing Noise Contours Along Freeways and Major Highways
8.9 Existing Noise Contours Along Freeways and Major Highways
8.10 Existing Noise Contours Along Freeways and Major Highways
8.11 Existing Noise Contours Along Freeways and Major Highways
8.12 Existing Noise Contours Along Freeways and Major Highways
8.13 Existing Noise Contours Along Freeways and Major Highways
8.14 Existing Noise Contours Along Freeways and Major Highways
8.15 Existing Noise Contours Along Freeways and Major Highways
8.16 Existing Noise Contours Along Freeways and Major Highways
8.17 Typical Diagram of Railroad Noise and Lines
8.18 Typical Diagram of Railroad Noise and Lines
8.19 Typical Diagram of Railroad Noise and Lines
8.20 Existing Noise Contours Around Airports

List of Tables

1.A	Incorporated Cities within Riverside County	1-5
1.B	Land Use Authority within Riverside County	1-5
2.A	Distribution of Existing (1998) Land Use Between Cities and Unincorporated Areas	2-3
2.B	Distribution of Existing (1998) Land Use within Cities and Unincorporated Areas	2-4
2.C	Distribution of Existing (1998) Developed Land Uses within Cities and Unincorporated Areas	2-5
2.D	Riverside County Land Use Determination System	2-13
3.A	Generalized Urban Functional Classification System - Definitions	3-4
3.B	Generalized Rural Functional Classification System - Definitions	3-5
3.C	Level of Service Criteria	3-8
3.D	Uninterrupted Traffic Flow Facilities Level of Service	3-8
3.E	Interrupted Traffic Flow Facilities Level of Service	3-9
3.F	Riverside County Roadway Capacity Table (Level of Service 10/1/99)	3-10
3.G	Existing Roadway Capacity Analysis (Interstate and State Route)	3-22
3.H	Existing Roadway Capacity Analysis (Classified Local Facilities)	3-25
3.I	Officially Designated Park-and-Ride Lots in Riverside County	3-35
3.J	Daily Truck Volume on Freeways in Riverside County (Bi-Directional)	3-37
3.K	Riverside County Roadway Classifications	3-39
4.2.A	Natural Community Categories	4.2-3
4.2.B	Generalized Natural Communities of Western Riverside County and Associated Listed, Proposed, and Candidate Species	4.2-6
4.2.C	Federal and State Listed, Proposed, and Candidate Species of Western Riverside County	4.2-13
4.2.D	Other Special Interest Species of Western Riverside County	4.2-31
4.2.E	Generalized Natural Communities of Eastern Riverside County	4.2-85
4.2.F	Federal and State Listed, Proposed, and Candidate Species of Eastern Riverside County	4.2-92
4.2G	Other Special Interest Species of Eastern Riverside County	4.2.95
4.3.A	South Coast Region Water Budget with Existing Facilities and Programs (thousands of acre feet)	4.3-19
4.3.B	South Coast Region Water Budget (percent)	4.3-20
4.3.C	Colorado River Region Water Budget with Existing Facilities and Programs (thousands of acre feet)	4.3-20
4.3.D	Colorado River Region Water Budget (percent)	4.3-20
4.4.A	SCS Soil Classes	4.4-2
4.4.B	Crop Valuation (in millions)	4.4-3
4.4.C	Planted Crop Acreages (in acre)	4.4-3

4.5.A	California Mineral Land Classification Diagram	4.5-4
4.5.B	1997 Mineral Production in Riverside County	4.5-8
4.6.A	Characteristics of the Prehistoric Periods of Riverside County	4.6-3
4.6.B	Distribution of Essential Plant and Animal Foods of the Cahuilla by Biotic Community	4.6-15
4.6.C	Historical Resources of Riverside County	4.6-21
4.6.D	Riverside County Properties Listed on the National Register of Historic Places	4.6-34
4.6.E	Paleontological Resources by Age, Formation, and Location	4.6-36
5.2.A	Abridged Modified Mercalli Intensity Scale And Relation to Other Parameters	5.2-8
5.2.B	Fault Source Parameters for Riverside County	5.2-14
5.2.C	Historical Earthquakes Impacting Riverside County	5.2-17
5.2.D	Alquist-Priolo Earthquake Fault Zone Map Available for Riverside County	5.2-26
5.2.E	Probable Earthquake Scenarios for Riverside County	5.2-27
5.2.F	Probabilistic Earthquake Accelerations for Riverside County	5.2-30
5.2.G	Magnitude of Possible Foreshock Required to Reach a Specified Probability Level for Four Microseismic Regions of the Southern San Andreas Fault (Working Group, 1991)	5.2-31
5.2.H	Alert Levels and Response for Anomalous Earthquake Activity Along the Southern San Andreas Fault (from Working Group, 1991)	5.2-32
5.2.I	General Liquefaction Potential Zones for Riverside County	5.2-35
5.2.J	HAZUS™ Scenario Earthquakes for Riverside County	5.2-58
5.2.K	Number of Buildings Damaged	5.2-59
5.2.L	Estimated Casualties	5.2-60
5.2.M	Estimated Shelter Requirements	5.2-60
5.2.N	Estimated Economic Losses	5.2-61
5.2.O	Expected Building Damage by Occupancy M_w 6.9 San Jacinto Fault Earthquake	5.2-62
5.2.P	Expected Building Damage by Building Type (all design levels) M_w 6.9 San Jacinto Fault Earthquake	5.2-62
5.2.Q	Expected Damage to Essential Facilities as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault	5.2-63
5.2.R	Expected Damage to the Transportation Systems as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault	5.2-63
5.2.S	Expected Electric Power System Performance as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault	5.2-63
5.2.T	Casualty Estimates as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault	5.2-64
5.2.U	Building-Related Economic Loss Estimates (millions of dollars) as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault	5.2-65
5.2.V	Expected Building Damage by Occupancy M_w 7.9 San Andreas Fault Earthquake	5.2-65
5.2.W	Expected Building Damage by Building Type (all design levels) M_w 7.9 San Andreas Fault Earthquake	5.2-66

5.2.X	Expected Damage to Essential Facilities as a Result of a M_w 7.9 Earthquake on the San Andreas Fault	5.2-66
5.2.Y	Expected Damage to the Transportation Systems as a Result of a M_w 7.9 Earthquake on the San Andreas Fault	5.2-67
5.2.Z	Expected Electric Power System Performance as a Result of a M_w 7.9 Earthquake on the San Andreas Fault	5.2-67
5.2.AA	Casualty Estimates as a Result of a M_w 7.9 Earthquake on the San Andreas Fault	5.2-68
5.2.AB	Building-Related Economic Loss Estimates (millions of dollars) as a Result of a M_w 7.9 Earthquake on the San Andreas Fault	5.2-69
5.2.AC	1997 Uniform Building Code Soil Profile Types	5.2-71
5.2.AD	1997 Uniform Building Code Seismic Source Types	5.2-73
5.2.AE	1997 Uniform Building Code Near-Source Zones and Classifications of Faults in Riverside County	5.2-74
5.3.A	Twenty Largest California Wildland Fires (Ranked By Structures Lost)	5.3-3
5.3.B	Disaster Declarations Impacting Riverside County	5.3-4
5.3.C	Uniform Fire Code Minimum Fire Protection Flows	5.3-17
5.3.D	Road Standards for Fire Equipment Access	5.3-18
5.3.E	Structural Standards	5.3-18
5.3.F	Model Ordinance Checklist, Fuel Modification Standards	5.3-19
5.3.G	Scenario Earthquakes for Riverside County	5.3-21
5.3.H	Earthquake Induced Fire Losses in Riverside County HAZUS™ Scenario Earthquakes	5.3-22
5.3.I	Estimated Functionality (in percent) of County Fire Response Facilities Based on Scenario Earthquakes at One Day After Event	5.3-23
5.4.A	Historical Stream Gage Data for Riverside County	5.4-4
5.4.B	Peak Elevation Levels of Lake Elsinore	5.4-5
5.4.C	Facilities in Riverside County Exposed to Flood Hazards	5.4-9
5.4.D	Flood Control Project Request FY 2000 Riverside County Flood Control District	5.4-12
5.4.E	National Inventory of Dam (NATDAM) Data for Riverside County	5.4-14
5.4.F	Inundation Modeling of Colorado River Dams	5.4-17
5.4.G	Local Agencies with Flood Control Responsibilities in Riverside County	5.4-20
5.6.A	Types of Slope Measurement	5.6-2
5.6.B	Generalized Slope Categories	5.6-3
5.6.C	Hillside Ordinance Summary	5.6-7
6.A	Regional Population Growth Trends, 1990-1999	6-1
6.B	Population Housing, and Employment Distribution, Riverside County Unincorporated Area, 1997	6-2
6.C	Age Distribution, 1990	6-3
6.D	Racial and Ethnic Composition, 1990	6-3

6.E	Employment Trends by Industry, Riverside County, 1990-1998	6-4
6.F	Employment Forecast by Occupation: 1995-2002, Riverside County	6-6
6.G	Jobs-Household Ratios	6-8
6.H	Household Size Distribution, 1990	6-8
6.I	Household Income by Tenure, Riverside County Unincorporated Area, 1990	6-9
6.J	Household Income Distribution, 1998	6-10
6.K	Housing Inventory by Type,Riverside County Unincorporated Area, 1999	6-10
6.L	Unit Size by Tenure, Riverside County Unincorporated Area, 1990	6-11
6.M	Housing Inventory by Tenure,Riverside County Unincorporated Area, 1990	6-12
6.N	Age of Housing Stock, Riverside County Unincorporated Area	6-13
6.O	Median Home Prices New and Existing Condos and Single Family, November 1999	6-13
6.P	Average Rents by Unit Type, Second Quarter, 1999	6-14
6.Q	Affordable Rent and Purchase Price by Annual Income, 1999	6-15
6.R	Overcrowding Lower-Income Households, 1999	6-16
6.S	Housing Overpayment, Lower-Income Households, Riverside County Unincorporated Area, 1998	6-16
6.T	Elderly Persons (65+) with Mobility or Self-Care Limitation, Riverside County Unincorporated Area, 1990	6-17
6.U	Large Households by Tenure, Riverside County Unincorporated Area, 1990	6-18
6.V	Female Headed Households with Children, Riverside County Unincorporated Area, 1990	6-18
7.A	Ambient Air Quality Standards	7-2
7.B	Ambient Air Quality at Norco Air Monitoring Station	7-10
7.C	Ambient Air Quality at Riverside-Rubidoux Air Monitoring Station	7-10
7.D	Ambient Air Quality at Riverside-Magnolia Air Monitoring Station	7-11
7.E	Ambient Air Quality at Banning-Alessandro Air Monitoring Station	7-11
7.F	Ambient Air Quality at Banning-Hathaway Air Monitoring Station	7-12
7.G	Ambient Air Quality at Perris Air Monitoring Station	7-12
7.H	Ambient Air Quality at Lake Elsinore Air Monitoring Station	7-13
7.I	Ambient Air Quality at Palm Springs Air Monitoring Station	7-13
7.J	Ambient Air Quality at Indio Air Monitoring Station	7-14
8.A	Ambient Noise Monitoring Results	8-8
8.B	Existing Traffic Noise Levels	8-11
9.A	Cities Served by the Riverside County Fire Department	9-4
9.B	Fire Stations Serving Riverside County	9-5
9.C	Sheriff's Department Substations	9-9
9.D	Library Facilities	9-12
9.E	Services Provided by Incorporated Cities in Northwestern Riverside County	9-17
9.F	Public Services Provided in Northwest Riverside County	9-18

9.G	Water Agency Services in Northwestern Riverside County	9-21
9.H	Water Consumption and Sewage Generation Factors Used by Water Districts in Northwestern Riverside County	9-22
9.I	Landfill Usage and Capacity for Northwestern Riverside County	9-25
9.J	Proposed Expansion of Landfills Serving Northwestern Riverside County	9-25
9.K	School Districts Serving Northwestern Riverside County	9-27
9.L	Student Generation Factors in Northwestern Riverside County	9-28
9.M	Projected Student Enrollments	9-29
9.N	City Services Provided in Southwestern Riverside County	9-36
9.O	Special District Services Provided in Southwestern Riverside County	9-36
9.P	Water and Sewer Agencies Serving Southwestern Riverside County	9-38
9.Q	Water and Sewer Factors Used by Agencies Serving Southwestern Riverside County	9-39
9.R	Sanitary Landfills Serving Southwestern Riverside County	9-41
9.S	Proposed Expansion of Landfills Serving Southwestern Riverside County	9-42
9.T	School Districts Serving Southwestern Riverside County	9-43
9.U	Student Generation Factors for the Temecula Unified School District	9-44
9.V	Projected Increases in Student Population in Southwestern Riverside County	9-44
9.W	Cemetery Facilities Serving Southwestern Riverside County	9-47
9.X	Services Provided by the Santa Rosa Community Services District and the Tenaja Community Services District	9-48
9.Y	Services Provided by Cities within Central Riverside County	9-49
9.Z	Special District Services Provided to Central Riverside County	9-49
9.AA	Water and Sewer Services in Central Riverside County	9-51
9.AB	Water Districts in Central Riverside County	9-51
9.AC	Landfills Serving Central Riverside County	9-53
9.AD	Proposed Expansion of Landfills Serving Central Riverside County	9-54
9.AE	School Facilities Serving Central Riverside County	9-56
9.AF	Hemet Unified School District Student Generation Factors	9-56
9.AG	Projected Increases in Student Enrollment	9-57
9.AH	School Capacity within the Hemet Unified School District	9-58
9.AI	Cemetery District Facilities Serving Central Riverside County	9-60
9.AJ	Hospital Facilities Serving Central Riverside County	9-61
9.AK	Services Provided by Cities within the San Gorgonio Pass Area	9-62
9.AL	Special District Services in the San Gorgonio Pass Area	9-63
9.AM	Water District Services in the San Gorgonio Pass Area	9-66
9.AN	Landfills Serving the San Gorgonio Pass Area	9-67
9.AO	Proposed Expansion of Landfills Serving the San Gorgonio Pass Area	9-68
9.AP	School Facilities Serving the San Gorgonio Pass Area	9-69
9.AQ	Projected Student Enrollment in the San Gorgonio Pass Area	9-70
9.AR	Cemetery Facilities Serving the San Gorgonio Pass Area	9-71

9.AS	Library Facilities Serving the San Gorgonio Pass Area	9-72
9.AT	Special District Services Provided in the REMAP Area	9-74
9.AU	REMAP Water Districts and Services	9-76
9.AV	Student Generation Factors for the REMAP Area	9-78
9.AW	Projected Student Enrollments for the Hemet Unified School District	9-79
9.AX	School Capacity within the Hemet Unified School District	9-79
9.AY	City Services Provided within the Coachella Valley	9-81
9.AZ	Special District Services in the Coachella Valley	9-82
9.BA	Water and Sewer Services in the Coachella Valley	9-85
9.BB	Water Districts in the Coachella Valley	9-85
9.BC	School Facilities Serving the Coachella Valley	9-89
9.BD	Student Generation Factors Used in the Coachella Valley	9-90
9.BE	Projected Student Enrollments in the Coachella Valley	9-90
9.BF	Public Cemeteries Serving the Coachella Valley	9-93
9.BG	Services Provided to the Eastern Desert and Palo Verde Valley Area	9-98
9.BH	School Facilities Serving the Eastern Desert and Palo Verde Valley Area	9-101
9.BI	Projected Student Enrollment in the Eastern Desert and Palo Verde Area	9-101
10.A	Title 22 Requirements	10-5

Fossils -- non-renewable paleontological resources -- are very important for dating sedimentary rocks, and thus determining the time of movement of faults against which those sediments lie. Eastern and western Riverside County have fossiliferous sediments that occur in different settings. In the western portion of the County, fossils occur in sediments lying on the surface of crystalline bedrock, or are deposited in or between the major fault zones.

Eastern Riverside County has fault block mountains that contain the older fossiliferous sediments. Younger deposits containing fossils are found around dry lakes, along high stands of the Salton Sea, and in terraces left by the Colorado River.

The oldest fossils in California are of Proterozoic age (900 million years old). Fossils in Riverside County of comparable age have been destroyed by the natural process of metamorphism. The oldest fossils found in Riverside County are from the late Jurassic Period (150 million years). Fossils from the late Cretaceous, the end of the Age of Dinosaurs, include ammonites, clams, and giant oysters.

The Cenozoic Era, the Age of Mammals, is divided into the Tertiary Period (65 million years to 2 million years) and the Quaternary Period, which includes the Pleistocene (2 million years to 10 thousand years) and the Holocene (10,000 years ago to present). The Tertiary Period records depositional events where continental sediments mixed with marine sediments. These important fluctuations in sea level are recorded in the Elsinore Fault Zone to the west and, in the Salton Trough of eastern Riverside county, as far west as Cabazon. Large fossils from the Tertiary Period include whales, sharks, primitive elephants and oreodonts, camels, and horses.

During the Quaternary Epoch, Riverside County was affected by increased Pleistocene rainfall which filled basins and fault zones and turned depressions into lakes. The influx of new sediment buried remains of large and small animals. Deposition of fossiliferous sediment occurred along the margins of the Salton Sea and along the Colorado River. The climate changed drastically ten thousand years ago from the end of the wet Pleistocene to the very dry Holocene. The record of changing plants and animals is preserved as mummified samples in the nests built by pack rats.

Summary of the Fossil Record

Riverside County has an extensive record of fossil life (Table 4.6.E). The record starts in Jurassic time, 150 million years ago, with diverse marine mollusks. The oldest Tertiary flora in southern California is found east of Lake Elsinore, and dates to around 60 million years ago. The 23 million year old oreodonts and camels, and the tracks of camels, come from the Orocopia Mountains in central Riverside County.

Marine advances are recorded at Corona, and in the Salton Trough. Marine sandstones of the Imperial Formation in the Salton Trough are found as far northwest as Cabazon. Three million years ago, near the present I-15/SR-91 interchange, was the white sand beach at the edge of the Pacific Ocean. The Ice Ages left fossils of giant sloths, elephants, camels, and bison that were preyed upon by giant bear, American

lion, and sabercats. Their remains lie waiting a few feet below the surface to be unearthed by construction excavation.

Table 4.6.E - Paleontological Resources by Age, Formation, and Location

	Western Riverside County	Central Riverside County	Eastern Riverside County
Mesozoic Era: The Age of Dinosaurs			
Jurassic Period 150 million years ago	The Bedford Canyon Formation in western Riverside County has been dated by a distinctive fauna of ammonites, brachiopods, and mollusks as Late Jurassic in age.		
Late Cretaceious Period 75 million years agp	The Ladd Formation contains the Holz Shale which produces large ammonites and giant clams distinctive to that time period. Dinosaurs have not yet been found in Riverside County, but are likely to occur in this unit, which encompasses the Santa Ana Mountains. Hadrosaur bones from a duck bill dinosaur have been found in nearby Santiago Canyon, in Orange County.		
Cenozoic Era: The Age of Mammals			
General	Western Riverside County has a long Tertiary record of marine advances and retreats. The fossiliferous marine sediments interfinger with sediments from the continent which contain land mammals. This record spans a period of time from 65 million years to 2 million years.	The fossils in central Riverside County are located on the bedrock isthmus between troughs of marine advances in western and eastern Riverside County. In part, the marine advances were simultaneous, and only 40 miles apart.	The Tertiary record of the eastern county includes Eocene marine fossils and the earliest record of Miocene land mammals in Riverside County. Deposition of late Miocene and early Pliocene marine sediments and their fossils have separate histories in the San Jacinto and San Andreas Fault Zones, and along the Colorado River.
Paleocene Epoch 65-55 million years ago	The "Martinez Formation," marine and non-marine siltstone, sandstone and coal north of Lake Elsinore contains Riverside County's oldest fossil flora. The Silverado Formation in southwestern Riverside County and Temescal Canyon consists of non-marine silty sands that grade upward into marine sediments which contain a diverse molluscan fauna.		
Eocene Epoch 55-34 million years ago	The Santiago Formation crops out in Santa Ana Canyon. The marine and non-marine sandstone contains abundant marine molluscs.		The Orocopia Mountains contain marine clams, snails and foraminifera. These sediments have been moved 200 miles away from their counterparts at Tejon Pass by the San Andreas Fault.

	Western Riverside County	Central Riverside County	Eastern Riverside County
Oligocene Epoch 34-24 million years ago	The Sespe and Vaqueros formations are non-marine and marine, respectively, interfingering across a broad, ancient coastal plain, that now includes Corona and Temescal Canyon. The green and white marine sediments contain fossil clams, snails, plants, crabs, and the teeth of sharks and rays. The non-marine red beds contain extinct camels, oreodonts, horses, rhinos, and carnivores. Important small finds are primates, insectivores, and rodents which help date portions of this formation that spans 10 million years.		
Miocene Epoch 24-4.5 million years ago	The Puente Formation in the Chino Hills is late Miocene in age, deposited from 12 to 7 million years ago. These marine sediments contain extremely well preserved fish, whales, sharks, clams, nautiloids and seaweed. Of great importance are fossil logs and leaves of many species of land plants, including palm fronds and pine cones and needles.	The Lake Mathews Formation, from Lake Mathews east to Val Verde, contains rare fossil oreodonts and camels from the period between 11 - 9 million years. These fossils were deposited in lakes and stream channels cutting through granitic bedrock. The Mount Eden Formation along Gilman Springs Road signals the initial basin filling of the Perris Block in late Miocene time (6 million years ago). Fossils used to date the formation are bear, rhinoceros, giant sloth, peccary, camel, deer, antelope and horse.	The Orocopia Mountains also contain the oldest Miocene mammals in Riverside County. These are a small oreodont and a camel. Tracks of the small camel are also found. Mid -Miocene sediments (15 million years) in the Palo Verde Mountains and the Mule Mountains have produced the bones of a three toed horse and the tracks of a large extinct camel. The Imperial Formation (6 million years) records a marine advance from the Gulf of California into the proto-Salton trough. Fossil whales, sharks teeth, and marine molluscs are found as far northwest as Cabazon, in west - central Riverside County. In addition to whales, walrus and sea cow are also found in the Imperial Formation. These marine mammals invaded the opening gulf in clean ocean water, prior to when silts were carried in by the Colorado River.
Pliocene Epoch 4.5-2 million years ago	The Fernando Formation crops out around Prado dam and Corona and is late Miocene to Pliocene in age, dated	The San Timoteo Formation makes up the Badlands north of Moreno Valley. It was deposited on top of the Mount Eden	The first sign of deposition by the Colorado River is the Bouse Formation, exposed between Parker and Blythe in the Colo-

	Western Riverside County	Central Riverside County	Eastern Riverside County
	by the presence of rhinoceros and primitive mastodon (5 million years) and distinctive small rodents (3 million years). Sediments containing fossils are in a near-shore marine deposit. The view at the time from Corona to the southwest was of the Pacific Ocean - before the Santa Ana Mountains were to rise!	Formation 4.5 to 1.3 million years ago, through Pliocene and Pleistocene time. The age of the formation has been determined by the fossil mammals that are very different than those that occur in the area today. Porcupine, muskrat, voles, lemmings and cotton rats are found in the sandstone of the Badlands, and suggest a cool well watered environment. Also present were giant bear, coyote, horse, tapir, camel, deer, mammoth, and giant ground sloth. The Elsinore Fault Zone around Murrieta and through Pauba Valley contains sediments which span early Pliocene time (4 million years) to the late Pleistocene (0.3 million years). Sediments equivalent to the Pauba Formation are exposed in the Elsinore Fault Zone from Temecula northwest to Norco. The age is based on a very important fossil record which includes ground sloths, mastodons, camels, horses, peccary, skunk, porcupine, rabbits, rodents and shrews. Birds, reptiles, amphibians, fish and clams and snails have also been described.	rado Trough. Fresh water fish and barnacles of unusual shape indicate that the marine waters of the Imperial formation were being freshened by the silty waters of the newly formed Colorado River at about 4.5 million years ago. The Mecca Hills contain fossils of extinct horses and cotton rats which date the start of deposition in the mid-Pliocene.
Pleistocene Epoch 2.5 million-10,000 years ago	Pleistocene deposits containing Ice Age fossils are found across Riverside County. The remains of large mammoths, mastodons, ground sloths, bison, horse and camel are associated with important remains of small rodents and insectivores that describe changes in habitat and age of deposit.	Buried Ice Age fossils occur in stable or subsiding areas in western Riverside County. Fossil antelope and horse have been found near Norco. Saber cat, giant ground sloth, and camel have been found further north in the Chino Basin. Ice Age fossils have been found buried only four feet below the surface of the Perris Plain. These near surface finds include saber cat, deer, horse and mammoth and large juniper logs from a time when the climate was colder.	Mammoths and bison occur in the Chemehuevi Formation along the Colorado River. Camels and horses are found in Ice Age lake sediments around Ford and Palen Basins, and in the lake sediments of Pinto Basin. Large fish fossils from the Colorado River system are found in ancient Lake Cahuilla sediments deposited in the Salton Trough.

Western Riverside County	Central Riverside County	Eastern Riverside County
	A spectacular buried assemblage of Ice Age fossils has been unearthed by excavation for the Eastside Reservoir. At least 1500 fossil localities below eight feet of depth have produced fossils the same age as, and as significant as those from the La Brea Tar Pits. Mastodon, giant ground sloth and bison are abundant but horse, camel, sabercat, dire wolf, and many other medium and small mammals are present, associated with reptiles, amphibians and birds.	

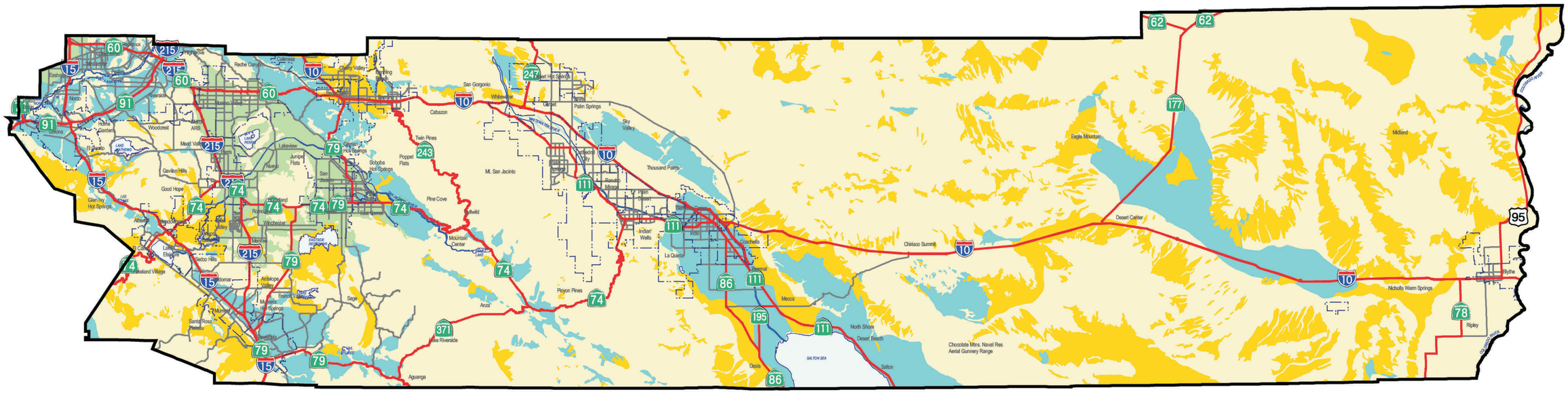
4.6.2.2 Paleontological Sensitivity

Figure 4.6.5 identifies the sensitivity of lands within Riverside County in relation to the potential for finding paleontological resources. The Paleontological Sensitivity map classifies lands into the following categories:

- ***Low Potential.*** This category encompasses lands for which previous field surveys and documentation demonstrates as having a low potential for containing significant paleontological resources subject to adverse impacts. The mapping of low potential was determined based on actual documentation, and was not generalized to cover all areas of a particular rock unit on a geologic map. For instance, an area mapped as "Qal" may actually be a thin surficial layer of non-fossiliferous sediments which covers fossil-rich Pleistocene sediments. Also, an area mapped as granite may be covered by a Pleistocene soil horizon that contains fossils. Thus, actual sensitivity must be ultimately determined by both a records search and a field inspection by a paleontologist, and those areas designated as having a low potential include those for which field inspections have been completed.

- ***Undetermined Potential.*** Areas underlain by sedimentary rocks for which literature and unpublished studies are not available have undetermined potential for containing significant paleontological resources. These areas need to be inspected by a qualified vertebrate paleontologist before a specific determination of high potential or low potential for containing significant non-renewable paleontological resources can be made.

- ***High Potential.*** Sedimentary rock units with high potential for containing significant non-renewable paleontological resources are rock units within which vertebrate or significant invertebrate fossils have been determined to be present or likely to be present. These units include, but are not limited to, sedimentary formations



LEGEND

Cities
Highways
Major Roads

Paleontological Sensitivity
- High A (Ha)
- High B (Hb)
- Low
- Undertermined

Figure 4.6.5

5 0 5 10 Miles

PALEONTOLOGICAL SENSITIVITY

which contain significant non-renewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. High sensitivity includes not only the potential for yielding abundant vertebrate fossils, but also for production of a few significant fossils that may provide new and significant (taxonomic, phylogenetic, ecologic, and/or stratigraphic) data. High sensitivity areas are mapped as either "High A" or "High B."

- ***High Sensitivity A (High A)*** is based on geologic formations or mappable rock units that are known to contain or have the correct age and depositional conditions to contain significant paleontological resources. These include rocks of Silurian or Devonian age and younger that have potential to contain remains of fossil fish and Mesozoic and Cenozoic rocks that contain fossilized body elements, and trace fossils such as tracks, nests, and eggs.

- ***High Sensitivity B (High B)*** is a sensitivity equivalent to High A, but is based on the occurrence of fossils at a specified depth below the surface. The category **High B** indicates that fossils are likely to be encountered at or below 4 feet of depth, and may be impacted during excavation by construction activities.

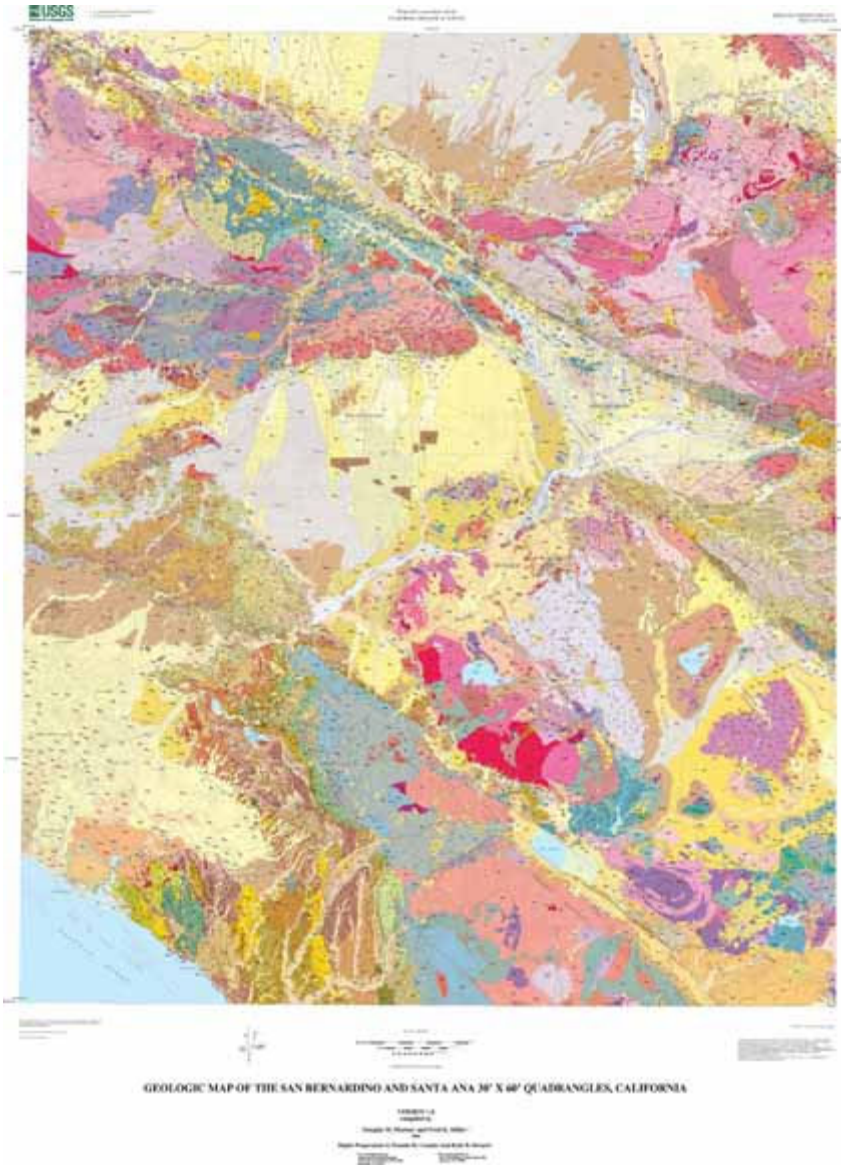
Western Earth Surface Processes

U.S. Geological Survey
Open-File Report 2006-1217
Version 1.0

Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California

By Douglas M. Morton and Fred K. Miller
Digital preparation by Pamela M. Cossette and Kelly R. Bovard

2006



The area covered by the combined Santa Ana and San Bernardino 30' x 60' quadrangles includes highly diverse geologic, physical, and climatic features. Topographic relief ranges from subsea to rugged mountains reaching elevations of more than 3,000 m, and includes large areas of low relief that are largely urbanized. Climatic variations include moderate coastal, cool mountain, and hot desert. Having a current population exceeding five million people, much of the quadrangles are densely populated metropolitan areas and rapidly urbanizing areas, but they also encompass large tracts of undeveloped land and even remote wilderness areas.

Included in the two quadrangles is some of the most varied and complex geology in the western United States. Parts of three major physiographic provinces fall within the area, the Peninsular Ranges, Transverse Ranges, and Mojave Desert provinces, in addition to four herein informally designated basement rock assemblages, the San Gabriel Mountains, San Bernardino Mountains, Mill Creek, and Peninsular Ranges assemblages (figs. 1 and 2). Bounding and falling within these basement rock assemblages are elements of several seismically active fault zones, including the San Andreas, San Jacinto, Elsinore, Whittier, Cucamonga, and Sierra Madre Faults.

Pamphlet

This comprehensive publication pamphlet contains a detailed Description of Map Units (DMU), and a discussion of the regional geologic framework. It is provided here in two forms, one without photographs and a larger collection of files that includes links to images of many exemplary rock unit outcrops and geologic features. The first file can be using the link below. The second file must be downloaded to your hard disc, expanded, and viewed offline.

Download pamphlet without photos as a PDF file (of2006-1217_pamphlet_nophotos.pdf; 24 KB)

Download pamphlet with 588 photos as a compressed ZIP file (of2006-1217_pamphlet_photos.zip; 145.7 MB that opens into a 150.2-MB folder)

Map

Four sheets are included in this report:
Sheet 1 (of2006-1217_geol_map.pdf; 37.6 MB) is the geologic map;
Sheet 2 (of2006-1217_major_flts.pdf; 18 MB), a fault map;
Sheet 3 (of2006-1217_young_flts.pdf; 24 MB), faults that cut late Pleistocene and Holocene deposits, and
Sheet 4 (of2006-1217_cmu.pdf; 1.1 MB), correlation of map units. In addition to the four map sheets, the report includes five figures.
Figures 1 and 2 (of2006-1217_fig1_and_2.pdf; 912 KB): Figure 1 shows the location of most place names used in descriptive parts of the report. Figure 2 is a highly simplified diagram showing the location of the two quadrangles relative to physiographic provinces of southern California.
Figure 3 (of2006-1217_fig3.pdf; 538 KB) shows the location of the major physiographic features including definable structural blocks having internally consistant characteristics.
Figure 4 (of2006-1217_fig4.pdf; 592 KB) shows sources of geologic mapping used to compile the geologic map and digital database. In this figure, published and unpublished mapping by the compilation authors are distinguished from published and unpublished mapping by others, in addition to showing where work by more than one person overlaps. References for published mapping are given; information for unpublished mapping includes the year(s) the mapping was done, the scale at which it was done, and the individual(s) who did the mapping.
Figure 5 (of2006-1217_fig5.pdf; 1.6 MB) shows the historic lake levels of Mystic Lake and a projection of where the lake level (closed depression) is predicted to be in 2023.

Data

Download the Readme file for this report as a PDF file (of2006-1217_readme.pdf; 64 KB)

Download the metadata for this report as an ASCII file. This is a text file of FGDC-compliant metadata for this report (sasb_metadata.txt; 176 kB).

sasb_geodatabase.zip Geodatabase package (332.5 MB; expands to 575.7 MB).

sasb_shapefiles.zip Shapefile package (198 MB; expands to 487 MB).

sasb_interchange_files.zip Coverage data model interchange (.e00) files (98.6 MB; expands to 422.1 MB).

symbols.zip This folder is included for those who continue to use ESRI's coverage data model: that symbology is not readable by ArcGIS 9x. However, sasb1d.style is included in the symbols folder for use with ArcGIS9x. (312 KB; expands to 3.5 MB).

For questions about the content of this report, contact Doug Morton .

Version history

Download a current version of Adobe Reader for free

| Help | PDF help | Publications main page | Open-File Reports for 2006 |
| Geologic Division | Western Earth Surface Processes |

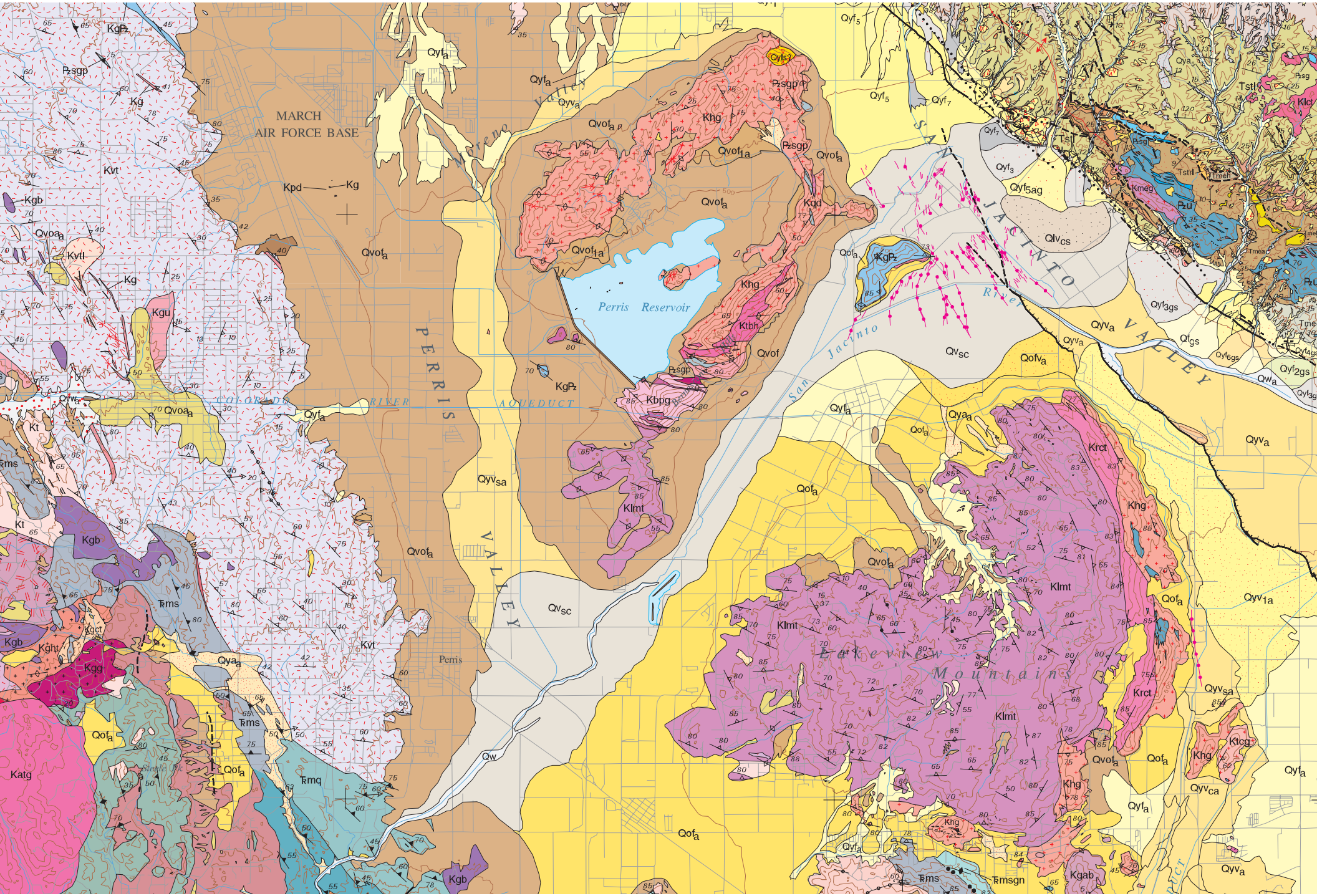
This report is available only on the Web

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: http://pubs.usgs.gov/of/2006/1217/
Page Contact Information: Michael Diggles
Page Last Modified: June 11, 2009






MARCH
AIR FORCE BASE
Perris Reservoir
PERRIS VALLEY
SAN JACINTO VALLEY
Lake Perris
Perris
Lakeview Mountains
Moreno Valley
San Jacinto River
COLORADO RIVER AQUEDUCT
Stimmel Rk
Qyf5
Qyfa
Qyva
Qvofa
Qvof1a
Khg
Kgd
Kbpg
Klmt
Ktbh
Qvof
Qvsc
Qofa
Qyaa
Qyvsa
Qyv1a
Qyvca
Qyva
Qwa
Qw
Kgb
Kvt
Kg
Kpd
Kgu
Kt
Tms
Tmsgn
Kgct
Kgh
Kgg
Katg
Tmq
Krct
Ktcg
Kgab
Qvoaa
Kvtl
Qyf7
Qyf3
Qyf5ag
Qlvcs
Qyf3gs
Qfgs
Qyf6gs
Qyf2gs
Tstl
Tmeh
Kmeg
Pzu
Pzsgp
KgPz

Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California

By Douglas M. Morton[1] and Fred K. Miller[2]

Digital preparation by Pamela M. Cossette[2], and Kelly R. Bovard[1]

Geology and Description of Map Units, version 1.0

Not illustrated. Photo links are accessable only if photo version of this document is used.

Open-File Report 2006-1217
Online version 1.0

http://pubs.usgs.gov/of/2006/1217

2006

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with
CALIFORNIA GEOLOGICAL SURVEY

A product of the Basins and Landscape Co-Evolution (BALANCE) Project

1 U.S. Geological Survey, Dept. of Geology
University of California, Riverside
Riverside, CA 92521
2 U.S. Geological Survey, Western Region Earth Surface Processes Team
W904 Riverside Avenue, Spokane, WA 99201-1087

GEOLOGIC MAP OF THE SAN BERNARDINO AND SANTA ANA 30' x 60' QUADRANGLES, CALIFORNIA

by
D.M. Morton and F.K. Miller

CONTENTS
[Click page numbers to go to that section.]

Introduction 1
Acknowledgements 2
Previous work 3
General 3
Peninsular Ranges 3
San Gabriel Mountains 5
Mill Creek Block 5
San Bernardino Mountains 6
Cajon Pass Area 6
Faults 7
General Geologic Setting 8
Peninsular Ranges Assemblage 8
San Gabriel Mountains Assemblage 9
Mill Creek Assemblage 9
San Bernardino Mountains Assemblage 10
Geomorphology 10
Peninsular Ranges Province 10
San Jacinto Mountains Block 11
Perris block 11
Basins marginal to Perris Block 14
Santa Ana Mountains Block 15
Transverse Ranges 16
San Gabriel Mountains 16
Cajon Pass Area 17
San Bernardino Mountains 17
Mojave Desert 18
Faults 18
Landslides 19
El Niño landslides 21
Fire-Flood sequence 22
Subsidence fissures 22
Geologic Summary 23
Peninsular Ranges Assemblage 23
Paleozoic Metamorphic rocks 23
Mesozoic Metamorphic rocks 25
Triassic 25
Rocks of Menifee Valley 25
Jurassic 27
Bedford Canyon Formation 27
Cretaceous 28
Volcanic and hypabyssal Rocks 28
Peninsular Ranges Batholith 29
Pegmatites 30
Plutons 31
Plutons of western zone 31

Paloma Valley ring Complex…… 31
Domenigoni Valley Pluton…….. 32
Cajalco Pluton…….. 32
Granites of the Riverside area and Mount Rubidoux…….. 33
Gavilan Ring Complex…….. 33
Arroyo del Toro pluton…… 34
Plutons of central zone…… 34
Green Acres Gabbro…… 34
Val Verde Pluton……. 35
Lakeview Mountains pluton…… 35
Reinhardt Canyon Pluton……. 37
Box Springs plutonic complex…….. 37
Granitic rocks of the Bernasconi Hills…….. 38
Plutons of eastern zone……..……. 38
Tonalite of Lamb Canyon……..…….. 38
Granite of Mount Eden…….……..…… 38
Post batholithic rocks……. 39
Upper Cretaceous…… 39
Sedimentary rocks…… 39
Trabuco Formation…….. 39
Ladd Formation…… 39
Williams Formation……. 40
Paleogene……..…….. 40
Sedimentary rocks…… 40
Silverado Formation…… 40
Santiago Formation……. 41
Sespe and Vaqueros Formations……. 41
Sespe Formation…….. 41
Vaqueros Formation…… 41
Neogene ……. 42
Neogene volcanic rocks……. 42
Glendora Volcanics……. 42
El Modeno Volcanics……. 42
Temecula area volcanic rocks…….……..…. 42
Sedimentary rocks, Los Angeles Basin…….. 43
Topanga Group…… 43
Buzzard Peak Conglomerate…… 44
Undivided Topanga Group, Santa Ana Mountains area…….. 44
San Joaquin Hills-Laguna Beach area…….. 44
Bommer Formation…….. 45
Los Trancos Formation…… 45
Paulerino Formation……. 45
San Onofre Breccia.....…….. 45
Monterey Formation……. 45
Puente Formation…….. 46
La Vida Member…….…….. 46
Soquel Member……...…….. 46
Yorba Member…….. 46
Sycamore Canyon Member……... 47
Capistrano Formation……..…… 47
Oso Member…….. 47
Siltstone facies…….. 47
Sandstone and conglomerate in southeastern Chino Hills…… 47
Fernando Formation…….. 48
Niguel Formation…….. 48
Sandstone of Norco area……. 48

Neogene to Pleistocene sedimentary rocks and deposits of interior basins..... 49
Temecula basin..... 49
Temecula Arkose..... 49
Sandstone and conglomerate of Wildomar area..... 49
Pauba Formation..... 49
San Timoteo basin..... 49
Mount Eden Formation..... 49
San Timoteo Beds..... 50
Pleistocene..... 51
Sedimentary Deposits..... 51
San Pedro Formation..... 51
Coyote Hills Formation..... 51
La Habra Formation..... 52
Unnamed deposits..... 52
Quaternary basins,..... 53
San Jacinto basin..... 53
Elsinore basin..... 53
San Gabriel Mountains Assemblage..... 53
Introduction..... 53
Proterozoic rocks..... 54
Paleozoic rocks..... 54
Pre-Cretaceous granitic rocks..... 55
Mount Lowe Intrusive Suite..... 55
Jurassic rocks..... 55
Cretaceous granitic rocks..... 56
Rocks in lower plate of Vincent Thrust: Pelona Schist..... 56
Internal structure of Pelona Schist..... 57
Tertiary granitic rocks..... 57
Tertiary volcanic and sedimentary rocks..... 58
Devil's Punchbowl area..... 58
Paleocene..... 58
San Francisquito Formation..... 58
Miocene-Pliocene..... 58
Punchbowl Formation..... 58
Pliocene-Pleistocene..... 59
Juniper Hills Formation..... 59
Quaternary geology..... 59
Creep and Landslides..... 60
San Bernardino basin..... 61
Rocks bounded by the Mill Creek Fault and the San Andreas Fault..... 61
San Bernardino Mountains Assemblage..... 62
Introduction..... 62
Proterozoic rocks..... 63
Paleozoic rocks..... 64
Cambrian..... 64
Wood Canyon Formation..... 64
Zabriskie Quartzite..... 64
Carrara Formation..... 65
Bonanza King Formation..... 65
Devonian..... 65
Sultan Limestone..... 65
Mississippian..... 65
Monte Cristo Limestone..... 65
Pennsylvanian.....66
Bird Springs Formation..... 66
Pre-Cretaceous granitic rocks..... 66

Cretaceous granitic rocks..... 67
Cenozoic sedimentary rocks..... 68
Rocks of the Cajon Valley area..... 68
Sedimentary rocks of Cosy Dell area..... 68
Vaqueros Formation..... 68
Cajon Valley Formation..... 69
Crowder Formation..... 69
Phelan Peak deposits of Weldon (1984)..... 69
Harold Formation and Shoemaker Gravel..... 69
Generic Quaternary deposits..... 69
Post Batholithic Structures..... 70
Faults..... 71
Introduction..... 71
San Andreas Fault Zone..... 71
Modern Trace..... 72
Holcomb Ridge to Cajon Pass..... 72
Cajon Pass to east edge of San Bernardino quadrangle..... 72
Older faults closely related to the San Andreas Fault..... 72
Mill Creek Fault..... 72
Wilson Creek Fault..... 73
Punchbowl Fault..... 73
San Gabriel Fault..... 73
Thrust fault, Devore area..... 73
San Jacinto Fault Zone..... 73
Glen Helen Fault..... 74
Relationship between the faults at Sycamore Flat-Lytle Creek, and the San Antonio Canyon-Stoddard Canyon Faults..... 74
Lytle Creek Fault Zone..... 75
Elsinore, Whittier, and Chino Fault Zones..... 75
Crafton Hills fault complex..... 76
Tokay Hill and Peters Faults..... 77
Cucamonga-Sierra Madre Fault Zone..... 77
Faults related to the Cucamonga-Sierra Madre Fault Zone..... 77
Sawpit-Clamshell fault complex..... 78
Cleghorn Fault..... 78
Santa Ana Fault..... 78
Devil Canyon Fault..... 78
Fault zone bounding the north side of the San Bernardino Mountains..... 79
Squaw Peak Fault..... 79
Description of Map Units..... 79
Surficial Deposits..... 79
Peninsular Ranges Assemblage..... 93
Granitic rocks of the Peninsular Ranges Batholith..... 105
Generic Cretaceous granitic rocks of the Peninsular Ranges Batholith..... 116
End granitic rocks of the Peninsular Ranges Batholith..... 118
San Gabriel Mountains Assemblage..... 122
Units between northern and southern Nadeau Faults..... 122
Units between San Andreas Fault and northern Nadeau Faults..... 123
Units south of Punchbowl Fault..... 123
Rocks bounded by the Mill Creek Fault and San Andreas Fault..... 140
San Bernardino Mountains Assemblage..... 142
References..... 168

Trabuco Formation (Ktr) along the west side of the Santa Ana Mountains is soil slip prone as is the Topanga Group units (Tt) in the San Joaquin Hills area. During extremely intense rainfall winters, such as 1969, devastating soil slip-debris flows can occur in basement rock units in the San Gabriel and Santa Ana Mountains (Campbell, 1975). Soil slip susceptibility maps for the area are given by Morton and others (2003). For a period of time, months to a year or more, after an El Niño winter bedrock landslides occur apparently as a result of the wet winter (photo 55).

Fire-Flood sequence

Devastating debris flows occur if summer and fall wildfires are followed by substantial winter rainfall. The sequential events of wildfire followed by heavy rainfall is commonly referred to as a fire-flood sequence. This temporal and spatial relationship appears to have been first published by Coleman (1953), who described the sequence of events that occurred during the 1933-34 rainfall season in the La Crescenta area at the base of the western San Gabriel Mountains.

Wildfires in southern California commonly result in the development of water repellant (hydrophobic) surface soils (DeBano, 1981; DeBano and others, 1998). The development of the water repellant surface soils results in subsequent rain running off slopes rather than seeping in (photo 56). Slopes on which water repellant soils have formed, generate few soil slips (e.g., Morton, 1989). The collective runoff transports large quantities of debris as hyperconcentrated flood flows and/or debris flows down channels and onto alluvial fans (photos 57, 58, 59, 60, 61, and 62). Typically debris flows generated develop by fluidizing material in the channel bottom (photo 54), and not by soil slips on the hillsides. These hyperconcentrated and debris flows in many places have caused loss of lives and have been devastating to man-made structures. A recent example occurred when two large autumn 2003 wildfires in the eastern San Gabriel and western San Bernardino Mountains were followed by a moderate storm, about a ten-year-rainfall-storm, on Christmas day, 2003. Runoff from the storm generated widespread debris flows and hyperconcentrated flows which resulted in extensive damage to structures near the mountain front and the loss of 16 lives.

SUBSIDENCE FISSURES

Within the San Bernardino and Santa Ana quadrangles, subsidence fissures are relatively common in some fault bounded basins, forming in response to withdrawal of groundwater (photos 35, 63, 64, 65, and 36). They are most numerous in the San Jacinto Valley, but are also present in the Chino basin, southwestern San Bernardino basin, and at Dunlap Acres on the south side of the Crafton Hills (Burnham, 1952). A fissure reported by Engel (1959) and purportedly attributed by local residents to the time of the 1918 San Jacinto earthquake appears more likely to be a subsidence related fissure.

Only the fissures in the San Jacinto Valley are showed on the geologic map. Most of these are located within the San Jacinto pull-apart basin, which formed between the Casa Loma and Claremont strands of the San Jacinto Fault Zone. These fissures started to develop locally about 1950 and through time have spread over a considerable area (Morton, 1977). Formation of the fissures appears to be related to subsidence resulting from groundwater withdrawal principally in the area where formerly only artesian water was used (Waring, 1919).

Both tectonic subsidence and groundwater withdrawal subsidence occurs in the pullapart basin, but the current rate of groundwater subsidence far exceeds the rate of tectonic subsidence (Fett and others, 1967; Lofgren, 1976; Lofgren and Meyer, 1975; Morton, 1977; Proctor, 1962). Rate of tectonic subsidence is estimated to be 0.3 to 0.6 cm/yr while the estimate of subsidence due to groundwater withdrawal is 3.5 to 4.0 cm/yr (e.g., Morton, 1977). Some fissures have occurred in the fine-grained alluvium on the northeast side of the Lakeview Mountains, Lakeview 7.5' quadrangle (fig. 1) and along the course of the San Jacinto River west of the pull-apart basin. The westernmost of the fissures, near the site of the former Bernasconi Hot Springs (also called Lakeview Hot Springs) (fig. 1) trenched to a depth of about 20 m revealed a cone-shaped (in cross-section), complex structure similar to liquefaction structures (photo 66; compare with photo 67 and 3).

On the northeast side of the San Jacinto Valley, adjacent to the San Timoteo Badlands, El Casco and Lakeview 7.5' quadrangles, on gently slopeing surfaces subsidence in the valley produces very slow moving, lateral-spread-like landslides. These lateral-spread-like landslides have been observed to move over a period of several years and produced an one meter high scarp (photos 68 and 69). No toe has been

observed in these landslides; the strain appears to be largely intergranular. Extension in the landslide body commonly forms sink-hole-like subsidence fissures and irregular shaped depressions (photos 70 and 71).

Parts of the San Jacinto Valley contain relatively low density sediments that are subject to hydroconsolidation and subsidence. Where hydroconsolidation occurs at a point source in relatively brittle material, circular fissures occur (photo 72). In unconsidated material a gentle cone of subsidence occurs.

GEOLOGIC SUMMARY

Peninsular Ranges assemblage

Rocks of the Peninsular Ranges assemblage range in age from Quaternary to Paleozoic; the assemblage contains no documented Precambrian rocks. Most of the Peninsular Ranges assemblage is represented by the Jurassic and Cretaceous Peninsular Ranges Batholith and the pre-batholithic metasedimentary and metavolcanic rocks into which the batholith was emplaced (e.g., Jahns, 1954a). In the Santa Ana and San Bernardino quadrangles, all granitic rocks of the batholith are Cretaceous; all Jurassic granitic rocks identified as being part of the batholith are found south of the Santa Ana quadrangle. Thick sequences of Late Cretaceous to Tertiary post-batholithic sedimentary and volcanic rocks flank the batholith on its western side.

Physiographically, onshore rocks of the Peninsular Ranges assemblage are divided into three major, fault-bounded blocks which, from west to east are, the Santa Ana Mountains block, the Perris block, and the San Jacinto Mountains block (figs. 1 and 3). The latter block is represented only by limited granitic and metamorphic rocks and the thick section of Miocene through Pleistocene nonmarine sedimentary rocks east of the San Jacinto Fault. Only the southern part of this block, which is located between the San Jacinto and San Andreas Fault Zones, is floored by the Peninsular Ranges assemblage; the northern part, including the Crafton Hills, is floored by the San Gabriel Mountains assemblage (fig. 1).

Cenozoic sedimentary rocks ranging in age from Holocene through Paleocene underlie most of the western part of the Santa Ana block; these rocks extend north of the block to include the low Puente Hills. East of, and underlying these Tertiary and Quaternary rocks in the Santa Ana Mountains, is a thick section of primarily Late Cretaceous marine rocks and Paleogene marine and nonmarine rocks that rest unconformably on Mesozoic basement consisting of metasedimentary and Cretaceous volcanic and batholithic rocks. The basement and Late Cretaceous and Paleogene rocks now constitute part of a highly faulted anticlinal structure. In the southern part of the Santa Ana Mountains the anticline passes into an extensive, nearly horizontal surface that was deeply weathered during the Paleocene and is partly covered by Miocene basalt flows.

East of the Santa Ana Mountains block and west of the San Jacinto Fault Zone, the Perris block (fig. 3), forms a roughly rectangular area of relatively low relief that has remained relatively stable and undeformed during the Neogene. The Perris block is underlain by lithologically diverse prebatholithic metasedimentary rocks intruded by plutons of the Peninsular Ranges batholith. Supra-batholithic volcanic rocks are preserved in the western part of the block. Several erosional and depositional surfaces are developed on the Perris block (e.g., Dudley, 1936; Woodford and others, 1971) and thin to relatively thick sections of nonmarine, mainly Quaternary, sediments discontinuously cover the basement.

In the Elephant Hill area (fig. 1) west of Pomona, deeply weathered tonalite (Keh) is poorly exposed in a few road cuts. It is lithologically similar to Peninsular Ranges batholithic rocks and contrasts with tonalite (Kgp) three kilometers to the north at Ganesha Park, which has affinities (e.g., initial Sr ratio) to San Gabriel Mountains granitic rocks. These two localities provide the limited surface control for placement of the boundary between the Peninsular Ranges and San Gabriel Mountains assemblages west of San Antonio Canyon.

Paleozoic Metamorphic Rocks

Metamorphic rocks that include thick sections of marble (PzPzmp) (photo 73) in the Riverside-Colton area are considered to be of Paleozoic age based on general lithologic affinities with dated Paleozoic rocks further to the south in the Peninsular Ranges. Based on lithology, marble bearing units in the Mount Eden area (fig. 1) and on the east side of the Lakeview Mountains are also interpreted as being Paleozoic (photo 74). Ordovician conodonts have been recovered from somewhat similar carbonate rocks in the Coyote Mountains in western Imperial County (Dockum, 1982; Miller and Dockum, 1983). All of these metamorphic rock sections do not appear to be derived from familiar Paleozoic sections in the Great Basin, partly because they are southwest of the San Andreas Fault. Where marble is sparse or missing in metamorphic sections of the Peninsular Ranges, the protolith could also be Mesozoic. Metamorphism

mountain-side (north) down sense of movement. If this is the case, it is the opposite sense of movement associated with the nearby, semi-parallel Santa Ana Fault.

Fault zone bounding the north side of San Bernardino Mountains

A prominent, discontinuous system of south dipping reverse faults bounds the north side of the San Bernardino Mountains northward and eastward from the vicinity of Deep Creek, Fifteen Mile Valley 7.5' quadrangle. Meisling (1984) and Meisling and Weldon (1989) refer to the faults as a thrust system, but except for the east central part of the zone, well east of the quadrangle, limited dip measurements are mostly greater than 40 degrees. They interpret the zone to shallow considerably in the subsurface.

Eroded fault and fault-line scarps tens of meters high are associated with late movement on parts of the fault zone. North of the Ord Mountains segment of the San Bernardino Mountains, the fault zone passes into a monoclinal flexure for several kilometers and then back into a fault (Meisling, 1984; Meisling and Weldon, 1989). Meisling (1984), Meisling and Weldon (1989), and J.C. Matti (oral commun., 2000)) consider northeast and east striking parts of this fault zone to be dominantly reverse or thrust movement, but some of the northwest striking parts to be strike slip.

Initial development of the fault zone was in early Pleistocene, but maximum movement occurred in middle Pleistocene. Middle Pleistocene fanglomerates flanking the western part of the range contain abundant, large, angular clasts derived from the San Bernardino Mountains, so elevation and drainage pattern off of the range had been established by that time. Meisling and Weldon (1989) consider this north-bounding fault system to be responsible for most of the uplift of the central San Bernardino Mountains, and that the uplift tapered off toward the western and eastern ends of the range.

Squaw Peak Fault

The Squaw Peak Fault, Cajon 7.5' quadrangle, is a deformed fault of unknown extent interpreted by Meisling and Weldon (1989) to be a late Miocene to early Pliocene thrust. It is highly disrupted by younger faults, and changes from north striking in its southern part to west-northwest striking in its northern part. Where exposed, the southern part of the fault dips steeply east, and the northwestern part, shallowly north. In the northern part, the fault places Crowder Formation over Cajon Valley Formation, and in the southern part, granitic rocks of the San Bernardino assemblage over Cajon Valley Formation.

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Qdg **Disturbed ground (late Holocene)**—Bedrock fragmented to sand- and gravel-sized pieces; commonly mixed with Quaternary sedimentary material found at site. Occurs mainly in areas where construction or excavation has obscured, mixed, redistributed, or covered naturally occurring units; thickness generally less than 3 meters. Areas shown as disturbed ground are localities where results of human activity generally preclude accurate identification or classification of natural geologic units

Qaf **Artificial fill (late Holocene)**—Sand, gravel, and bedrock from pits, quarries, and excavations related to construction, mining, or quarrying activities; mapped primarily where materials are placed for construction of highways, canals, railway grades, dams, and water catchment basins. Only large features are mapped; not shown in some places where unit obscures detailed surficial or bedrock relations. Differs from disturbed ground (Qdg) in that generally large amounts of rock and (or) sediment have been imported to site

Qw **Very young wash deposits (late Holocene)**—Unconsolidated sand and gravel deposits in active washes, ephemeral river channels of axial-valley streams, and in channels on active surfaces of alluvial fans; has fresh flood scours and channel-and-bar morphology. Essentially no soil development. Subject to localized reworking and introduction of new sediment mainly during winter months. In places, especially upper reaches of some drainages, contains clasts several meters across that were deposited by flash floods. Grain shape ranges from angular to rounded; larger clasts tend to be more rounded than smaller clasts. All sediment derived from local bedrock or reworked from local, older

Quaternary deposits. In Mojave River bed, almost all sediment is fine- to very coarse-grained sand containing lesser gravel and pebbles; clasts larger than pebbles are sparse. Gravel bars up to 100 m long fairly common. In beds of Arrastre Creek, Mescal Creek, and Big Rock Creek, clasts are mixed sand to boulders and include numerous bars dominated by one or another of larger clast sizes. Unit in Sheep Creek differs from other Qw deposits; it is dominated by debris-flow deposits originating in steep headwater area of drainage in Mesozoic Pelona Schist. Debris flows catastrophically transported during years of heavy snowfall when rapid melt occurs (Morton and Campbell, 1974; Sharp and Nobles, 1953). In Cajon Wash and beds of Lytle Creek and Santa Ana River, clasts are mixed sand to boulders, coarsening toward mountains; in lower reaches of Santa Ana River, unit consists mostly of unconsolidated sand and gravel. North of mountains and west of Mojave River, nearly all Qyw deposits are cut by medial channels of Qw too small to show at map scale. Divisions are distinguished by relative position in local terrace riser succession and by overlapping relations. In northwestern part of quadrangle, within 2 km of San Andreas Fault Zone, includes most of stream channel deposits unit of Barrows and others (1985) and Barrows (1987). Locally subdivided to include:

Qw_3 **Very young wash deposits, Unit 3**—Unconsolidated sand, gravel, and pebble deposits that form very slightly elevated terraces. Unit common in vicinity of city of Riverside. Also mapped within, or along margins of, active Mojave River channel. Grain size distribution and degree of rounding generally same as Qw deposits at similar distances from mountain front. Has slightly less prominent vegetative cover than most Qw deposits. Probably intermittently active during high water in years of peak rainfall. Range of clast size, shape, and distribution similar to that of Qw deposits

Qw_2 **Very young wash deposits, Unit 2**—Unconsolidated, mixed sand, gravel, pebble, cobble, and boulder deposits that form slightly elevated, low terraces within, or along margins of, active washes. Grain size distribution and degree of rounding generally same as Qw units at similar distances from mountain front. Clast compositions reflect bedrock and older Quaternary sources within individual drainages. Commonly has noticeably denser vegetative cover than Qw_3 deposits, especially larger, older bushes and trees. Appears to be intermittently active based on localized bar-and-swale geomorphology and channel scouring. May or may not undergo redistribution or destruction during high water in years of peak rainfall. Range of clast size, shape, and distribution similar to that of Qw deposits

Qw_1 **Very young wash deposits, Unit 1**—Unconsolidated sand-and-gravel deposits that form consistent, but low, elevated terraces in or marginal to channelized washes of streams and rivers. Grain size distribution and degree of rounding generally same as Qw units at similar distances from mountain front. Largely abandoned by modern stream flows; less likely to become occupied or destroyed by major flood events than Qw_2 deposits. Has noticeably denser vegetative cover than Qw_3 or Qw_2 deposits, may show suggestion of soil development, and has larger, older bushes and trees. Range of clast size, shape, and distribution similar to that of Qw deposits

Qf **Very young alluvial-fan deposits (late Holocene)**—Unconsolidated to slightly coherent, essentially undissected deposits of sand, gravel, and boulders that form active and recently active parts of alluvial fans (photo 587). Clasts typically angular to subrounded, rarely rounded. Deposits generally coarsen toward heads of fans. Relative abundance of clast sizes varies greatly depending on setting, size of drainage area, and sediment source. At most places, unit lacks soil development, but on south side of San Bernardino Mountains, locally is capped by weak A/AC soils. On north side of San Bernardino and San Gabriel Mountains, unit occurs chiefly as small fans emanating from limited-extent, steep canyons, mouths of channels cut in dissected scarps, or mouths of channels

cut in elevated, older Quaternary deposits. Surfaces typically cut by braided streams, but deposition exceeds dissection. Where subdivision of Qf deposits is possible, subunits are distinguished from one another by relative position in local terrace riser succession, by local superposition, or by relative dissection. Includes:

Qf_2 **Very young alluvial-fan deposits, Unit 2**—Unconsolidated to loosely compacted alluvial-fan deposits. Essentially undissected, but surface typically cut by anastomosing network of channels. Size, shape, and distribution of clasts similar to that of unit Qf. Distinguished in most cases as fans built out on Qf_1 sediments, and to some degree as fans relatively less dissected than, or emanating from channels cut into, Qf_1 sediments. Appearance from place to place differs greatly; primarily dependent on sediment source, steepness of source area and fan location, and distance from mountain front

Qf_1 **Very young alluvial-fan deposits, Unit 1**—Unconsolidated to loosely compacted alluvial-fan deposits, varying in grain size from sand to boulders. Degree of compaction unreliable for distinguishing Qf_1 from other Qf units or some Qyf units. Has general physical characteristics of Qf and Qf_2 sediments. Mode of occurrence, in addition to range of clast size, clast shape, and clast distribution, similar to that of unit Qf and Qf_2. Distinguished in most cases as fans upon which Qf and Qf_2 fans have built, and to lesser degree as fans that are relatively more dissected than Qf and Qf_2 fans, or as fans that are cut by channels from which Qf and Qf_2 fans emanate. Appearance from place to place differs greatly; primarily dependent on sediment source, steepness of source area and fan location, and distance from mountain front

Qa **Very young axial-channel deposits (late Holocene)**—Unconsolidated deposits of silty, sandy and cobbly alluvium deposited by streams in through-going stream valleys; cemented only where carbonate rocks are in source area. Includes:

Qa_1 **Very young axial-channel deposits, Unit 1**—Largely unconsolidated to barely consolidated alluvial deposits in valley bottoms. Varies in grain size from sand to boulders; finer size-fractions more common. Has general physical characteristics of Qa sediments, but is relatively more dissected than Qa, and is distinguished by relative position in local terrace-riser succession. Appearance from place to place differs greatly; primarily dependent on sediment source and steepness of source area

Qv **Very young alluvial-valley deposits (late Holocene)**—Active and recently active fluvial deposits along valley floors. Consists of unconsolidated sandy, silty, or clay-bearing alluvium; coarser clasts are relatively rare

Qc **Very young colluvial deposits (late Holocene)**—Unconsolidated sediment and loose sediment, rock fragments, and soil material deposited by rain wash or slow continuous downslope creep; found mainly, but not exclusively, at base of slopes or hillsides. In western San Bernardino Mountains, much of sediment is angular, derived from extensive grus developed on Cretaceous and Jurassic granitic units. No soil development

Qt **Very young talus deposits (late Holocene)**—Unconsolidated to slightly consolidated deposits of angular pebble-, cobble-, and boulder-size material that form scree and rubble on hill slopes and at base of slopes. In places, loose and hazardous to walk on. Best developed below steep faces of highly fractured granitic and metamorphic rocks in eastern San Gabriel Mountains. In places, probably includes some colluvium. Numerous small talus cones found on steeper slopes in San Bernardino and eastern San Gabriel Mountains are too small to map

Qsw **Very young slope-wash deposits (late Holocene)**—Unconsolidated sand, cobbles, and pebbles deposited by water not confined to channels. Most deposits are angular, multi-mineralogic sand derived from in-place weathering of granitic rocks, but many include larger clasts transported by torrential storms or clasts spalled from up-slope outcrops of bedrock

Qls **Very young landslide deposits (late Holocene)**—Slope-failure deposits consisting of chaotically mixed soil and rubble and (or) displaced bedrock blocks; most are debris slides and rock slumps or earth slumps. Landslides may or may not be active. Landslide morphology well preserved. In San Bernardino Mountains in Holcomb Creek drainage northeast of Lake Arrowhead, consists of granitic rubble. On west side of Bear Canyon, near east edge of San Bernardino quadrangle, consists of granitic rubble and probably includes some talus. In eastern San Gabriel Mountains between Deer Canyon and San Sevaine Flats, consists of granitic rubble and possibly includes some talus and slope wash

Qpl **Very young playa deposits (late Holocene)**—Pale-brown to pale-gray, silty, sandy clay, and clayey silt. Relatively coherent where damp or dry. All playa deposits, including Qp_1, restricted to Rabbit Dry Lake (photo 366) and small unnamed dry lake 7 km west of Rabbit Dry Lake. New sediment is distributed and uppermost part of existing sediment redistributed by wind generated wave action during wet periods. Along margins, mixed with and includes some very young eolian deposits (Qe)

Qpl_1 **Very young playa deposits, Unit 1**—Pale-brown to pale-gray silty, sandy clay, and clayey silt. Relatively coherent where completely dry. Slightly elevated and locally shows incipient dissection compared to active playa surface of Rabbit Dry Lake (photo 366). Along margins, mixed with and includes some very young eolian deposits (Qe)

Ql **Very young lacustrine deposits (late Holocene)**—Silt, sand, and gravel associated with sag ponds along San Andreas Fault strands; also underlies floor of closed pull-apart depression in Elsinore Fault Zone that is partly filled by Lake Elsinore (Alberhill and Elsinore 7.5' quadrangles). Sediments are commonly submerged, but are exposed partly or completely during dry periods. Dominately gray, clayey, silty, and fine-grained sandy lacustrine deposits

Qlv **Very young lacustrine and fluvial deposits (late Holocene)—**Dominately gray, clayey, silty, and fine-grained sandy lacustrine deposits interbedded with fluvial deposits. Underlies floor of closed pull-apart depression in San Jacinto Fault Zone that is partly filled by ephemeral Mystic Lake (photo 242) (Lakeview and El Casco 7.5'quadrangles)

Qe **Very young eolian deposits (late Holocene)**—Fine-grained sand and silt. Along north bank of Arrastre Canyon between San Bernardino and Granite mountains, forms thin sand patches in lee of desert vegetation; mapped only where sand patches have coalesced. Unconsolidated, active or recently active sand dune deposits along coast in Newport Beach area. Shows dune morphology in coastal areas, but generally not in desert areas

Qm **Very young marine deposits (late Holocene)**—Unconsolidated, active or recently active sandy beach deposits along coast

Qes **Very young estuarine deposits (late Holocene)—**Unconsolidated, active, sandy, silty, and clayey organic-rich estuarine deposits (Newport Beach 7.5' quadrangle)

Qs **Very young surficial deposits (late Holocene)**—Silt, sand, and pebble- to small-cobble gravel. Mostly unconsolidated, but locally, slightly consolidated. Includes many small scattered deposits consisting of sediment that does not have features allowing confident assignment to any specific surficial materials unit. Some were identified on aerial photographs, and not checked at site. Probably includes wash, alluvial-fan, colluvial, and valley-filling deposits

Qs_1 **Very young surficial deposits, Unit 1**—Sand and pebble to small- cobble gravel not assigned to any specific surficial materials unit. Essentially same characteristics as very young surficial deposits unit (Qs), but distinguished either as terraces cut into Qs sediments, or parts of Qs sediments that show anomalous dissection

Qyw **Young wash deposits (Holocene and late Pleistocene)**—Unconsolidated to slightly consolidated sand and gravel deposits in marginal parts of active and recently active washes and ephemeral river channels of axial-valley streams. Differs

from very young wash deposits by absence or modification of flood scours, modified channel-and-bar morphology, and immature soil horizons. Mapped mainly on north sloping fan surfaces north of Cajon Summit area, where sediment is mixed with eroded and slumped material from steep, high, stream embankments. Clast size reflects distance from mountain front to same degree as Qw deposits. All is sediment derived from local bedrock or reworked from local, older Quaternary deposits. West of Rabbit Dry Lake and west of Silverwood Lake, includes sediment in partially abandoned washes. Subunits are distinguished by relative position in local terrace riser succession. Includes:

Qyw_3 **Young wash deposits, Unit 3 (early Holocene)**—Unconsolidated silt, sand, and coarse-grained sand to cobble alluvium. Forms low, moderately well defined terrace risers along Antelope Valley wash south of Hesperia. Truncated by locally younger Qyw sediments, but shows very little surface modification

Qyw_2 **Young wash deposits, Unit 2 (early Holocene)**—Unconsolidated to slightly consolidated silt, sand, and coarse-grained sand to cobble alluvium. Forms relatively low, but well defined terrace risers along Antelope Valley wash south of Hesperia. Truncated by Qyw_3 sediments, but shows only slight surface modification

Qyw_1 **Young wash deposits, Unit 1 (early Holocene and late Pleistocene)**—Unconsolidated to slightly consolidated silt, sand, and coarse-grained sand to cobble alluvium. Forms well defined terrace risers along west side of Mojave River southeast of Hesperia. Stands above, and is truncated by younger Qyw_2 sediments; shows slight surface modification

Qyf **Young alluvial-fan deposits (Holocene and late Pleistocene)**—Unconsolidated to moderately consolidated silt, sand, pebbly cobbly sand, and bouldery alluvial-fan deposits having slightly to moderately dissected surfaces (photo 417). Young alluvial-fan deposits, including subunits, constitute most widespread, and probably greatest in terms of sediment volume, of all Quaternary units. Forms large and small fans throughout quadrangle. Covers large areas in upper part of Cajon Canyon and on north side of San Gabriel Mountains west of Sheep Creek. Close to mountains, unit typically contains large proportion of cobbles and boulders. Intermediate and distal parts of large fans west of Sheep Creek are mainly pale-brown, mixed silt to medium-grained sand, containing sparse, coarse-grained sand and pebble lenses. Except where coarser-grained lenses are present, stratification is obscure. Clast compositions, especially in upper third of fans, reflect bedrock source areas and clast compositions of nearby older Quaternary units. In San Bernardino Mountain area, fans emanating from areas underlain by deeply weathered Cretaceous granitic rocks are relatively fine grained and contrast with coarser grained fans emananating from areas underlain by Triassic and older rocks. Includes from youngest to oldest:

Qyf_7 **Young alluvial-fan deposits, Unit 7 (late Holocene and latest Pleistocene)**—Unconsolidated alluvial-fan deposits. Consists of gravel, sand, and silt; youngest part of Qyf. In part distinguished on basis of relative terrace levels. Restricted to southwest side of San Timeteo Badlands in northeastern Santa Ana quadrangle

Qyf_6 **Young alluvial-fan deposits, Unit 6 (late Holocene and latest Pleistocene)**—Unconsolidated alluvial-fan deposits consisting of fine- to coarse-gravel, sand, and silt; young part of Qyf. In part distinguished on basis of relative terrace levels. Restricted to Lamb Canyon area in northeastern Santa Ana quadrangle

Qyf_5 **Young alluvial-fan deposits, Unit 5 (late Holocene)**—Unconsolidated to slightly consolidated coarse-grained sand to bouldery alluvial-fan deposits having slightly dissected to essentially undissected surfaces. Stage S_7 soils in Devore area. Notably finer grained in some parts of quadrangle, especially in distal parts of fans. Braided stream pattern on surfaces of fans that is related to deposition is relatively unmodified. On south side of San Gabriel Mountains, includes large, well formed fan emanating from Lytle Creek drainage; largely

boulder alluvium in headward parts of fan, grading southward into dominantly sand and gravel. West of Phelan, includes Sheep Creek fan which has distinct gray-green color, and strongly contrasts with nearly all other alluvial material in quadrangle. Sheep Creek fan is composed essentially of material derived from Pelona Schist, and mainly deposited by debris flows. Parts of unit subsequently redistributed by conventional stream flow, especially in distal areas. Fans of Qyf_5 sequence are younger than Qyf_4 fans based mainly on relative position in terrace riser sequence and on superposition and overlap relations of adjacent fans

Qyf_4 **Young alluvial-fan deposits, Unit 4 (late Holocene)**—Unconsolidated to slightly consolidated silt, sand, and coarse-grained sand to bouldery alluvial-fan deposits having slightly to moderately dissected surfaces. Stage S_7 soils in Devore area. Fans emanating from canyons on south side of San Gabriel Mountains contain large proportion of coarse boulders, especially in upper parts. Fans emanating from canyons on south side of San Bernardino Mountains contain coarse boulders in upper parts, but grade over short distances southward into sand and pebble alluvium. On south side of both ranges, typically braided stream pattern on surfaces of fans related to deposition is only slightly modified. Large area of Qyf_4 between Granite Mountains and Mojave River is slightly consolidated silt and sand, that contains lenses and individual matrix-supported clasts generally less than 2 cm across. Represents large area of coalesced fan material. Surface is smooth and undulating, showing only slight dissection in upper parts. Unit in this part of quadrangle may contain some axial-valley deposits, especially near western end of Granite Mountains. Age relative to Qyf_5 and Qyf_3 based mainly on overlap relations of adjacent fans and degree of dissection compared to fans in general area

Qyf_3 **Young alluvial-fan deposits, Unit 3 (middle Holocene)**—Slightly to moderately consolidated silt, sand, and coarse-grained sand to bouldery alluvial-fan deposits having slightly to moderately dissected surfaces. In Devore area, unit has stage S_6 or incipient stage S_5 soils developed. West of Mojave River, consists of relatively uniform, medium brown silt and sand containing sparse granule and pebble lenses and scattered, matrix-supported, pebble-sized clasts. Fan surfaces are slightly to moderately dissected, and in many places show low amplitude, rolling surfaces having swales and ridges parallel to axes of fans. In this area, may include some Qyf_2 and Qyf_4 deposits. Cut by several large Qyw washes incised to depths as great as 4 m, containing active medial Qw channels too small to map

Qyf_2 **Young alluvial-fan deposits, Unit 2 (early Holocene)**—Slightly consolidated coarse-grained sand to bouldery alluvial-fan deposits having moderately dissected surfaces and, in Devore area, well-developed S_5 soils. Widespread on both north and south sides of San Gabriel and San Bernardino Mountains, mainly forming relatively small fans. On south side of mountains, especially San Gabriel Mountains, fans contain high percentage of boulders. On north side of San Bernardino Mountains, east of Mojave River, fans are made up largely of sand- to pebble-sized clasts in a silty matrix. There, most show very indistinct stratification; surfaces are relatively smooth, but are cut by discreet, wide, deeply incised channels

Qyf_1 **Young alluvial-fan deposits, Unit 1 (early Holocene and late Pleistocene)**—Slightly to moderately consolidated silt, sand, and coarse-grained sand to bouldery alluvial-fan deposits having moderately dissected surfaces. Has well-developed S_5 soils on south side of San Gabriel and San Bernardino mountains. Appears to form major fill that was deposited throughout San Bernardino Valley region during transition between late Pleistocene and Holocene (McFadden and Weldon, 1987; Morton and Matti, 1987). Also, widespread on north side of San Bernardino Mountains, but mainly forming relatively small fans. On south side of mountains, especially San Gabriel Mountains, fans contain much higher

percentage of boulders than on north side of San Bernardino Mountains, east of Mojave River. There fans are made up largely of sand- to pebble-size clasts, and most show very indistinct stratification

Qya **Young axial-channel deposits (Holocene and late Pleistocene)**—Slightly to moderately consolidated silt, sand, and gravel deposits. Units distinguished from each other on basis of soil-profile development, relative position in local terrace-riser succession, and degree of erosional dissection. In central and eastern San Gabriel Mountains, some deposits contain abundant boulders derived from steep valley sides and steep tributary canyons. Unit in that area also may include some very young alluvial-fan deposits (Qf) and young alluvial-fan deposits (Qyf) emanating from tributary canyons and gulches, especially along Prairie Fork of San Gabriel River. Includes:

Qya_6 **Young axial-channel deposits, Unit 6 (Late Holocene)**—Fluvial deposits along canyon floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium. Youngest part of Qya. In part distinguished on basis of relative terrace levels

Qya_5 **Young axial-channel deposits, Unit 5 (late Holocene)**—Young part of late Quaternary valley fill. Consists mainly of thin- to thick-bedded very fine to medium sand that varies from white and light gray (10YR 8/1 and 7/1) to very pale brown (10YR 8/3 and 8/4 to 7/3). Sand is interlayered with subordinate pebbly fine sand and dark-colored organic-rich layers. On south side of Transverse Ranges, unit commonly capped by weak A/C soil (San Emigdio fine sandy loam of Woodruff and Brock, 1980, map sheet 10). South of mountain front, forms large and small benches along Santa Ana River, Yucapia Creek, and Cajon Wash. Although not differentiated, some deposits mapped as Qw and Qyw adjacent to Mojave River may be included in this unit

Qya_4 **Young axial-channel deposits, Unit 4 (late Holocene)**—Forms thin veneers resting on strath terraces incised into unit Qya_3, or forms low terrace risers standing one meter or less above active washes. Consists of pale brown and very pale brown (10YR 6/3 to 8/3) fine to coarse sand and pebbly sand that coarsens upstream to poorly sorted fine to coarse sand and sandy-pebble to small-cobble gravel. On south side of Transverse Ranges, unit capped by weak $A/AC/C_{ox}$ soils (Hanford coarse sandy loam and Tujunga loamy sand of Woodruff and Brock, 1980, map sheet 10). Occupies inactive channels adjacent to Mill Creek and forms benches along Santa Ana River, City Creek, and Yucaipa Creek. Although not mapped, some deposits mapped as Qw and Qyw flanking main channel of Mojave River may be part of this unit

Qya_3 **Young axial-channel deposits, Unit 3 (middle Holocene)**—Forms terrace risers standing 1 to 2 m above active washes. Unit probably is no more than 2 to 5 m thick, and consists of pale brown and very pale brown (10YR 6/3 to 7/3 and 7/4 to 8/4) fine- to coarse-grained sand and pebbly sand that coarsens up-stream to poorly sorted fine- to coarse-grained sand and sandy pebble to small-cobble gravel. On south side of Transverse Ranges, unit capped by weak to moderate $A/AC/C_{ox}$ soils (Tujunga loamy sand and gravelly loamy sand of Woodruff and Brock, 1980; locally includes Soboba gravelly loamy sand). In Yucaipa Valley region, unit represents aggradational event, and formed as fluvial sediment, back-filled valleys buttressing against high-standing older alluvial deposits. Extensively developed adjacent to Santa Ana River channel, and on northeast side of Cajon Wash, flanking Shandin Hills on both sides

Qya_2 **Young axial-channel deposits, Unit 2 (early Holocene)**—Forms terrace risers intermediate to those of Qya_1 and Qya_3. Consists of pale brown and very pale brown, fine- to very coarse-grained sand and pebbly sand that coarsens upstream to poorly sorted sand and sandy pebble to small-cobble gravel. Areally very restricted compared to other Qya units

Qya_1 **Young axial-channel deposits, Unit 1 (early Holocene and late Pleistocene)**—Forms terrace risers standing several meters above active washes. Probably is less than 5 m thick and consists of pale brown and very pale brown (10YR 6/3 to

8/3) fine- to very coarse-grained sand and pebbly sand that coarsens up-stream to poorly sorted sand and sandy pebble- to small-cobble gravel. Unit is capped by moderately developed $A/AC/B_{cambric}/C_{ox}$ soils (grouped variously by Woodruff and Brock, 1980, into Greenfield and Tujunga loamy sand and sandy loam and Oak Glen gravelly sandy loam). In Yucaipa Valley region, unit formed as fluvial sediment, backfilled valleys, buttressing against high-standing older alluvial deposits. In San Bernardino Valley area, unit is part of region-wide fill that was deposited during transition between late Pleistocene and Holocene (McFadden and Weldon, 1987; Morton and Matti, 1987)

Qyv **Young alluvial-valley deposits (Holocene and late Pleistocene)**—Fluvial deposits along valley floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium. Includes:

Qyv_1 **Young alluvial-valley deposits, Unit 1 (early Holocene and late Pleistocene)**—Fluvial deposits along valley floors west of Casa Loma Fault. Consists of unconsolidated sand, silt, and clay-bearing alluvium

Qyc **Young colluvial deposits (Holocene and late Pleistocene)**—Undissected to slightly dissected, unconsolidated to slightly consolidated, relatively stabilized deposits of sediment, rock fragments, and soil material deposited by rain wash or slow continuous downslope creep. In northwestern San Bernardino Mountains, largely derived from redistribution of extensive grus developed on Cretaceous and Jurassic units. Minor soil development

Qyt **Young talus deposits (Holocene and late Pleistocene)**—Slightly to moderately dissected, consolidated to cemented deposits of angular and subangular pebble-, cobble-, and boulder-size material that form scree and rubble on hill slopes and at base of slopes. In most cases, debris is angular and unsorted. In some areas, probably includes localized chutes of Qt and active talus. In San Gabriel Mountains, includes distal parts of some talus cones that gradationally pass into slopewash-like deposits originating from finer grained material preferentially washed from talus

Qysw **Young slope-wash deposits (Holocene and late Pleistocene)**—Unconsolidated to slightly consolidated sand, cobbles, and pebbles deposited by water not confined to channels. Rarely more than a few meters thick, except locally at bases of some broad, extensive slopes. Surfaces show incipient dissection. Probably includes colluvium at places, and colluvial deposits. Especially in northwestern part of quadrangle probably includes slope-wash materal

Qyls **Young landslide deposits (Holocene and late Pleistocene)**—Slope-failure deposits that consist of displaced bedrock blocks and (or) chaotically mixed rubble. Slightly dissected or modified surfaces. Deposits may or may not be active under current range of climatic conditions. Widespread throughout quadrangles, but found as concentrated, multiple slides in steep areas of highly fractured Mesozoic granitic rocks and in areas underlain by Mesozoic Pelona Schist, especially along or near San Andreas Fault Zone. Large area of Qyls west of Bluecut is made up of numerous large and small landslides. Concentration of young landslides at head of Bear Canyon near east edge of San Bernardino quadrangle, contain numerous low-angle, subhorizontal gouge and breccia zones that probably formed at time of landsliding. Very abundant Qyls landslides in Puente Formation in Chino Hills, in Bedford Canyon Formation in Santa Ana Mountains, and in Tertiary and Quaternary units in San Joaquin Hills

Qypl **Young playa deposits (Holocene and late Pleistocene)**—Pale-brown to pale-gray silty, sandy clay, and clayey silt. Relatively coherent where completely dry. Slightly elevated, hummocky, and shows slight dissection by low gradient streams compared to modern playa deposits

Qye **Young eolian deposits (Holocene and late Pleistocene)**—Silt and medium- to fine-grained sand. Relatively large deposits east and west of Mojave River are thin and in places include patches of alluvial-fan deposits not completely covered by eolian material. Subtle, modified dune morphology preserved in parts of large

deposit east of Mojave River. Slightly dissected by thin, discontinuous, poorly developed stream channels oriented mainly parallel to dune crests. Numerous, small, discontinuous eolian deposits too small to show at map scale are scattered east and west of Mojave River. Includes:

$Qyed_1$ **Young eolian deposits (dune sand), Unit 1 (early Holocene and late Pleistocene)**—Slightly consolidated to moderately consolidated, yellowish brown (10YR 5/4) to pale brown (10YR 6/3) and light brownish gray (10YR 6/2), fine- to medium-grained sand, silty sand, and slightly gravelly sand; locally contains layers of sandy pebble gravel and gravelly sand. Found east of Lytle Creek-Cajon Creek Wash on south side of Shandin Hills. Similar to unit $Qoed_3$. Forms large northwest-trending dunes that appear to be broadly linguoid to longitudinal

$Qyes_1$ **Young eolian deposits (sheet sand), Unit 1 (early Holocene and late Pleistocene)**—Slightly consolidated to moderately consolidated, yellowish brown (10YR 5/4) to pale brown (10YR 6/3) and light brownish gray (10YR 6/2), fine- to medium-grained sand, slightly gravelly sand, sandy pebble gravel, and gravelly sand. Gravelly beds represent fluvial deposits interstratified with finer-grained eolian deposits that mainly are sand. Restricted to area east of Lytle-Creek-Cajon Creek Wash, west and southwest of Shandin Hills. On east side of wash forms low rolling surfaces adjacent to unit $Qyed_1$, and is lithologically similar to that unit

Qys **Young surficial deposits (Holocene and late Pleistocene)**—Sand to boulder deposits not assigned to any specific surficial materials unit of this age. Includes wash, alluvial-fan, colluvial, and valley-filling deposits. Slightly dissected, slightly consolidated. Most small deposits in northern San Bernardino Mountains are in inactive parts of stream channels, and are mixtures of grus, valley-filling sediment, and slumped or sheetwashed sediment from sides of stream valleys. Almost all deposits assigned to this unit were identified from aerial photographs, and not observed directly

Qypt **Young peat deposits (Holocene)—**Deposits of low density peat and peaty sediments (Newport Beach 7.5' quadrangle)

Qow **Old wash deposits (late to middle Pleistocene)**—Slightly to moderately indurated, gravel and sand alluvial wash deposits. Slightly dissected; typically elevated above modern washes

Qof **Old alluvial-fan deposits (late to middle Pleistocene)**—Moderately- to well-consolidated silt, sand, and gravel. Subunits are distinguished on basis of soil-profile development, degree of dissection, and relative position in local terrace-riser succession. On south side of San Bernardino Mountains, reddish-brown alluvial-fan deposits of primarily sand- to boulder-sized clasts are moderately consolidated and slightly to moderately dissected. They have moderate to well developed pedogenic soils ($A/AB/B/C_{ox}$ profiles with B_t horizons). On north side of San Bernardino Mountains, Qof deposits near east edge of quadrangle are mainly coarse debris flows consisting of angular boulders in matrix ranging from small boulders to silt. They are essentially unstratified, and have moderately well developed soil horizons and well dissected surfaces. Old fan deposits southeast of Hesperia, east of Mojave River, are stream-deposited, consisting of poorly to moderately well stratified pebble- to boulder-bearing sand, containing pebble to boulder lenses. Fan surfaces are cut by well defined channels separated by relatively smooth surfaces having moderately well developed soil horizons. West of Sheep Creek, on north side of San Gabriel Mountains, Qof fans consist of massive to poorly bedded, sand to boulder alluvium. Many show 2-m-thick soil profiles having well developed B_1 horizons ranging from dark brown to orangish-brown. Moderately well consolidated; highly dissected (Kenney, 1999). In Santa Ana quadrangle, extensive Qof deposits surround Lakeview Mountains, flank both sides of

Santiago Creek east of Orange, and occur at places in and along Elsinore trough. Includes:

Qofv **Old alluvial-fan deposits and young alluvial-valley deposits (Holocene and late to middle Pleistocene)**—Reddish-brown, gravel and sand alluvial-fan deposits; moderately indurated. Includes discontinuous younger alluvial-valley deposits locally

Qof_3 **Old alluvial-fan deposits, Unit 3 (late to middle Pleistocene)**—On south side of San Bernardino Mountains, moderately dissected interstratified sand and gravel capped by soils having B_t horizons a few tens of centimeters thick (Greenfield soils of Woodruff and Brock, 1980). Unit occurs in alluvial fans that flank Yucaipa Ridge and San Bernardino Mountains west of mouth of Mill Creek Canyon. Southeast of Hesperia and east of Arrastre Canyon, unit is reddish-brown in upper meter, grading downward to mediun brown; primarily sand- to boulder-sized clasts; moderately consolidated and variably dissected. Cut by deep canyons, but relatively smooth, undulating, elevated surfaces; commonly ponded against $Qvof_1$. Distinguished primarily by relative overlap relations at fan margins and relative dissection. East and west of Sheep Creek, fans are similar to those southeast of Hesperia, but surfaces are modified by numerous low-relief arroyos. In Santa Ana quadrangle, extensive Qof_3 deposits south and southwest of Riverside

Qof_2 **Old alluvial-fan deposits, Unit 2 (late to middle Pleistocene)**—On south side of San Bernardino Mountains, moderately dissected interstratified sand and gravel capped by soils having B_t horizons as much as 50 cm thick (Ramona soils of Woodruff and Brock, 1980). Unit occurs in alluvial fans that flank Crafton Hills, Yucaipa Ridge, and San Bernardino Mountains, and locally within the ranges (photo 362). On north side of San Bernardino Mountains, south of Rabbit Lake, unit is largely massive debris flows having irregular, varibly disseced, bouldery surfaces. Proximal parts of fans are reddish-brown in upper meter, and have much higher sand and gravel fraction near surface; moderately consolidated; surface littered with abundant, very large, angular boulders. Unit commonly flanks and laps onto $Qvof_2$. Distinguished mainly by relative degree of dissection and by overlap relations at fan margins

Qof_1 **Old alluvial-fan deposits, Unit 1 (middle Pleistocene)**—On south side of San Bernardino Mountains, moderately dissected interstratified sand and gravel capped by soils having B_t horizons as much as 50 to 150 cm thick (photo 567) (Ramona soils of Woodruff and Brock, 1980). On north side of San Bernardino Mountains, reddish-brown alluvial fan deposits of primarily sand- to boulder-sized clasts that are moderately consolidated and slightly to moderately dissected. Distinguished as terraces cut into locally older Qof sediments. On north side of San Bernardino Mountains, chiefly restricted to small area northeast of Silverwood Lake. There, distinguished from other Quaternary units using aerial photographs; deposits are distinctly elevated and more dissected than Qyf units, but less dissected than locally older Qof units

Qoa **Old axial-channel deposits (late to middle Pleistocene)**—On south side of San Bernardino Mountains, consists of moderately to well consolidated silt, sand, and gravel having moderate to well developed pedogenic soils ($A/AB/B/C_{ox}$ profiles with B_t horizons). Subunits are distinguished on basis of soil-profile development and relative position in local terrace-riser succession. Consists of two main deposits (Qoa_1 and Qoa_2) that filled valley areas as result of deposition by Oak Glen and Yucaipa Creeks and their tributaries, and third (Qoa_3) that forms thin veneer on strath terrace cut into Qoa_2. Qoa units rest unconformably on underlying San Timoteo Formation. Mapped as undifferentiated Qoa only west of Santa Ana River, near Crestmore. Includes:

Qoa_7 **Old axial-channel deposits, Unit 7 (late Pleistocene)**—Moderately indurated, slightly dissected gravel, sand, silt, and clay-bearing alluvium. Youngest

subdivision of Qoa. Correlates with Qoa_7 unit in Oceanside 30' x 60' quadrangle south of Santa Ana quadrangle

Qoa_3 **Old axial-channel deposits, Unit 3 (late to middle Pleistocene)**—On south side of San Bernardino Mountains, alluvial-valley deposit that forms thin veneer of sand and pebbly sand on strath terrace incised into unit Qoa_2. Capped by soils having thin to moderate B_t horizons (Greenfield soils of Woodruff and Brock, 1980). Unit very restricted, mapped only in southeastern part of quadrangle

Qoa_2 **Old axial-channel deposits, Unit 2 (late to middle Pleistocene)**—On south side of San Bernardino Mountains, moderately dissected interstratified sand and gravel capped by soils having B_t horizons as much as 50 cm thick (Ramona soils of Woodruff and Brock, 1980). Unit mapped only in southeastern part of quadrangle. In valley of Oak Glen Creek, north of Yucaipa, unit Qoa_2 forms widespread fill more than 10 m thick that rests unconformably on unit Qoa_1. On bench beneath City of Yucaipa, unit Qoa_2 is more restricted in distribution and forms thin veneer deposited on strath incised into Qoa_1

Qoa_1 **Old axial-channel deposits, Unit 1 (late to middle Pleistocene)**—On south side of San Bernardino Mountains, moderately dissected interstratified sand and gravel capped by soils having B_t horizons as much as 150 cm thick (Ramona soils of Woodruff and Brock, 1980). Unit occurs in and south of valley of Oak Glen Creek, north of Yucaipa, in southeastern part of quadrangle. There, consists of poorly sorted sand and pebble-cobble-boulder gravel preserved beneath overlying unit Qoa_2. In Yucaipa Valley, Qoa_1 forms widespread body deposited by stream flows of Yucaipa and Oak Glen Creeks that converged southwest and flowed down ancestral Live Oak Canyon

Qov **Old alluvial-valley deposits (late to middle Pleistocene)**—Moderately indurated, commonly slightly dissected sand, silt, and clay-bearing alluvium. Some deposits include thin alluvial deposits of Holocene age

Qoc **Old colluvial deposits (late to middle Pleistocene)**—Slightly to well dissected, unconsolidated to slightly consolidated, stabilized deposits of sediment, rock fragments, and soil material deposited by rain wash or slow continuous downslope creep. Forms small, discontinuous deposits at various places in quadrangle, but most abundantly in northwesternmost and northeasternmost parts

Qols **Old landslide deposits (late to middle Pleistocene)**—Slope-failure deposits that consist of chaotically mixed rubble and (or) displaced bedrock blocks (terminology follows Varnes, 1978). Moderately dissected, and probably inactive under current climatic and tectonic conditions. Large area of multiple slides mapped in Yucaipa Ridge area in southeastern part of quadrangle; there slides developed almost entirely in Mill Creek Formation of Gibson (1971). Large area of multiple slides also mapped on east side of San Antonio Ridge in upper part of San Gabriel River drainage; there slides mainly developed in Pelona Schist

Qop **Old paralic deposits, undivided (late to middle Pleistocene)**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on now emergent wave cut abrasion platforms preserved by regional uplift (photos 418 and 419). Where more than one number shown (e.g. Qop_{2-4}) those deposits are undivided. Qop_5 is found in the Oceanside 1:100,000-scale quadrangle to the south, but is not known to occur in Santa Ana quadrangle. Includes:

Qop_7 **Old paralic deposits, Unit 7**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 9-11 m Bird Rock terrace. Age about 80,000 years. In database, unit is queried because correlation with well dated Qop_7 in Oceanside 1:100,000-scale quadrangle to the south is uncertain

Qop_6 **Old paralic deposits, Unit 6**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 22-23 m Nestor terrace. Age about 120,000 years.

Qop_4 **Old paralic deposits, Unit 4**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 34-37 m Stuart Mesa terrace. Age about 200,000-300,000 years

Qop_3 **Old paralic deposits, Unit 3**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 45-46 m Guy Fleming terrace. Age about 320,000-340,000 years

Qop_2 **Old paralic deposits, Unit 2**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 55m Parry Grove terrace. Age about 413,000 years

Qop_1 **Old paralic deposits, Unit 1**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 61-63 m Golf Course terrace. Age about 450,000 years

Qop_{2-6} **Old paralic deposits, Units 2-6, undivided**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 22-55m terraces

Qop_{3-6} **Old paralic deposits, Units 3-6, undivided**—Paralic deposits consisting of poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of silt, sand and cobbles. These deposits rest on the 22-46 m terraces

Qopf **Old paralic deposits overlain by alluvial-fan deposits (late to middle Pleistocene)—**Areas where old paralic deposits are capped by extensive but thin, discontinuous, younger, locally derived, sandy alluvial fan deposits

Qolb **Old lacustrine deposits (bar) (late to middle Pleistocene)**—Pale-brown to pale-gray silty, sandy clay, and clayey silt. Has higher sand and silt component than younger lacustrine deposits. Relatively coherent when completely dry. Slightly elevated and incipiently dissected. Along margins, mixed with and includes some eolian deposits (Qoe). Mapped only around Rabbit Lake (dry) in northeastern part of quadrangle

Qoe **Old eolian deposits (late to middle Pleistocene)**—Stablized silt and medium- to fine-grained sand. Unconsolidated to slightly consolidated. Mapped only around Rabbit Lake (dry) in northeastern part of quadrangle

$Qoed_3$ **Old eolian deposits (dune sand), Unit 3 (late to middle Pleistocene)**—Slightly consolidated to moderately consolidated, yellowish brown (10YR 5/4) to light yellowish brown (10YR 6/4) and very pale brown (10YR 7/4), fine- to medium-grained sand and lesser amounts of silty sand and slightly gravelly sand that is well sorted to poorly sorted. Occurs on Rialto-Colton terrace west of Lytle-Creek-Cajon Creek Wash and north of Santa Ana River. Depositional structures are texturally massive to finely laminated. Forms large north-trending longitudinal dunes. Unit may be as much as 80 ft thick where dune forms are tallest (Clarke, 1977)

$Qoes_3$ **Old eolian deposits (sheet sand), Unit 3 (late to middle Pleistocene)**—Slightly consolidated to moderately consolidated, yellowish brown (10YR 5/4) to light yellowish brown (10YR 6/4) and very pale brown (10YR 7/4), fine to medium sand and lesser amounts of silty sand and slightly gravelly sand that is well sorted to poorly sorted; locally contains layers of sandy pebble gravel and gravelly sand. Occurs on Rialto-Colton terrace west of Lytle-Creek-Cajon Creek Wash and north of Santa Ana River. Similar to unit $Qoed_3$, except lacks

surface dune forms. Depositional structures are texturally massive to finely laminated. Forms sheets and low rolling upper surfaces adjacent to dunes of unit $Qoed_3$

Qos **Old surficial deposits (late to middle Pleistocene)**—Reddish-brown alluvial deposits not assigned to any specific surficial materials unit of this age. Chiefly sand- to boulder-sized clasts that are moderately consolidated and slightly to moderately dissected. Includes alluvial-fan, colluvial, and valley-filling deposits. Forms small, discontinuous deposits at various places in quadrangle, but most abundantly in Lake Arrowhead area, along eastern edge of quadrangle, and in San Gabriel Canyon area

Qvof **Very old alluvial-fan deposits (middle to early Pleistocene)**—Moderately to well consolidated silt, sand, gravel, and conglomerate. Subdivided units are distinguished on basis of soil-profile development, relative position in local terrace-riser succession, and overlapping relationships. In much of Peninsular Ranges area, unit is moderately well consolidated orangish brown sand and silt that is typically well dissected (photo 21). Very extensively developed on north side of San Bernardino and San Gabriel mountains, especially in area between Mojave River and Sheep Creek alluvial fan. Includes upper part of unit Meisling and Weldon (1989) term Victorville fan deposits (photos 354 and 295). Typically consists of medium to dark, reddish-brown lithic arkose. Moderately to well consolidated; in places, supports natural and artifical vertical faces 10 m high. Grain size variable over wide range, but mostly medium to very coarse sand; ranges from sparsely to highly conglomeratic. Bedding features obscure in much of unit, most commonly defined by lensoidal pods of conglomerate or conglomeratic, lithic arkose. Contains abundant, conspicuous clasts of Pelona Schist in most of unit. In places subdivided into:

$Qvof_3$ **Very old alluvial-fan deposits, Unit 3 (middle to early Pleistocene)**—In Yucaipa area and northwestward along and near San Andreas Fault, limited to localized deposits of brown silty sand a few meters thick that overlies unit $Qvof_2$. Consists of well consolidated, crudely stratified, light yellowish-brown (10YR 6/4 to 5/4), texturally massive to faintly laminated, poorly sorted, fine- to very coarse-grained sand. Capped by A/AB/B soils having Bt horizons as much as 1 to 2 m thick (Ramona soils as mapped by Woodruff and Brock, 1980). Extensively developed in Grand Terrace area north of Riverside. There, unit consists of thick, yellowish-brown, massive to moderately well bedded, sparsely conglomeratic arkose. Moderately well consolidated. Matrix supported, sparsely distributed pebble beds are common locally. On north side of San Bernardino Mountains, near east edge of quadrangle, unit consists of massive debris flow deposits containing unsorted, unbedded, angular and subrounded boulders up to 1 m across. Upper meter of deposits is orangish-brown, grading downward to light and medium brown. Upper surfaces are littered with angular and subrounded boulders

$Qvof_2$ **Very old alluvial-fan deposits, Unit 2 (early Pleistocene)**—In Yucaipa area and northwestward along and near San Andreas Fault, unit forms sequence of sand and subordinate gravel as much as 30 m thick. Well dissected, well consolidated, but friable, well stratified, medium- to very coarse-grained sand containing abundant pale pink, potassium feldspar angular granules and pebbles; locally capped by veneer of unit $Qvof_3$ or by A/AB/B soil. On north side of San Bernardino Mountains, near east edge of quadrangle, unit consists of massive debris flow deposits consisting of angular and subrounded boulders and lesser sand and gravel. Upper part is pale orangish-brown, grading downward to light and medium brown. Probably more than 10 m thick. Deeply incised compared to Qof fans. Flanked and overlapped by Qof_2 and $Qvof_3$ debris flows, and cut by thrust faults partly responsible for uplift of range

$Qvof_1$ **Very old alluvial-fan deposits, Unit 1 (early Pleistocene)**—In Yucaipa area and northwestward along and near San Andreas Fault, unit is reddish-brown,



An Early Complex in San Diego County, California

D. L. True

American Antiquity, Vol. 23, No. 3. (Jan., 1958), pp. 255-263.

Stable URL:
http://links.jstor.org/sici?sici=0002-7316%28195801%2923%3A3%3C255%3AAECISD%3E2.0.CO%3B2-7

American Antiquity is currently published by Society for American Archaeology.

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at http://www.jstor.org/about/terms.html. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at http://www.jstor.org/journals/sam.html.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

The JSTOR Archive is a trusted digital repository providing for long-term preservation and access to leading academic journals and scholarly literature from around the world. The Archive is supported by libraries, scholarly societies, publishers, and foundations. It is an initiative of JSTOR, a not-for-profit organization with a mission to help the scholarly community take advantage of advances in technology. For more information regarding JSTOR, please contact support@jstor.org.

http://www.jstor.org
Tue Nov 27 01:07:42 2007

AN EARLY COMPLEX IN SAN DIEGO COUNTY, CALIFORNIA

D. L. TRUE

THE ARCHAEOLOGY of the San Luis Rey Basin is characterized by a series of sites which for the most part conform to the San Luis Rey complexes described by Meighan (1954). San Luis Rey I is characterized by dark, sooty midden deposits containing small pressure flaked projectile points, manos, portable metates, spire-lopped and disc beads of *Olivella,* drilled stone ornaments, and portable and bedrock mortars with unshaped cobble pestles. San Luis Rey II contains all of the above elements plus pottery, pictographs, and historical artifacts on the terminal sites. The physical locations for San Luis Rey sites seldom deviate from streamside locations in close proximity to boulder outcroppings suitable for bedrock mortars and shelter. In addition to the San Luis Rey sites there exists, scattered throughout the northeastern part of San Diego County, a series of sites which apparently do not belong with the San Luis Rey complexes. The probable existence of a "pre-Luiseño" complex in this area was suggested by Eberhart (1952) and Meighan (1954: 222). That certain sites did not conform to the known local pattern was apparent as early as 1946 when present survey efforts were initiated.* These sites, which because of their distinctiveness must be older than either San Luis Rey I or II, form the basis of this report. The sample of both sites and artifacts is small; the pattern however, appears to be consistent and definitive. A total of 25 sites has been discovered. These are characterized by crude chipped stone implements and grinding tools which reveal similarities to the San Dieguito complex (M. J. Rogers 1929), as well as to Topanga, Oak Grove, and other early remains from areas to the north. In addition to their general typological crudity, the artifacts and some of the sites are associated with geological features indicative of some antiquity.

To simplify future reference to this complex it is suggested that it be termed "Pauma complex" after the valley in which the type site is located.

Geological and Geographic Background. Located about 30 miles northeast of the modern town of Oceanside, this area falls within the California Peninsular Range province. Semiarid in climate, the region is subject to infrequent, but sometimes heavy, flooding and erosion. The nature of the terrain and climatic conditions in force since Pleistocene times have combined to produce alluviation on a considerable scale. This erosion and mass wasting process appear to have substantially altered many physical features of the area. However, remnants are present of rather stable geological features, originating in Pleistocene or early Recent times, that have seemingly retained much of their original structure and appearance. Because many of the sites of this series are found on these or similar features, some explanation of the Quaternary geology of the area seems necessary.

Pleistocene and Recent geological activity in the area has been confined primarily to landslide activities, faulting, alluvial depositions, and related erosive functions of the San Luis Rey River and its tributaries.

In the Pauma Valley proper at an elevation between 700 and 800 feet is a bluff or terrace composed of alluvium and river debris, some of which appears to be material similar to the Agua Tibia mudflow deposits partially overlain by mantles of more recent soils. At an elevation of approximately 1200 to 1600 feet above sea level a series of benches comprise well-defined features along the northern perimeter of the valley. Here mudflow remnants appear to be intermixed with landslide materials and other transported deposits. The benches seem to be very complex in their structures and origins, and for the most part appear to be the result of direct and indirect influences of the Elsinore fault zone which bisects the area. While some of the benches are no doubt the result of direct faulting, the majority are more than likely landslide materials or large chaotic accumulations of broken rock derived from the fault zone by gravity movements (Richard Jahns, personal communication, 1954). At

* Appreciation is expressed to C. W. Meighan, University of California at Los Angeles. His generous contributions in time and many helpful suggestions have made this report possible. Richard Jahns, Department of Geological Sciences, California Institute of Technology, contributed background as well as detailed geological data on this area.

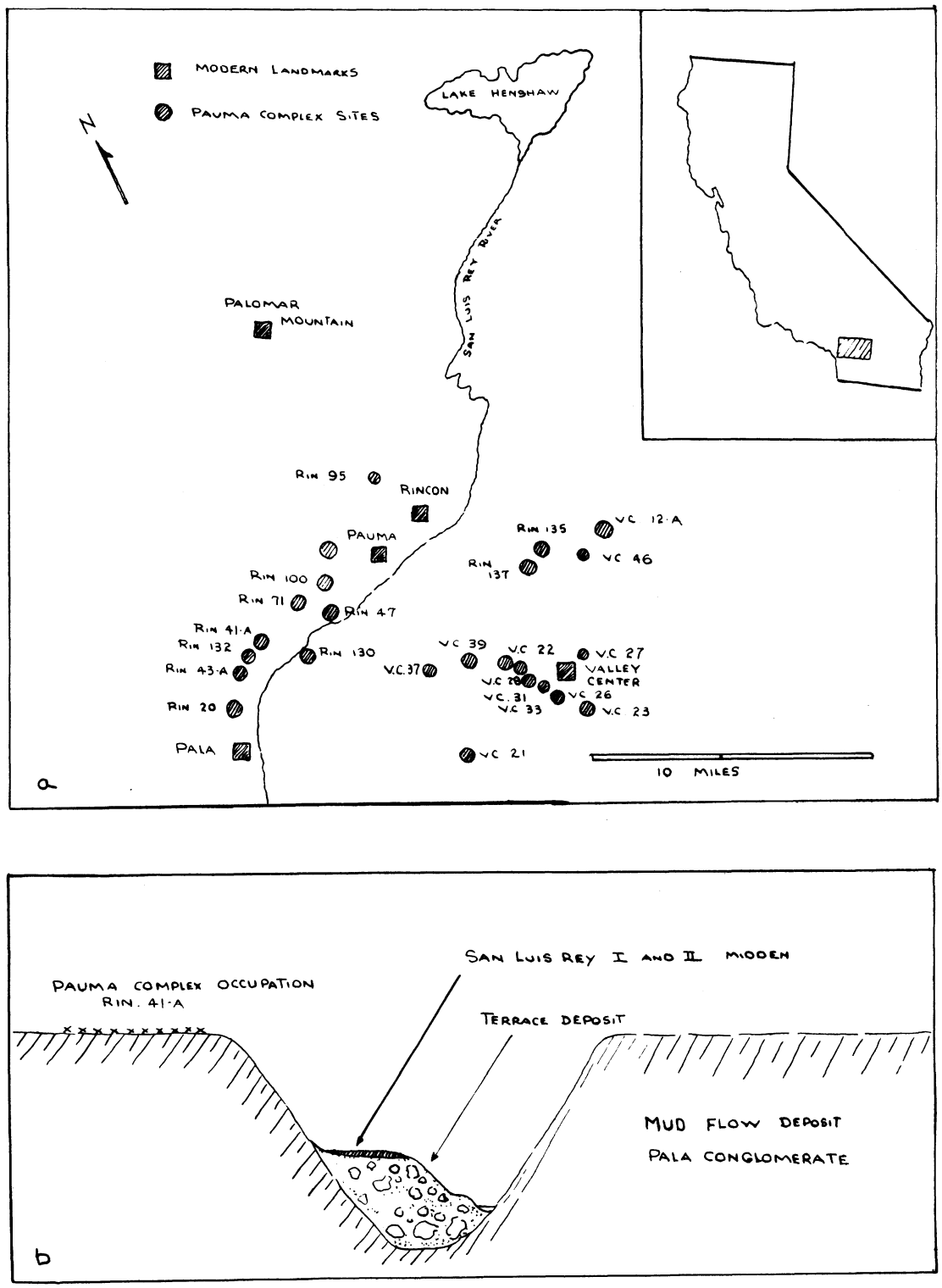


FIG. 1. *a*, map of Pauma area, showing location of sites of Pauma complex; *b* diagrammatic cross section to show relationship of Pauma complex sites to San Luis Rey I and II sites.

present no data are available to date the formation of these features although similarities in structure and soil development might indicate some relationships in time with the tentatively dated Agua Tibia mudflow deposits.

A large mudflow deposit forms a complex structure east of Pala at Agua Tibia. The mudflow features in the Pala area can be briefly described as alluvial deposits of varying age composed mainly of poorly consolidated arkoses and pebble to boulder conglomerates (Jahns and Wright 1951: 12-13). Termed Pala Conglomerate by Ellis (Ellis and Lee 1919: 70), this deposit was almost certainly formed during a pluvial period at or near the close of the Pleistocene. The exact date of development is not known; however, it can be tentatively dated as late Pleistocene on the basis of well-preserved horse, elephant, and mastodon remains found in the deposit (Jahns, personal communication, 1952). The fan itself is dissected by several stream channels originating in the higher elevations of the Agua Tibia mountains. Two of the channels, Agua Tibia Creek and Marion Creek, are quite well developed and are in places many tens of feet deep. The major incisions of the Agua Tibia mudflow by the Agua Tibia and Marion creeks were almost assuredly made during the period of long drought in Altithermal times. Within the channels proper, terrace deposits are apparent that seem to postdate the primary incision of the fan and apparently are composed of materials that differ somewhat in composition from the original mudflow deposits. The composition of the terraces and topography of the area suggest the possibility that the terraces were formed during a period of increased precipitation postdating the Altithermal. The possibility that this development occurred during the "Little Pluvial," about 2000 to 3000 years ago, has been suggested. However, the differences in rainfall that might result in an increased rate of deposition over degradation may have been slight and there is at present no way of determining the exact time of such a deposition.

Thus the terraces may have been formed during a transition immediately following the long drought or during one of several possible periods of increased rainfall since the termination of the Altithermal. In considering this sequence, however, it should be noted that the effect of the Elsinore fault zone, which bisects the upper Agua Tibia and Marion creeks, upon the topography, channel, and terrace development within those creeks in Postpleistocene times, is not immediately apparent, other than as a source of more than normal amounts of detritus and alluvial materials. However, in the Temecula area, vertical displacements along this fault are believed to have been in excess of 2400 feet. Such displacements locally, if postdating the original mudflow development could substantially alter any suggested reconstruction. Present indications suggest that the terraces are at least 1500 years of age. Portions of the terraces are overlain by midden deposits of the San Luis Rey complexes, with some areas showing deposit depths in excess of 36 inches. To date no evidence of Pauma complex occupation has been found on the terraces within the channels, while artifacts taken from the upper levels of the fans and the arroyo tops are confined almost exclusively to those types attributed to the Pauma series (see Fig. 1 *b*). The increased proximity to water and shelter from the elements makes obvious the desirability of the terraces as occupation areas. This seems to be at least suggestive then, that occupation of the upper levels conceivably took place at a time when the lower terraces were untenable or even nonexistent. The nature of the sites and some variation within the artifact sample suggests that occupation was spread intermittently over many hundreds of years. Under the circumstances, a Prealtithermal date for the oldest occupation does not seem unreasonable.

At present, a rather abrupt break and considerable separation in time between the Pauma complex and San Luis Rey I is indicated by obvious dissimilarities in artifact types and site locations. Intensive survey efforts over a period of many years have so far failed to produce or isolate evidence of a so-called intermediate complex. This hiatus suggests either an abrupt dislocation of the Pauma complex and subsequent replacement by the San Luis Rey complexes or the gradual dwindling of the Pauma occupation during some period of difficult times, followed by a period of little or no occupation of the area. This might suggest that the Pauma occupation was most active just prior to or during the initial stages of the period of long drought, with only sporadic or extremely limited activities extending, perhaps, well into the dry period. Survivors of this Alti-

thermal occupation, locally, would probably be few in number. Thus even with the onset of the more favorable Medithermal period a population increase would probably be slow and closely tied to the recovery of the permanent vegetation. Such reduced or nonexistent activity could easily be responsible for the apparent dearth of occupation through a portion of both the Altithermal and Medithermal periods. There is no apparent evidence of occupation following the Pauma complex until population influxes or influences from other areas probably introduced the artifact assemblages typical of early San Luis Rey I.

Lithic Resources. Local resources were used in most ground stone artifacts, while chipped materials were nearly all imported. Granites and several metamorphics are readily available as float, as well as from outcrop sources. Pegmatite dikes provide plentiful quantities of quartz, although quartz is not especially common in the artifact sample. Basalt is not found locally, but is common in the Murietta area some 20 miles north and east of Pala. Felsite is reportedly found in the gorge of the San Dieguito River southwest of Escondido (M. J. Rogers 1929: 461). Old alluvial beds found in the coastal strip and generally throughout the southwestern part of the county contain cobbles of basalt, basalt porphyry, and other fine-grained volcanics (Poway Conglomerate). Travel to the coast or trade with the inhabitants of the area could make this material available locally. It appears that at least some of the artifacts found here are of this origin. Artifacts of chert, jasper, and chalcedony occur but are not common; the material is not indigenous to this area and its origin is unknown. It is assumed however, that this material was imported from the desert areas to the east. Obsidian is found at the southern tip of the Salton Sea, but seems to be rare on sites in this complex with only one small fragment recovered to date.

Rincon 47. Of the sites presently assigned to this complex, Rincon 47 is the richest in terms of artifact yield. The site is located on what appears to be a fairly old river terrace or mudflow remnant overlooking the present San Luis Rey River channel. Present stream locations are close to ½ mile from the site. Unfortunately, the area has been farmed for at least 40 years and has undergone several land clearing and rock removal operations. The owner states that in the early days he consistently plowed up metates and manos, using a horse-drawn moldboard plow. Present farming methods using a disc harrow have cut down the frequently of the finds. As recently as 1946 however, the appearance of manos was common following cultivation and rain. For the past 4 years most of the site has been planted to permanent pasture and has not been worked. The site area is scattered over at least 10 acres. The elevation is close to 800 feet above sea level at the top of the bluff, and about 30 feet above the present river bed. Careful examination shows no sign of soil alteration. Hearths, house pits, bone, and shell remains are not found.

Metates from this site are primarily deep basin forms with only one slab or shallow basin known. All show evidence of pecking on basin wear surfaces. Granite is favored material and most specimens are either fragmentary or show cracks and fissures in several stages of development. Wear surfaces or shoulders as described by Mohr (1954: 394) and Treganza and Malamud (1950: 141) are noted on 3 specimens, but these are not pronounced. The deeper basins have unbroken wear surfaces on all sides. The basins are quite symmetrical in outline, elevation, and section. Off-center basins described by Treganza and Malamud (1950: 141) are not apparent in this sample. Average size of the grinding surfaces is 22 by 29 cm. with depressions ranging from 0.6 to 8.0 cm. deep. Slabs are usually rough ovals although in many cases original shapes are unknown. A total of 16 whole and fragmentary metates have been recovered from this site; one shallow basin or slab type, 2 medium basin, and 4 deep basin types, with 9 fragments, all of which appear to have been deep basin types. One specimen is double sided with grinding depressions on both slab surfaces. One medium basin and 2 deep basin types show evidence of wear shoulders and 2 appear to have been killed, with plugs broken from the centers of the grinding surface.

A total of 39 manos has been found. In addition many more are known to have been removed by private collectors in the past. Manos range from slightly used monofacial cobbles to well worn bifacial types; pecking is common on nearly all wear surfaces. Sizes range from 9.7 by 7.1 by 5.8 cm. to 16.2 by 8.0 by 5.9 cm., and the average size is 11.6 by 8.6 by 5.5 cm. Granites predominate in the sample, although occasional schist and gneiss specimens are found. Of the 39 manos, 11 are monofacial unshaped cobbles, 5 are shaped monofacial cobbles, 4 are unshaped bifacial types, and 11 are shaped bifacial types. One monofacial type has grinding on one edge and 5 bifacial types have indications of edge grinding. Two out of the total are pitted on one wear surface, and 8 show evidence of end battering indicating usage as hammerstones as well as manos.

A total of 17 unshaped cobbles has been found, with battered ends or edges. Of these 5 appear to have slight wear surfaces on one side. Of the five, 3 have pitting on the wear surface.

Two small cobbles with slight wear surfaces are assumed to be rubbing stones of some sort.

Four semiround stones or "balls" have been found. Apparently shaped by pecking, all are slightly flattened on at least one side. On 3 specimens slight wear surfaces are noted. Sizes range from 8.4 by 10.0 cm. to 10.0 by 12.6 cm. Stone balls are reported from several coastal sites in California. Treganza describes 4 found at the Tank site (Treganza and Malamud 1950: 150). Two somewhat larger specimens were found at San Fernando by Walker (1951: 23). Similar large spherical stone objects are reported from a cairn site near Saticoy, Ventura County, California (Meighan, personal communication, 1955). All are believed to belong to occupations of at least 2000 years ago.

A single granite disc 11.1 cm. in diameter and 3.7 cm. thick was found. Both surfaces have been smoothed, with light pecking on both sides. The edges are slightly beveled and the surfaces are nearly parallel. The disc varies less than 2 mm. from a perfect circle. Similar artifacts are described from several of the older complexes in California. The Tank site in Topanga Canyon,

TABLE 1. ARTIFACT DISTRIBUTION BY SITE IN THE PAUMA AREA OF SAN DIEGO COUNTY.

All site numbers are preceded by *Rincon*.

	METATES	MANOS	COBBLE HAMMERS	CORE HAMMERS	CORE SCRAPERS	DISCOIDALS	STONE BALLS	CRESCENT STONES	PROJECTILES OR BLADES	CHIPPING WASTE
20	4	29	–	–	2	–	–	–	2	10
20A	2	12	1	–	–	–	–	–	–	41
20B	5	26	3	–	2	–	–	–	–	41
47	16	39	17	–	8	1	4	–	2	36
71	5	23	2	2	2	1	–	–	–	6
41A	6	14	2	1	5	–	–	–	6	108
43A	–	7	–	–	–	–	–	–	1	7
130	2	4	–	–	–	–	–	–	–	–
135	–	5	1	1	2	–	–	–	1	76
100	3	6	–	–	3	–	1	–	–	18
132	–	–	–	–	–	–	–	–	4	55
137	–	9	1	–	3	–	–	–	–	40
95	–	–	–	–	–	–	–	–	3	123

TABLE 2. ARTIFACT DISTRIBUTION BY SITE IN THE VALLEY CENTER AREA.

All site numbers are preceded by *Valley Center*.

	METATES	MANOS	COBBLE HAMMERS	CORE HAMMERS	CORE SCRAPERS	DISCOIDALS	BALLS	CRESCENT STONES	PROJECTILES OR BLADES	CHIPPING WASTE
22	1	13	1	–	1	–	–	1	–	19
26	2	16	3	–	2	–	–	–	2	63
33	–	4	–	–	9	–	–	–	–	62
37	–	3	2	–	–	–	–	–	–	–
27	–	5	4	–	4	–	–	–	–	–
39	1	5	–	–	–	–	–	–	–	9
21	3	8	–	1	3	–	–	1	–	3
28	2	10	4	3	3	–	–	1	–	32
31	4	17	2	2	9	–	–	–	2	65
12A	6	22	6	–	15	–	–	–	3	50
23	–	2	–	–	–	–	–	–	1	22
46	–	4	1	–	11	–	–	–	6	355

Los Angeles County, Walker's metate site in San Fernando (Walker 1951: 25), the second level of the Malaga Cove site (Walker 1951: 55), and Little Sycamore Creek in Ventura County (Wallace and Wallace 1954: 114) all include discoidal ground stone objects in the artifact samples. All of the above occurrences are in sites believed to be over 3000 years in age.

Other ground stone objects include a small perforated disc described by its owner as a little doughnut. This object was about 1½ inches in diameter. Located many years ago during early land clearing operations, this object has been misplaced by its finder and must be presumed lost. No similar specimens have been found within the complex, but an artifact similar in size and description was found on a San Dieguito site near Escondido.

Scrapers consisting of flakes and cores of basalt and felsite are found that resemble those described by Treganza and Malamud from the Tank site in Los Angeles County as well as many of Rogers' San Dieguito specimens. Sizes range from 2.6 by 3.4 cm. to 5.9 by 5.3 cm. at Rincon 47 and up to 10.3 by 11.0 cm. on all sites in the complex (Fig. 2). Of the 8 artifacts in this group, 7 are basalt and one is felsite. In addition 36 chips and cores believed to represent chipping waste have been recovered. Twenty-five are basalt, 9 are felsite, and 2 are other fine grained volcanics.

Blades are rare, with only 2 fragments found in this site. The fragments are poorly made of quartz and seem to be midsections about 1.2 cm. thick and 2.5 cm. wide for one specimen and 1.0 cm. thick and 2.1 cm. wide for the other.

Surface collecting has produced a total of 94 artifacts from this site. Eighty are ground stone, 14 are chipped, and an additional 36 fragments are chipping waste.

The predominance of grinding implements over chipped artifacts on this site suggests a seed grinding economy based on manos and metates in contrast to the mortars and pestles which dominate the later San Luis Rey sites. The small pressure flaked projectile points common on the later sites are absent here, as

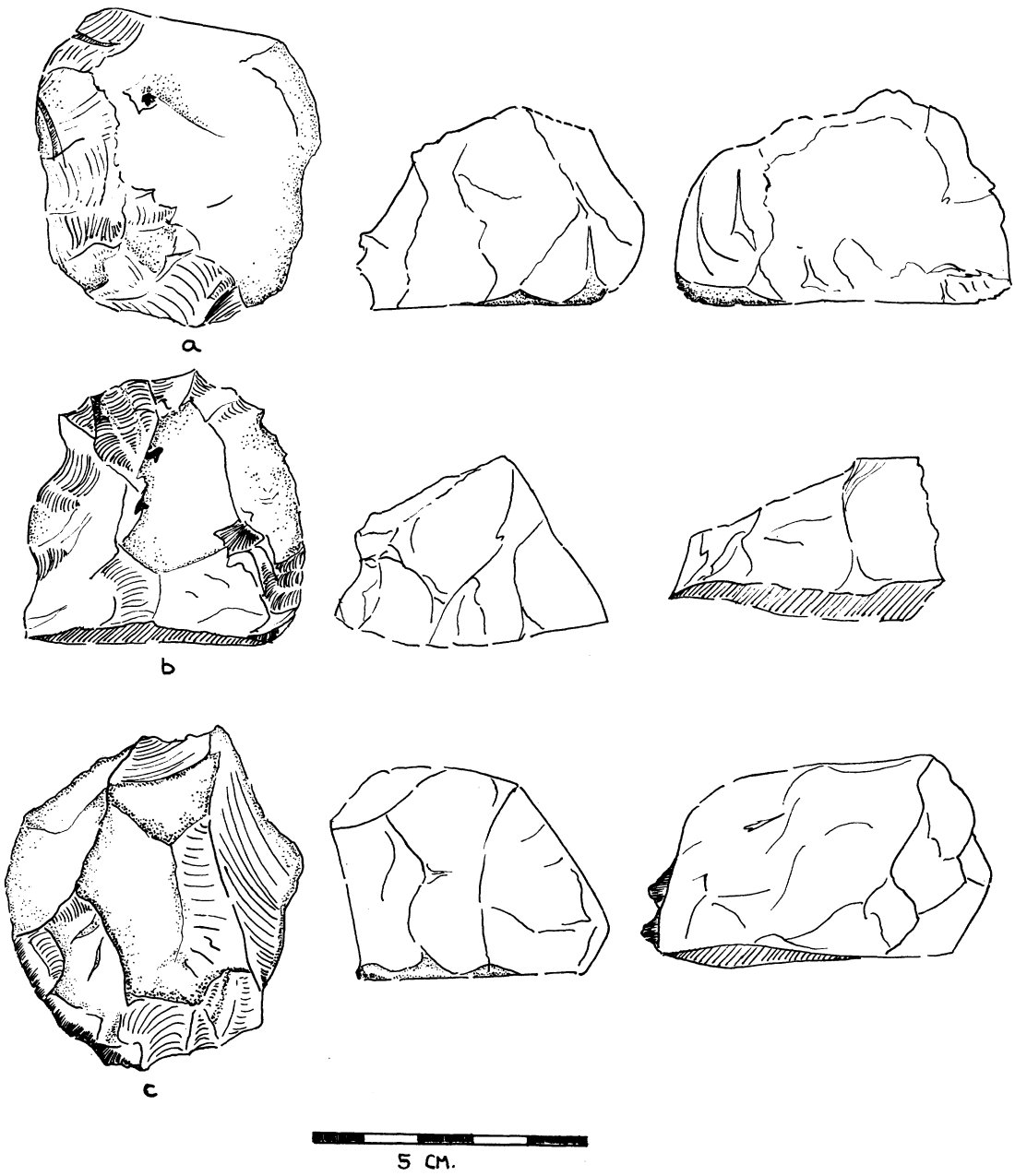


FIG. 2. Planes and core scrapers from Rincon 47 (each shown in 3 views).

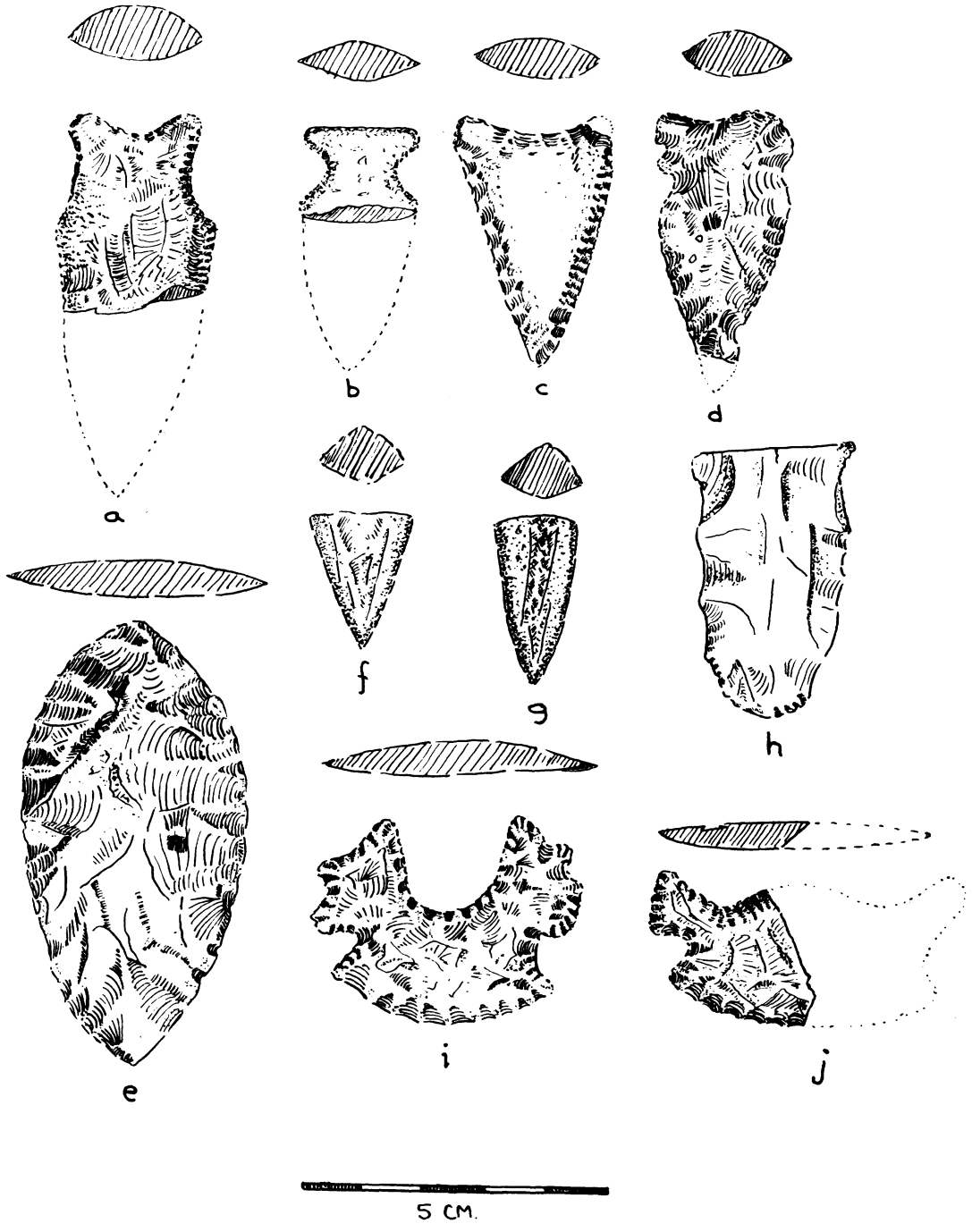


FIG. 3. Chipped implements from sites of the Pauma complex.

are artifacts of shell and bone. Lack of shell on a site in an area easily accessible to the sea, and in which later inhabitants made annual migrations to the coast, points either to a variation in cultural pattern or to considerable time during which all such perishable remains have weathered away. Surface indications and apparent lack of deposit depth points to a seasonal camp rather than a permanent village location.

* * *

Other sites in the complex are quite uniform in appearance. In the Pauma-Pala area (Table 1) they are characterized by thinly scattered artifacts located on the mudflow deposits and fault benches. In the Valley Center area (Table 2), they are found on exposed knolls and saddles overlooking present intermittent water courses. All known sites appear to be surface deposits. Midden deposits, house pits, or other dwelling remains are not found. Sites vary in area from 2 to approximately 20 acres, and range in elevation from 480 to 1800 feet above sea level. (Sites of the San Luis Rey complexes range from just above sea level to over 5000 feet on Mount Palomar.) Shell is absent and bone is represented by a tiny handful of unidentified fragments. Chipped artifacts are not common, but several interesting and possibly diagnostic points or blades have been recovered:

1. Stemmed base fragment of gray basalt (Fig. 3 *a*). Site Rincon 41-A.

2. Side-notched, straight-based fragment of quartz (Fig. 3 *b*). Site Rincon 41-A.

3. Concave base triangular point of jasper, complete (Fig. 3 *c*). Site Rincon 43-A.

4. Somewhat triangular basalt point with a slight basal notch and side notches (Fig. 3 *d*). Site Rincon 132.

5. Oval leaf-shaped blade (Fig. 3 *e*). Site Valley Center 23.

6. Crude leaf-shaped blade fragment of quartz, 3.8 cm. wide by 0.9 cm. thick, with an unrestored length of 5.8 cm. Site Valley Center 12-A.

7. Leaf-shaped point of felsite, 1.8 cm. wide by 2.8 cm. long by 0.6 cm. thick. Site Valley Center 46.

8. Triangular point with straight base of felsite, 2.1 cm. wide by 3.6 cm. long by 0.6 cm. thick. Site Valley Center 26.

9. Point base, fragment, of chert, 1.5 cm. wide by 0.5 cm. thick with an unreconstructed length of 1.7 cm. Site Rincon 135.

10. Leaf-shaped point of jasper-agate, 2.1 cm. wide by 3.5 cm. long by 0.7 cm. thick. Site Rincon 95.

11. Crescent stone, complete, of felsite (Fig. 3 *i*). Site Valley Center 21.

12. Crescent stone fragment of chert (Fig. 3 *j*). Valley Center 22.

13. Crescent stone, complete. Valley Center 28.

14. Possible drill fragments Fig. 3 *f, g*). Rincon 20 and Rincon 100.

Nearly all sites in the complex seem to fall generally into Wallace's (1955) milling stone Horizon II. However, Wallace (1955: 219-21) has separated the San Dieguito complexes from his Horizon II and places them in Horizon I, early period. For some inland manifestations of San Dieguito, at least (for example, Rogers' Escondido Locus IV), this may create some questions, since nearly all elements described by Wallace as being typical of the milling stone complexes in Horizon II are found on nearly all San Dieguito sites examined by this writer. This is not to suggest that Wallace's dating for San Dieguito is in error, but more to emphasize the milling stone elements apparent in at least some San Dieguito sites.

Similarities between the Pauma complex and elements of San Dieguito are obvious. That this complex represents another locus of the San Dieguito culture or is a peripheral area of Rogers' Escondido locus has been suggested (Meighan, personal communication, 1954). However, no conclusions or even close comparisons can be made until there are more data available from the San Dieguito areas and until the status of San Dieguito has been determined.

No firm conclusions can be drawn from available data, but typological relationships with several of the older Southern California complexes are indicated. Located less than 25 miles from Escondido this complex is within easy reach of M. J. Rogers' Locus IV (1929: 455). The proximity of the central San Luis Rey basin to the whole San Dieguito culture area, including both Escondido and coastal strip foci, plus probable migrations to the coast of the inland inhabitants, indicates probable contacts between these complexes. Strong inclination toward a seed gathering economy with grinding implements dominating the artifact assemblage are suggestive of close relationships with such complexes as Topanga and Oak Grove. Importation of jasper, chert, and agate from the desert areas to the east along with some similarities in artifacts also indicate possible contact with some of the older desert

groups. Contact with such complexes as Lake Mohave or Pinto Basin would not have been impossible and some artifact types in this sample are similar to types found in the desert location (Fig. 3 *a, d*).

Comparative analysis of the small artifact sample presently available with those of San Dieguito, Oak Grove, Topanga, Sycamore Creek, and other milling stone complexes in Southern California indicates a sharing of certain elements. This relationship is becoming increasingly evident as data accumulate and it appears to be only a matter of time until these complexes are satisfactorily fitted into the time sequence of California archaeology.

EBERHART, HAL

1952 Report on an Archaeological Survey Near Rincon Indian Reservation, San Diego County, California. MS, in file, Department of Anthropology and Sociology, University of California, Los Angeles.

ELLIS, A. J. AND C. H. LEE

1919 Geology and Ground Waters of the Western Part of San Diego County, California. *United States Geological Survey, Water Supply Paper* 446. Washington.

JAHNS, RICHARD AND L. A. WRIGHT

1951 Gem and Lithium Bearing Pegmatites of the Pala District, San Diego County, California. *California Division of Mines, Special Report* No. 7-A. San Francisco.

MEIGHAN, C. W.

1954 A Late Complex in Southern California Prehistory. *Southwestern Journal of Anthropology*, Vol. 10, No. 2, pp. 215-27. Albuquerque.

MOHR, ALBERT

1954 The Deep Basined Metate of The Southern California Coast. *American Antiquity*, Vol. 19, No. 4, pp. 394-6. Salt Lake City.

ROGERS, D. B.

1929 *Prehistoric Man of the Santa Barbara Coast.* Santa Barbara Museum of Natural History.

ROGERS, M. J.

1929 The Stone Art of the San Dieguito Plateau. *American Anthropologist*, Vol. 31, No. 3, pp. 454-67. Menasha.

TREGANZA, A. E. AND C. G. MALAMUD

1950 The Topanga Culture. First Season's Excavation of the Tank Site, 1947. *Anthropological Records*, Vol. 12, No. 4. Berkeley.

WALKER, E. F.

1951 Five Prehistoric Archaeological Sites in Los Angeles County, California. *Publications of the Frederick Webb Hodge Anniversary Publication Fund*, Vol. 6. Southwest Museum, Los Angeles.

WALLACE, W. J.

1954 The Little Sycamore Site and the Early Milling Stone Cultures of Southern California. *American Antiquity*, Vol. 20, No. 2, pp. 112-23. Salt Lake City.

1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology*, Vol. 11, No. 3, pp. 214-30. Albuquerque.

PAUMA VALLEY, CALIF.
February, 1957

REPRINT

Published quarterly by the Association of Environmental Professionals

the Environmental monitor

Fall 2003

CEQA and Fossil Preservation in California



AEP 2004 Conference

AEP Spring 2004 CEQA Workshop Series

By Eric Scott and Kathleen Springer, Division of Geological Sciences, San Bernardino County Museum, Redlands, California 92374

CEQA and Fossil Preservation in California

Paleontologic resources – fossils – are the fossilized evidence of past life found in the geologic record. Fossils are preserved in sedimentary rocks, which are the most abundant rock type exposed at the surface of the earth. Yet despite the abundance of these rocks, and the vast numbers of organisms that have lived through time, preservation of plant or animal remains as fossils can be an extremely rare occurrence. This is not always the case; some fossil deposits are made up of the remains of millions upon millions of organisms, in such abundance that mining rock exposures for the fossil remains of those organisms does not deplete the resource too rapidly. Fossil fuels are mined on just such an assumption as this. However, in many cases fossils of animals and plants occur only in limited areas and in small numbers relative to the distribution of the living organisms. In particular, fossils of vertebrates – animals with backbones – are generally very rare. Such fossils are sufficiently rare to be considered nonrenewable resources. These resources are the focus of this review.



Figure 1. A plaster jacket encasing vertebrate fossils at a locality near Lake Mathews in Riverside County, California. Note that true north ("TN") is marked on the jacket, to enable proper orientation of the fossils later in the laboratory. Note also that fossils encased within the sediment have been diagrammatically represented on the surface of the jacket, enabling preparators in the laboratory to better assess where fossils will be encountered during curation.

Because of their rarity, and because of the scientific information they can provide, fossils are highly significant records of ancient life. They provide information about the interrelationships of living organisms, their ancestry, their development and change through time, and their former distribution. Progressive morphologic changes observed in fossil lineages provide critical information on the evolutionary process itself – that is, the ways in which new species arise and adapt to changing environmental circumstances. Fossils also serve as important guides to the ages of the rocks and sediments in which they are contained, and may prove useful in determining the temporal relationships of rock deposits from one area to another and the timing of geologic events. Time scales established by fossils provide chronologic frameworks for geologic studies of all kinds.

THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

The stated intent of the California Environmental Quality Act (CEQA) is to "[d]evelop and maintain a high-quality environment now and in the future, and take all action necessary to protect, rehabilitate, and enhance the environmental quality of the state" (PRC §21001a). The "environment" in the sense of CEQA is defined as "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, noise, [and] objects of historic or aesthetic interest" (PRC §21060.5).

Paleontologic resources are explicitly afforded protection by CEQA, specifically in Section V(c) of Appendix G, the "Environmental Checklist Form", which addresses the potential for adverse impacts to "unique paleontological resource[s] or site[s] or … unique geological feature[s]". This provision clearly covers fossils of signal importance – remains of species or genera new to science, for example, or fossils exhibiting features not previously recognized for a given animal group – as well as localities that yield fossils significant in their abundance, diversity,

preservation, and so forth. Mitigation of adverse impacts to resources such as these is therefore mandated by CEQA. However, while such fossils and such localities are indeed important, the emphasis of CEQA on resources of this nature is in some ways unfortunate, for it perpetuates a stereotypical perception that only unique fossils are important, and that more common paleontologic remains are less so. This perception is a holdover from the early days of paleontology, when scientists did focus on looking for one-of-a-kind fossils, particularly those providing superlatives – the biggest, the oldest, the fiercest, the most complete, and so forth.

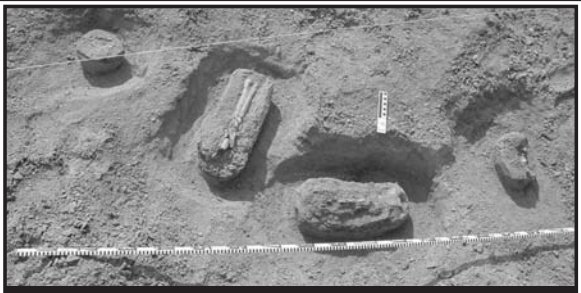


Figure 2. A quarry yielding fossils of an extinct camel near Lake Mathews in Riverside County, California. The quarry has been cleared, and each fossil has been isolated on a pedestal of sediment. The meter rod and scale bar will assist in mapping and photodocumenting this locality. Note that extensive preparation of the exposed fossils was not conducted in the field. Rather, the fossils were exposed to delimit their boundaries. More detailed preparation and stabilization is conducted in the laboratory, where detailed efforts will not derail excavation schedules.

Yet the science of paleontology has advanced since those early days, and paleontologists no longer focus so intently on finding new, rare or unique extinct animals. Rather, paleontologists today are more concerned with elucidating the relationships of extinct organisms, both in an evolutionary sense – how species and higher groupings of organisms are related to one another, and how new species have arisen through time – and in an ecological sense, interpreting how different paleobiological communities may have functioned at specific points in time and in particular geographic regions. Of course, no biota is made up of only unique plants or animals, and evolution is not restricted to unique organisms; so the emphasis of CEQA on uniqueness belies the advances made by paleontology over the past several decades.

This emphasis also fails to take into account the technological and procedural advances that have taken place in paleontology and related disciplines in recent years. The advent of radiometric dating techniques, the increasing ability to recover molecular data – including isotopes and even DNA – from fossil remains, the application of taphonomic techniques and interpretations to paleontologic localities, and the digital revolution are just a few of the means by which old fossils can be interpreted in new ways. Yet many of these advances can only be brought to bear if the fossils under consideration are collected in certain ways and under special conditions … and existing paleontologic collections do not always meet these criteria. The importance of new fossil discoveries, including both unique and more common resources, is consequently emphasized.

Nor is uniqueness a characteristic of a paleontologic resource that can be readily recognized or assessed. Determining whether a fossil or a locality can be considered unique requires extensive study that is generally beyond that which can be performed in the field. Further, the very concept of "uniqueness" is problematic, in that it can be taken to extremes when considering paleontologic resources. Uniqueness can be interpreted loosely, for example, in which virtually every fossil encountered is unique in some fashion and so should be preserved. Interpreting uniqueness too strictly, in contrast, would exclude many scientifically significant fossils from consideration under the auspices of CEQA – although to do so is clearly at odds with the stated intent of CEQA. The correct interpretation lies between these extremes, and can be reached by considering a resource's significance as well as its potential for uniqueness.

A prerequisite to determining whether a fossil is unique is an accurate identification of the fossil to a reasonably precise level. In some rare cases, accurate identifications of distinctive fossil elements to the genus or species level can be made in the field, at the time of discovery. In most cases, however, accurate genus- or species-level identifications of fossil remains are not possible in the field for the following reasons: 1.) the resource(s) are generally not sufficiently well-exposed and visible to permit accurate field identification; 2.) the resource(s) have generally suffered damage from heavy equipment activity, which makes field identification(s) much more difficult; 3.) many bones of comparably-sized animals (for example, limb bones and vertebrae of camels and horses) are very similar in overall appearance, and are difficult to discriminate without the aid of a well-provisioned comparative osteological collection; and 4.) in the context of an excavation that is proceeding according to a defined schedule, precise identification in the field is neither efficient nor cost effective. Microfaunal remains offer an additional challenge, as these elements are generally not visible to the naked eye in the field; rather, they are recovered in the laboratory through processing of bulk samples of fossiliferous sediments.

In order to comply with the explicit recommendations of CEQA, therefore, determinations of the uniqueness of a fossil, or of a paleontologic locality, require the recovery, preparation, and analysis of paleontologic resources from the area of potential impact. Treatment programs designed to mitigate impacts to significant resources must therefore incorporate such recovery and analysis. Only in this manner can the explicit requirements of CEQA be effectively realized, and compliance with these recommendations be achieved.

An obvious corollary of such an approach is that many fossils that are not unique will also be recovered as a consequence of

continued on page 6

continued from page 5

such treatment programs. This unavoidable circumstance can seem to present a challenge: having spent time, effort and money to recover a sample of paleontologic resources, what is to be done with those (presumably many) fossils that are not technically unique? Fortunately, this question is easily answered, for uniqueness is not the sole trait by which a resource is to be interpreted. In addition to the explicit requirements of CEQA regarding paleontologic resources, there are also implicit guidelines. For example, CEQA provides that generally, a resource shall be considered "historically significant" if it has yielded or may be likely to yield information important in prehistory (PRC §15064.5). Paleontologic resources clearly fall within this broad category. Under these guidelines, the focus is less upon the uniqueness of a resource, and more upon its significance. The question then becomes: how does one determine whether or not a paleontologic resource is significant?



Figure 3. Paleontologists from the SBCM map a quarry of bones from an extinct mastodon, on a project outside of Hemet in Riverside County, California. Such mapping and documentation are essential in correctly recovering and preserving fossil resources in order to comply with CEQA. A fossil out of context has little or no paleontologic significance.

DETERMINING THE SIGNIFICANCE OF PALEONTOLOGIC RESOURCES

As stated previously, preservation of plant or animal remains as fossils can be an extremely rare occurrence. Because of the infrequency of fossil preservation, fossils are considered to be nonrenewable resources. Because of their rarity, and because of the scientific information they provide, fossils can be highly significant records of ancient life. Given this, fossils can be considered to be of significant scientific interest if one or more of the following criteria apply:

1. The fossils provide data on the evolutionary relationships and developmental trends among organisms, both living and extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

As so defined, significant paleontologic resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and/or those that add to an existing body of knowledge in specific areas – stratigraphically, taxonomically, and/or regionally. They can include fossil remains of large to very small aquatic and terrestrial vertebrates, remains of plants and animals previously not represented in certain portions of the stratigraphy, and fossils that might aid stratigraphic correlations, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, paleoclimatology, and the relationships of aquatic and terrestrial species. (As noted earlier, dense concentrations of plant and/or invertebrate fossils remains may be so locally abundant that impacts to the resources do not appreciably diminish their overall abundance or diversity; in these cases, such impacts may be considered to be less than significant.)

Determinations of the significance of paleontologic resources can only be made by qualified, trained paleontologists familiar with the fossils under consideration. Such determinations are best advanced in the light of a well-conceived and clearly defined treatment plan. With an efficient sampling plan based upon such a treatment program in effect, the ability of the paleontologists to recognize, recover and preserve significant paleontologic resources is greatly enhanced.

The guidelines for significance identified above all have in common one basic assumption: that the fossils in question have been identified to a reasonably precise level, preferably to the generic or the specific level. *All identifiable paleontologic resources are always potentially significant.* In general, fossils are not considered to be significant unless they are *diagnostic* – that is, unless the fossils exhibit distinctive features permitting identification with some degree of precision. It is of course true that there are exceptions to this rule; for example, fossils that are not diagnostic, or fossil fragments, can nevertheless be significant when recovered from a sedimentary unit or formation that previously had not yielded fossils, or from an area with little or no history of paleontologic sensitivity. Fossils of animals that are rare in faunal assemblages may provide significant information even when only identifiable to class, ordinal or familial level (e.g., Carnivora). Fossil fragments exhibiting weathering, abrasion, wear, or other indications of significant taphonomic processes can also be important in reconstructing site-specific depositional

processes. A research design that includes a complete taphonomic study may incorporate all fossil fragments (see Shaw, 1982 for one example). However, questions of evolutionary relationships, age of the deposit, and so forth – those questions that are generally employed to determine the significance of a paleontologic resource – cannot be reasonably addressed until the fossils under study have been identified to a relatively precise degree. Viewed in this light, fossils with little or no diagnosticity and/or fossil fragments can be seen to have little scientific significance.

In the context of paleontologic mitigation, detailed collection practices (i.e. academically-driven research designs where every fossil and/or fossil fragment is analyzed) are not always feasible. Destruction of at least some paleontologic resources is an unavoidable consequence of development-related excavation. Clearly, then, the goal of the paleontologists(s) in this context is not to *eliminate* impacts to fossil resources, but rather to *mitigate* such impacts by protecting fossils from physical damage whenever possible, and by emphasizing collection of sufficient significant resources to constitute a representative sample of the entire potential assemblage. In this manner, adverse impacts are reduced to an insignificant level. In such cases, nondiagnostic fossils or fossil fragments may *not* be considered to be potentially significant in terms of the criteria presented above, since identification is usually an essential prerequisite to determining significance – and there may be little chance of ever supplementing these specimens with their missing portions or advancing more detailed identifications at some future date. Further, isolated fragments cannot always be placed in a sufficiently detailed three-dimensional context with their missing portions to enable taphonomic data to be advanced with any reliability.

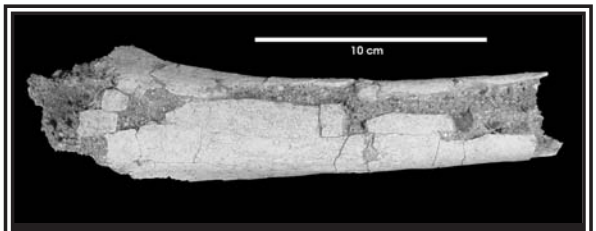


Figure 4. A fossil limb bone found in the Murrieta region of Riverside County, California, by scientists from the SBCM. The fossil was clearly both broken and incomplete, but was nevertheless collected because it seemed to exhibit features enabling identification in the laboratory. In fact, following extensive analysis, the fossil was determined to be a partial wing bone of an extinct large condor-like bird known as a teratorn. The bone was sufficiently diagnostic that it permitted erection of a new genus, Aiolornis. This find emphasizes the importance of focusing on field recovery of fossils that appear to be diagnostic, rather than attempting to determine in the field whether a fossil find is unique or significant.

For these reasons, nondiagnostic fossils and unidentifiable fossil fragments are determined to be scientifically significant only in a limited sense. In general, where exposed such elements should be employed by field paleontologists to indicate sediments or outcrops that demonstrably contain fossil resources; these areas can be examined and test-sampled to determine the presence of more complete – and therefore more significant – paleontologic resources. Fossil fragments encountered in quarry situations are an exception to this condition, as such elements may reattach to other broken fossils from the quarry. Such fragments might also assist in advancing taphonomic interpretations elucidating the formation of the assemblage. Fossil fragments exhibiting weathering, wear, abrasion, or other indications of significant taphonomic processes may also be collected. Microfossils are another evident exception. These elements are obtained through recovery of bulk samples of fossiliferous sediments that are washed and processed in the laboratory. Some unidentifiable microfossil remains are an unavoidable circumstance of this collection procedure (although most fossils recovered in this manner are readily identifiable).

Regarding those fossil remains that *are* diagnostic, it is reiterated that all identifiable paleontologic resources are always potentially significant. This being the case, the question of determining potential significance thus becomes one of where the identifications of the resource(s) are made – in the field, before physical recovery of the resource, or in the laboratory subsequent to recovery and preparation. As stated previously, while in some cases accurate identifications are possible in the field, most of the time such identifications are better made in the laboratory, subsequent to recovery. In this environment, recovered fossils can be cleaned and stabilized without delaying excavation activities, then identified using comparative samples and references that would not be available in a field context. Microfossils are also best processed in the laboratory.

Given the above, field paleontologists in a mitigation context should be trained primarily for the collection of resources which exhibit distinctive features such as articular surfaces, bony spines, or prominent bony ridges that will enable detailed identifications to be made later, in the laboratory. Resources that do not appear to be *potentially* diagnostic in this manner are generally not collected, although their presence in the field may be recorded in field notes.

Any of the fossil resources that appear in the field to be diagnostic are *potentially* significant in that they could provide data crucial to resolving any number of research questions under consideration by paleontologic investigators – both presently and in the future. Since this significance in most cases cannot be accurately (or cost-effectively) determined prior to recovery of the resource(s), it is most reasonable and efficient to recover *all* diagnostic or potentially-diagnostic resources as they are exposed with the aim that these resources will, utilizing any number of techniques, be later demonstrated to be scientifically significant.

continued on page 8

CEQA

continued from page 7

The resolution of specific questions or issues (as outlined in the significance criteria presented above) can be attempted given certain volumes of certain types or kinds of fossil remains. However, while estimates of the sufficiency of data – that is, the number of specimens required to properly address a given question or issue – can be advanced *a priori*, such estimates should by no means be considered final. The acquisition of a quantity of specimens sufficient to address a given research question does not imply that no more specimens of a similar nature need to be collected. In most cases, the recovery of minimally sufficient numbers of specimens does not imply that "additional" remains are not significant. Rather, estimates of sufficiency should be employed only to determine that it has become possible to *begin* to address a particular question. Nor can such estimates be treated in isolation, without also considering estimates of "sufficiency of data" necessary for the resolution of other paleontologic questions.



Figure 5. Full curation of significant paleontologic resources in an established repository is an essential part of the mitigation process. In the absence of such curation, impacts to significant resources are not truly mitigated, but merely postponed.

FIELD RECOVERY

Although CEQA explicitly and implicitly mandates the recovery and preservation of paleontologic resources, it does not detail how these tasks should be accomplished. The following discussion of field, laboratory and curation techniques is therefore presented to document the key considerations involved in initiating, maintaining and completing a paleontologic resource mitigation and treatment program in order to comply fully with the requirements of CEQA.

The recovery in the field of paleontologic resources can generally be assigned to one of three collecting practices: research-driven fossil collection, cyclic prospecting, and mitigation salvage. Although each of these practices has its own distinctive approach, each also shares with the others certain basic requirements for correctly recovering and preserving fossil resources.

Permission: Where permits are required, fossils may only be recovered under the authority of a valid permit and with full written permission from the appropriate landowner. Due diligence in this regard is the first step in insuring the permanent preservation of fossil finds.

Field Notes: A fossil out of context has no scientific significance. Accurate and precise locality data is therefore extremely important. Localities should be mapped or recorded with an accuracy that will allow future researchers to locate the site, even after the land surface is altered. The integrity of the site – whether a fossil is *in situ* or whether the fossil is float – must be noted. It is also important to delineate distinct localities and avoid lumping of field sites, to avoid inadvertent mixing of closely situated but potentially distinct faunas.

Descriptive site data should be recorded with an eye to permanence, e.g., waterproof paper and ink or hard-lead pencil in the field; archival materials in the laboratory. Complete geologic descriptions should be made in the field using the appropriate standards of sedimentological description. Small samples of sediment can be recovered and preserved with the fossil(s) where deemed appropriate. Field maps, quarry sketches, and photographs should be made onsite and must always include scale, north arrows, and locality information. The fossils or fossil jackets should be marked in the field with cardinal directions, a field inventory number, north arrow, and stratigraphic and actual "up" direction to preserve the original orientation of the fossil for taphonomic studies.

Sampling: The most basic criterion for determining whether or not a fossil should be collected is its diagnosticity. As discussed above, fossils are not considered to be significant unless they can be identified with some degree of precision. Field collection should focus upon the recovery of those fossils that appear to be diagnostic – that is, those fossils that seem sufficiently complete or that exhibit sufficient anatomical characters so as to have some likelihood of being identified to a reasonable level of precision upon preparation and examination in the laboratory. Microfossils are an exception to this provision; recovery of bulk samples of fossiliferous sediments can yield some unidentifiable microfossils.

Fossil trackways provide unique challenges for field sampling. In many cases, such trackways are preserved in sedimentary blocks so massive as to defy effective removal or recovery. In these cases, sampling should entail molding the exposed trackways in a nondestructive manner, so that a record of the resource(s) can be preserved. Preservation of trackways left in the field should be based upon avoidance where possible.

As stated, all of these guidelines are always applicable in field collection of fossil resources. In paleontologic mitigation and salvage these guidelines are perhaps most critical, as construction and development so completely rework a region as to render it impossible to revisit localities or exposures. In these cases, if the appropriate contextual data is not recorded at the time the fossils are recovered, there are rarely any second chances. It is therefore

essential that the above listed guidelines be kept clearly in mind when collecting vertebrate fossils.

Collection strategies should be based upon a well-defined, pertinent research design wherever possible. Research-based collection strategies, if sufficient in scope and number, will examine similar numbers of outcrops and recover similar numbers of fossils as compared to cyclic prospecting. Research-based collecting has the added benefit of providing data useful in answering specific inquiries. Questions of species abundance and diversity, population dynamics, age of the assemblage, depositional conditions, paleoenvironmental conditions, and evolution of lineages through time, to name just a few concepts, can and should provide a strong foundation for field investigations.

Although a research design is strongly recommended, there are cases where such a foundation might not be essential. Paleontologic mitigation activities, for example, endeavor to salvage significant fossils from areas where development, construction, and/or excavation will impact and possibly destroy paleontologic resources. Fossil salvage in these cases is most correctly interpreted as representing the initial observation stage that is the beginning of any scientific investigation. Paleontologic mitigation is challenged by the potential weight of future investigations – sufficient fossils and contextual information must be recovered to provide data for a wide variety of future research questions – and encumbered by the immediacy of salvage needs, as any delay will result in the complete loss of nonrenewable resources. In effect, mitigation based fossil salvage can be seen as conservation enabling research, not necessarily as research in and of itself. The lack of a research design, or hypotheses to be tested, at the outset of paleontologic mitigation and salvage should not be seen to constrain these conservation activities in any way.

CURATION

Field recovery of vertebrate fossils is clearly only the first step in fossil preservation. Curation of recovered fossils is a critical requirement for proper stewardship of these resources.

Preparation: Some degree of preparation is usually required to stabilize fossil resources to the point of permanent preservation. Preparation should be suited to the fossil and its place in a research framework, but long-term stability and preservation of the fossil should always be primary factors. Matrix recovered from this cleaning should be preserved for later washing, screening and examination for microfossils. Glues, hardener, or other stabilizing agents should be reversible, must provide long-term stability, and should be non-reactive.

Preparation also includes processing of fossiliferous sediments. This sedimentary matrix can be water-washed through mesh screens to facilitate disaggregation of clays and fine silts. Mesh size should be determined in advance based upon the research framework and the size of the specimens that might be recovered. The resulting clean concentrate should be visually examined – when necessary with the aid of magnifying lenses and/or binocular microscopes – and hand-picked to remove fossil specimens.

Preparation can also include reconstruction of broken elements. This is a point of critical concern. Unless a broken fossil has had each of its elements thoroughly cleaned and hardened, it may not reassemble easily or correctly. Also, many fossils suffer distortion due to pressure and other geologic factors. Given these facts, and recalling that preparation should be aimed primarily at long-term stability, thought must be given to the purposes that would be served by reconstruction of the fossil(s). A specimen intended for exhibition might very well have different reconstruction and preservation requirements than a fossil intended for research, and so the degree to which a fossil should be repaired needs to take this into account. Further, a fossil intended for display at the outset may in future years be removed and returned to the collections. It is important in this eventuality that modifications that may have been made to the fossil(s) for the sake of exhibition should be reversible if at all possible, so that the value of the specimen(s) in research is not diminished. Reconstruction should be as accurate as possible; poorly reconstructed fossils only make more work for investigators.

Identification: If a fossil's significance is based to some degree upon whether or not it can be identified with any degree of precision, as discussed above, then it follows that fossil identification is a key element in resource stewardship. Many academic research institutions and professional repositories house their fossils organized by taxon and by element, and so identification is a central part of the curation process, as well. Finally, paleontologic research of any kind demands correctly identified fossils as a *minimum* requirement if it is to actually advance science in any way. As in the field, notes should be kept to record the detailed observations of the researcher that may not otherwise be available.

Specimen storage: This is one more of the critical components in correct, professional stewardship of fossil resources. Vertebrate fossils are unique, *nonrenewable* resources, and if not cared for they will eventually be lost, never to be replaced. Further, fossils form the basis for many scientific studies, and if an investigation is truly scientific then it must to some degree be repeatable. If this is to happen, then scientists must have access to fossils employed in prior studies. Finally, paleontology as a science has grown and evolved – much faster than the once-living organisms it studies – and as new techniques and new philosophical perspectives come into play it is imperative that fossils form a cohesive core, an enduring chain of consistency linking older studies to newer interpretations.

Paleontologic resources must be housed in professional, academic repositories with databases capable of preserving and manipulating specimen and locality data (see below). Repositories should be accredited by the American Association of Museums (AAM) to ensure long-term stability and compliance with established museum procedures and guidelines. In keeping with AAM standards, fossils should be stored in dust-proof steel cabinets. These cabinets should be housed in a dedicated, climate- and humidity-controlled collections area, separate from office and laboratory space. Exceptionally large

continued on page 10

continued from page 9

specimens may be stored on heavy-duty steel shelving where necessary, but in such cases efforts must be made to ensure that such shelving is also relatively dust-free. Catalogue and locality data should be recorded in permanent ink on archival-quality tags or labels associated with each specimen. Resin or plaster cradles may be constructed to provide additional support for large, bulky and/or fragile specimens. Catalogue numbers for large fossils should be written on the bone in permanent ink.

Microfossils present unique challenges for proper long-term storage. These small specimens are generally very delicate and can be extremely easily misplaced. Microfossils should be stored in a manner that will prevent the fossils from being separated from the identifying data. Unique numbers that identify the specimens should be attached to the specimen or its container to prevent the loss of critical provenience data.

Data storage: In addition to storage of the fossils themselves, contextual data recovered must also be housed and preserved. Computer databases are extremely effective virtual storehouses for all of the data that can be associated with fossils. A computerized collections management database should therefore be considered an essential commodity for institutions intent upon acting as repositories for paleontologic resources.

All data pertaining to recovered fossil specimens should be recorded in the collections database of the pertinent repository. This data should be cross-referenced and easily manipulated in virtual space. Resource locality information should also be entered into the specimen database. Localities should be plotted on standard topographic maps for convenient hard copy. Field notebooks should be housed in the selfsame repository as holds the fossils, as should photos, maps and other site records.

The preservation of paleontologic resources is a long-term endeavor. The job does not end when the fossils are placed on display or locked away in cabinets. Despite the most painstaking care and patient work, fossils by their very nature are likely to deteriorate through time. For this reason, it is important that repositories for vertebrate fossils are prepared, in terms of maintaining a secure physical environment, a competent collections management staff, and a stable financial outlook, to maintain fossils in the long term.

DISSEMINATION

Paleontologic research is not conducted in a vacuum. As with any science, the whole point of studying fossils is to advance humanity's knowledge of the natural world. Unless the information and interpretations gleaned from paleontologic investigations are made broadly available, however, the potential benefits of such investigations are limited. For this reason, dissemination of data information regarding the newly preserved resources, as well as the results of any research performed, is an essential function for all professional paleontologists.

Dissemination of data acquired from the study of paleontologic resources is particularly important in light of the stated intent of CEQA. In order to "take all action necessary to … enhance the environmental quality of the state" (PRC §21001a), it is essential that the data gleaned from fossil resources be made available to those individuals involved in working to fulfill the requirements of CEQA, as well as to the public at large. Environmental impact statements, mitigation and treatment reports, and other project-related documents may contain substantial data, but such documents are often either confidential or lack a sufficiently wide distribution to constitute true dissemination. Government agencies and land management personnel need access to such data in order to make more informed decisions regarding land use; professional researchers require data in order to fully realize the significance of the resources; and Californians in general should be provided with what data can be made available in order to arrive at a better appreciation of their environment in all its aspects.

In order for this dispersal of paleontologic information to be effective, the data collected have to be accurate. The guidelines discussed here are presented with that focus clearly in mind: that paleontologic resources are excavated carefully and professionally, with contextual data fully recorded, and are safely housed in secure repositories, so that this unique and irreplaceable data set is preserved as completely and accurately as possible. If all the time and trouble invested in these efforts is to be truly worth taking, research should be equally carefully conducted, with full consideration of all pertinent data, and results thoughtfully presented, if our stewardship of these fossils is to move beyond just collecting and preserving.

FINAL THOUGHTS

The foregoing has been a brief review of the procedures, requirements and philosophy of thought for proper stewardship of paleontologic resources in order to comply with the recommendations of CEQA. As California continues to grow and the pace of development increases, it is important to emphasize the ways in which CEQA protects significant paleontologic resources, and to highlight some of the basics of the practice of paleontologic resource management as a foundation from which to continue to build. The future holds the promise of new discoveries and new interpretations; if we are to make the most of them, we must not lose sight of the fundamentals of our profession.

The recommendations provided here are by no means complete, but rather are intended to provide a "bare bones" (so to speak) perception of how best to act to recover, preserve and properly manage significant paleontologic resources in compliance with CEQA. While CEQA does effectively require preservation of significant paleontologic resources, the time is ripe to act to strengthen and augment the Act. Official guidelines requiring many or all of the procedures delineated herein would provide a level of support for paleontologic research not previously available. If we are to ensure that nonrenewable paleontologic resources are properly cared for, the recommendations presented herein should as deemed necessary be weighted with official sanction. Only if the procedures discussed here cease to be suggestions and become requirements can we ensure that we are all on the same page, working towards the same goals, with the same sense of care and concern for the resources under our care.

AEP Membership application

Please mail this portion along with your check made payable to AEP:
AEP, 1333 36th Street, Sacramento, CA 95816. Sorry no credit cards accepted.
AEP can not invoice for new memberships. Questions: 916.737.AEP1 (2371).

GENERAL INFORMATION

Name _____

Firm/Agency _____

Address _____

City _____ Zip _____ E-Mail: _____

Daytime Phone No. _____ Fax No. _____

☐ Check here to be OMITTED from the AEP Website Directory. Employment type: ☐ Public ☐ Private ☐ Non-Profit ☐ Other _____

☐ Check here to receive the Environmental Monitor in electronic form ONLY.

Which AEP Chapter would you like to belong to and receive news and information (see region information in box below)? _____

AREAS OF INTEREST (SELECT 3)

☐ 1. CEQA/NEPA Compliance
☐ 2. Environmental Impact Analysis
☐ 3. Resource Management/Biology
☐ 4. Solid/Hazardous Waste
☐ 5. Air Quality
☐ 6. Noise
☐ 7. Transportation
☐ 8. Water/Wastewater
☐ 9. Legal Profession
☐ 10. Geology/Seismic
☐ 11. Cultural Resources
☐ 12. Growth Management
☐ 13. Policy Planning
☐ 14. Land Use/Site Planning
☐ 15. Geographic Information Systems
☐ 16. Economic
☐ 17. Engineering
☐ 18. Other_____

CHAPTER REGIONS & MEMBERSHIP

AEP Code of Ethics

1. Conduct myself and my work in a manner that will uphold the honor, integrity, and dignity of the profession.
2. Uphold the stated intent as well as the letter of environmental policies, laws, and regulations which are adopted by governmental bodies or agencies.
3. Not engage in, encourage, or condone dishonesty, fraud, deceit, discrimination, or misrepresentation in the solicitation , preparation, or use of work prepared by me or under my direction.
4. Fully disclose to my employers and my prospective clients any economic or ethical interests which could reasonably be interpreted as a conflict of interest by them or by other affected parties with regard to my professional work.
5. Ensure a good faith effort at full disclosure, technical accuracy, sound methodology, and objectivity in the collection, analysis, interpretation, and presentation of environmental information by me or under my direction.
6. Achieve the highest level of professional competency, for myself and for those I supervise.

_____
Signature

Signature acknowledges full understanding and acceptance of the AEP Code of Ethics and Professional Conduct Guidelines.

OFFICE USE ONLY Co. ___ P. ___ Date _____ Amount _____ Check # _____

Status	Please Check
New Member Application	☐
Change of Address, Etc.	☐

Membership Category	Annual Dues	Please Check
Full Member	$100.00	☐
Sponsor	$180.00	☐
Student Member*	$ 35.00	☐

*application must include current full time, 12 units or greater, student schedule.

Region

☐ 1. Channel Counties
☐ 2. Inland Empire
☐ 3. Los Angeles
☐ 4. Monterey Bay Area
☐ 5. Superior California
☐ 6. Orange County
☐ 7. San Diego
☐ 8. San Francisco

Contributions or gifts to AEP are not tax deductible as charitable contributions for income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses subject to restrictions imposed as a result of association lobbying activities. AEP estimates that the nondeductible portion of your dues allocable to lobbying is 5%. Printed on recycled paper.

the Environmental monitor
1333 36th Street
Sacramento, CA 95816-5401

DATED MATERIAL, PLEASE EXPEDITE

PRESORTED
FIRST CLASS
US POSTAGE
PAID
San Jacinto CA 92583
Permit No. 51

1 DAY

OFFICERS

President	—	William A. Clemens, Jr.
Vice President	—	David W. Krause
Past President	—	C. S. Churcher
Members-at-Large	—	Annalisa Berta
		Brent H. Breithaupt
		Kathleen M. Scott
Secretary	—	John J. Flynn
Treasurer	—	John R. Bolt

NEWS BULLETIN EDITORS

Editor	—	David S Berman
Managing Editor	—	Mary Ann Schmidt, ELS
Coordinating Editors:		
International	—	Miao Desui
Canada	—	Kevin Seymour
Northeast USA	—	Judy A. Massare
Southeast Editor	—	William P. Wall
Midwest USA	—	Russell W. Graham
Rocky Mountain Region USA	—	Brent H. Breithaupt
Southwest USA	—	Nicholas Czaplewski
Pacific Coast USA	—	George Callison
Mexico	—	Shelton P. Applegate

COPY DEADLINES
January 1, May 1, September 1
Send members' news to coordinating editors
Send notices directly to Editor

Published in Pittsburgh, Pennsylvania
Subscription rate: $25.00 per year

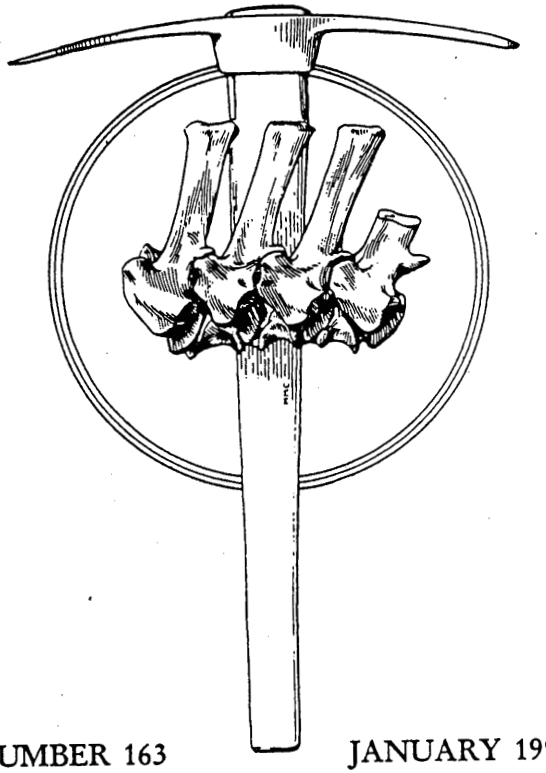
SOCIETY OF VERTEBRATE PALEONTOLOGY
401 N. Michigan Avenue
Chicago, IL 60611-4267 USA

ADDRESS CORRECTION REQUESTED

Non-Profit Org.
U.S. Postage Paid
Pittsburgh, PA
Permit No. 307

University of California - Berkeley
20874820(JVP) 173464OX(NB)
Main Library 01 - Periodicals
Division
BERKELEY CA 94720
USA

SOCIETY OF VERTEBRATE PALEONTOLOGY



NUMBER 163 JANUARY 1995

NEWS BULLETIN

— COMMITTEE REPORTS —

Conformable Impact Mitigation Guidelines Committee

The Committee for Conformable Impact Mitigation Guidelines has been active for five years. Robert E. Reynolds was appointed Committee Chair by SVP President Michael O. Woodburne in 1989. The Committee is presently submitting the final draft of guidelines.

An informal "committee" dealing with the subject of conformable guidelines has been active since about 1976, as California agencies were attempting to conform to CEQA (the California Environmental Quality Act) and NEPA (the National Environmental Protection Act). By 1978, museum curators, planning agencies, and salvage paleontologists in California had focused on preserving vertebrate fossils from construction impacts. Meetings with planners, curators, and paleontologists at the San Bernardino County Museum in Redlands, Calif., were the first to address consistency in procedures. Later meetings at the University of California, Riverside, addressed the impacts that voluminous salvage collections made on the repositories of not-for-profit universities and museums. Dr. Woodburne, aware that this was or would become a national issue, developed an SVP committee to study the issues.

Guidelines that had been tested by federal, state, and municipal authorities in the states of California, Arizona, and Nevada were summarized. These were reviewed by regulatory agencies, contract paleontologists, and museum curators, revised, and submitted for general SVP membership review in 1991. Comments and changes were incorporated in a series of reviews by a committee representing state and federal agencies, curators, and salvage paleontologists. Final review was conducted by SVP Executive Committee officers.

I herewith submit the final draft of the Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources. (Robert E. Reynolds, Chair)

ASSESSMENT AND MITIGATION OF ADVERSE IMPACTS TO NONRENEWABLE PALEONTOLOGIC RESOURCES: STANDARD GUIDELINES

INTRODUCTION

Vertebrate fossils are significant nonrenewable paleontologic resources that are afforded protection by federal, state, and local environmental laws and guidelines. The potential for destruction or degradation by construction impacts to paleontologic resources on public lands (federal, state, county, or municipal) and land selected for development under the jurisdiction of various governmental planning agencies is recognized. Protection of paleontologic resources includes: (a) assessment of the potential for property to contain significant nonrenewable paleontologic resources which might be directly or indirectly impacted, damaged, or destroyed by development, and (b) formulation and implementation of measures to mitigate adverse impacts, including permanent preservation of the site and/or permanent preservation of salvaged materials in established institutions. Decisions regarding the intensity of the Paleontological Resource Impact Mitigation Program (PRIMP) will be made by the Project Paleontologist on the basis of the paleontologic resources, not on the ability of an applicant to fund the project.

ASSESSMENT OF THE PALEONTOLOGICAL POTENTIAL OF ROCK UNITS

Sedimentary rock units may be described as having (a) high (or known) potential for containing significant nonrenewable paleontologic resources, (b) low potential for containing nonrenewable paleontologic resources, or (c) undetermined potential.

It is extremely important to distinguish between archaeological and paleontological (=fossil) resource sites when defining the sensitivity of rock units. The boundaries of archaeological sites define the areal extent of the resource. Paleontologic sites, however, indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontologic potential in each case. Paleontologists can thus develop maps which suggest sensitive areas and units that are likely to contain paleontological resources. These maps form the bases for preliminary planning decisions. Lead agency evaluation of a project relative to paleontologic sensitivity maps should trigger a "request for opinion" from a state paleontologic clearing house or an accredited institution with an established paleontological repository.

The determination of a site's (or rock unit's) degree of paleontological potential is first founded on a review of pertinent geological and paleontological literature and on locality records of specimens deposited in institutions. This preliminary review may suggest particular areas of known high potential. If an area of high potential cannot be delimited from the literature search and specimen records, a surface survey will determine the fossiliferous potential and extent of the sedimentary units within a specific project. The field survey may extend outside the defined project to areas where rock units are better exposed. If an area is determined to have a high potential for containing paleontologic resources, a program to mitigate impacts is developed. In areas of high sensitivity, a pre-excavation survey prior to excavation is recommended to locate surface concentrations of fossils which might need special salvage methods.

The sensitivity of rock units in which fossils occur may be divided into three operational categories.

I. HIGH POTENTIAL. Rock units from which vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a high potential for containing significant nonrenewable fossiliferous resources. These units include, but are not limited to, sedimentary formations and some volcanic formations which contain significant nonrenewable paleontologic resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical, and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas which contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas which may contain new vertebrate deposits, traces, or trackways are also classified as significant.

II. UNDETERMINED POTENTIAL. Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.

III. LOW POTENTIAL. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections. These deposits generally will not require protection or salvage operations.

MEASURES TO MITIGATE ADVERSE IMPACTS RESULTING FROM DEVELOPMENT

Measures for adequate protection or salvage of significant nonrenewable paleontologic resources are applied to areas determined to have a high potential for containing significant fossils. Specific mitigation measures generally need not be developed for areas of low paleontological potential. Developers and contractors should be made aware, however, that it is necessary to contact a qualified paleontologist if fossils are unearthed in the course of excavation. The paleontologist will then salvage the fossils and assess the necessity for further mitigation measures, if applicable.

Areas of High Potential

In areas determined to have a high potential for significant paleontologic resources, an adequate program for mitigating the impact of development should include:

(1) a preliminary survey and surface salvage prior to construction;

(2) monitoring and salvage during excavation;

(3) preparation, including screen washing to recover small specimens (if applicable), and specimen preparation to a point of stabilization and identification;

(4) identification, cataloging, curation, and storage; and

(5) a final report of the finds and their significance after all operations are complete.

All phases of mitigation are supervised by a professional paleontologist who maintains the necessary paleontologic collecting permits and repository agreements. The Lead Agency assures compliance with the measures developed to mitigate impacts of excavation during the initial assessment. To assure compliance from the start of the project, a statement that confirms the site's potential sensitivity, confirms the repository agreement with an established institution, and describes the program for impact mitigation, should be deposited with the Lead Agency and contractors before work begins. The program will be reviewed and accepted by the Lead Agency's designated vertebrate paleontologist. If a mitigation program is initiated early during the course of project planning, construction delays due to paleontologic salvage activities can be minimized or avoided.

RECOMMENDED GENERAL GUIDELINES

These guidelines are designed to apply to areas of high paleontologic potential.

Assessment Before Construction Starts.

Preconstruction assessment will develop an adequate program of mitigation. This may include a field survey to delimit the specific boundaries of sensitive areas and pre-excavation meetings with contractors and developers. In some cases it may be necessary to conduct field survey and/or a salvage program prior to grading to prevent damage to known resources and to avoid delays to construction schedules. Such a program may involve surface collection and/or quarry excavations. A review of the initial assessment and proposed miti-gation program by the Lead Agency before operations begin will confirm the adequacy of the proposed program.

Adequate Monitoring.

An excavation project will retain a qualified project paleontologist. In areas of known high potential, the project paleontologist may designate a paleontologic monitor to be present during 100% of the earth-moving activities. If, after 50% of the grading is completed, it can be demonstrated that the level of monitoring should be reduced, the project paleontologist may so amend the mitigation program.

Paleontologists who monitor excavations must be qualified and experienced in salvaging fossils, and authorized to temporarily divert equipment while removing fossils. They should be properly equipped with tools and supplies to allow rapid removal of specimens.

Provision should be made for additional assistants to monitor or help in removing large or abundant fossils to reduce potential delays to excavation schedules. If many pieces of heavy equipment are in use simultaneously but at diverse locations, each location may be individually monitored.

Macrofossil Salvage.

Many specimens recovered from paleontological excavations are easily visible to the eye and large enough to be easily recognized and removed. Some may be fragile and require hardening before moving. Others may require encasing within a plaster jacket for later preparation and conservation in a laboratory. Occasionally specimens encompass all or much of a skeleton and will require moving either as a whole or in blocks for eventual preparation. Such specimens require time to excavate and strengthen before removal and the patience and understanding of the contractor to recover the specimens properly. It is thus important that the contarctors and developers are fully aware of the importance and fragility of fossils for their recovery to be undertaken with the optimum chances of successful extraction. The monitor must be impowered to temporarily halt or redirect the excavation equipment away from the fossils to be salvaged.

Microfossil Salvage.

Many significant vertebrate fossils (e.g., small mammal, bird, reptile, or fish remains) are too small to be visible within the sedimentary matrix. Fine-grained sedimentary horizons and paleosols most often contain such

fossils. They are recovered through concentration by screen washing. If the sediments are fossiliferous, bulk samples are taken for later processing to recover any fossils. An adequate sample comprises 12 cubic meters (6,000 lbs or 2,500 kg) of matrix for each site horizon or paleosol, or as determined by the supervising paleontologist. The uniqueness of the recovered fossils may dictate salvage of larger amounts. To avoid construction delays, samples of matrix should be removed from the site and processed elsewhere.

Preservation of Samples.

Oriented samples must be preserved for paleomagnetic analysis. Samples of fine matrices should be obtained and stored for pollen analysis. Other matrix samples may be retained with the samples for potential analysis by later workers, for clast source analysis, as a witness to the source rock unit and possibly for procedures that are not yet envisioned.

Preparation.

Recovered specimens are prepared for identification (not exhibition) and stabilized. Sedimentary matrix with microfossils is screen washed and sorted to identify the contained fossils. Removal of excess matrix during the preparation process reduces storage space.

Identification.

Specimens are identified by competent qualified specialists to a point of maximum specificity. Ideally, identification is of individual specimens to element, genus, and species. Batch identification and batch numbering (e.g., "mammals, 75 specimens") should be avoided.

Analysis.

Specimens may be analyzed by stratigraphic occurrence, and by size, taxa, or taphonomic conditions. This results in a faunal list, a stratigraphic distribution of taxa, or evolutionary, ecological, or depositional deductions.

Storage.

Adequate storage in a recognized repository institution for the recovered specimens is an essential goal of the program. Specimens will be cataloged and a complete list will be prepared of specimens introduced into the collections of a repository by the curator of the museum or university. Adequate storage includes curation of individual specimens into the collections of a recognized, nonprofit paleontologic specimen repository with a permanent curator, such as a museum or a university. A complete set of field notes, geologic maps, and stratigraphic sections accompany the fossil collections. Specimens are stored in a fashion that allows retrieval of specific, individual specimens by researchers in the future.

Site Protection.

In exceptional instances the process of construction may reveal a fossil occurrence of such importance that salvage or removal is unacceptable to all concerned parties. In such cases, the design concept may be modified to protect and exhibit the occurrence within the project's design, e.g., as an exhibit in a basement mall. Under such circumstances, the site may be declared and dedicated as a protected resource of public value. Associated fragments recovered from such a site will be placed in an approved institutional repository.

Final Report.

A report is prepared by the project paleontologist including a summary of the field and laboratory methods, site geology and stratigraphy, faunal list, and a brief statement of the significance and relationship of the site to similar fossil localities. A complete set of field notes, geological maps, stratigraphic sections, and a list of identified specimens accompany the report. The report is finalized only after all aspects of the program are completed. The Final Report together with its accompanying documents constitute the goals of a mitigation project. Full copies of the Final Report are deposited with the Lead Agency and the repository institution.

Compliance.

The Lead Agency assures compliance with measures to protect fossil resources from the beginning of the project by:

(1) requesting an assessment and program for impact mitigation which includes salvage and protection during initial planning phases,

(2) by arranging for recovered specimens to be housed in an institutional paleontologic repository, and

(3) by requiring the Final Report.

The supervising paleontologist is responsible for:

(1) assessment and development of the program for impact mitigation during initial planning phases,

(2) the repository agreement,

(3) the adequacy and execution of the mitigation measures, and

(4) the Final Report.

Acceptance of the Final Report for the project by the Lead Agency signifies completion of the program of mitigation for the project. Review of the Final Report by a vertebrate paleontologist designated by the Lead Agency will establish the effectiveness of the program and adequacy of the report. Inadequate performances in either field comprise noncompliance, and may result in the Lead Agency removing the paleontologist from its list of qualified consultants.

DEFINITIONS

A QUALIFIED VERTEBRATE PALEONTOLOGIST is a practicing scientist who is recognized in the paleontologic community and is proficient in vertebrate paleontology, as demonstrated by:

(1) institutional affiliations or appropriate credentials,

(2) ability to recognize and recover vertebrate fossils in the field,

(3) local geological and biostratigraphic expertise,

(4) proficiency in identifying vertebrate fossils, and

(5) publications in scientific journals.

A PALEONTOLOGICAL REPOSITORY is a publicly supported, not-for-profit museum or university employing a permanent curator responsible for paleontological records and materials. Such an institution assigns accession and catalog numbers to individual specimens which are stored and conserved to ensure their preservation under adequate security and climate control. The repository will also retain site lists of recovered specimens, and any associated field notes, maps, diagrams, or associated data. It makes its collections of cataloged specimens available to researchers.

SIGNIFICANT NONRENEWABLE PALEONTOLOGIC RESOURCES are fossils and fossiliferous deposits here restricted to vertebrate fossils and their taphonomic and associated environmental indicators. This definition excludes invertebrate or botanical fossils except when present within a given vertebrate assemblage. Certain plant and invertebrate fossils or assemblages may be defined as significant by a project paleontologist, local paleontologist, specialists, or special interest groups, or by Lead Agencies or local governments.

A SIGNIFICANT FOSSILIFEROUS DEPOSIT is a rock unit or formation which contains significant nonrenewable paleontologic resources, here defined as comprising one or more identifiable vertebrate fossils, large or small, and any associated invertebrate and plant fossils, traces and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways, or nests and middens which provide datable material and climatic information). Paleontologic resources are considered to be older than recorded history and/or older than 5,000 years BP.

A LEAD AGENCY is the agency responsible for addressing impacts to nonrenewable resources that a specific project might generate.

PALEONTOLOGIC POTENTIAL is the potential for the presence of significant nonrenewable paleontological resources. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have potential for the presence of significant nonrenewable paleontologic resources. Review of available literature may further refine the potential of each rock unit, formation, or facies.

PALEONTOLOGIC SENSITIVITY is determined only after a field survey of the rock unit in conjunction with a review of available literature and paleontologic locality records. In cases where no subsurface data are available, sensitivity may be determined by subsurface excavation.

Development Committee

In 1994, the reins of the Development Committee passed from David Archibald to John Wible. John would like to thank Dave for his years of service as the Chair of the Committee and for facilitating the transition. In June 1994, John met with the Executive Committee and representatives of Smith, Bucklin and Associates (SBA) in Chicago. The Development Committee was charged with organizing a new fund-raising campaign to meet the growing financial needs of the Society, in particular to enable the *Journal of Vertebrate Paleontology* to increase the number of pages published each year and, thereby, reduce the current 18-month backlog of manuscripts. Working with Dave Krause (SVP President), Mark Thorsby, and Pamela D'Argo (SVP Business Office), a fund-raising plan for 1994–95 campaign will be developed. (John R. Wible, Chair)

Editorial Report, *Journal of Vertebrate Paleontology*

Introduction

Traditionally, the *JVP* annual report has served to summarize the status of the journal, including areas covered by published papers, the number and disposition of submitted manuscripts, and average lag time between acceptance and publication. In recent years, the *JVP* has experienced rapid growth in number of submitted manuscripts, with a resultant increase in lag time. Growth of the journal thus prompts reexamination of the mission of *JVP*, its published length, and the source/amount of support necessary to publish it. Accordingly, a second purpose of this report is to present information on manuscript submission, acceptance, and publication, in order to provide the basis for development of a long-term management plan for the *JVP*.

For historical reasons, the annual report for the *JVP* is based on a fiscal rather than calendar year; consequently, the present report covers the period 1 July 1993 through 30 June 1994. Data for previous reporting periods, not always complete, have been accumulated from several sources, including published issues of *JVP*, editorial reports, and information contained in the *JVP* editorial files. Submitted manuscripts are considered to have only two possible fates, acceptance and rejection. The "rejection" category thus includes manuscripts which are rejected outright, returned with encouragement to submit (these often come back but are sufficiently different to warrant the complete review process; they can be analogized

CONDITIONS OF RECEIVERSHIP FOR PALEONTOLOGIC SALVAGE COLLECTIONS

Society of Vertebrate Paleontology
Conformable Impact Mitigation Guidelines Committee
Robert E. Reynolds, Chairman

Society of Vertebrate Paleontology News Bulletin Number 166, pages 31-32

February 1996

1. The repository museum and its curator maintain the right to accept or refuse the materials.

2. The materials received must fit with the repository museum's mission and policy statements.

3. All repository arrangements must be made with the curator in advance of receipt. All arrangements for inventory numbers and locality numbers must be made in advance. “Museums are not a dumping ground.”

4. The museum will act as the trustee for the specimens. A deed of gift from the land owner or agent must be provided. A loan form or M.O.U. must be prepared for specimens from government lands.

5. Specimens must receive discrete locality numbers. Locality data must be to the maximum specificity available and plotted on 7.5 minute topographic maps, and as specific as allowed by stratigraphic collecting and field mapping. The repository may require the repositor to bear the cost of entering locality data into computerized data files.

6. All reports prepared to meet mitigation requirements, field notes, and photographs must be provided at the time of transfer to the repository museum.

7. Specimens must be delivered to the repository fully prepared and stabilized. Standards of stabilization and modern conservation techniques must be established prior to preparation and must be acceptable to the repository institution. Details of stabilizing materials and chemicals must be provided by the repositor. For microvertebrates, this means sorting and mounting. For large specimens, including whales, this means removal of all unnecessary materials and full stabilization. Fossiliferous matrix must be washed and processed. Earthquake-proofing includes inventory numbers on corks and in vials. In storage, specimens must be insulated or cushioned to protect each from contact or abrasion. Oversized specimens must be stored on shelves or on racks developed to fit existing constraints of the repository museum. The repositor must provide for all nonstandard materials for storage.

8. Specimens must be individually inventoried in accordance with the established system at the repository museum. The specimen inventory must be acceptable to and meet the -

requirements of the lead agency. Specimens must be identified to element and to maximum reasonable taxonomic specificity. Batch or bulk cataloging must be avoided.

9. Specimens must be cataloged in accord with the repository system so that specimens are retrievable to curators and to researchers. The repository museum may require that the repositor bear the cost of having repository staff catalog specimens into computerized data bases.

10. The repository may require the repositor to bear the cost for completing preparation and stabilization, completing inventory, and completing cataloging.

11. There will be a one-time fee charged by the repository for permanent storage of specimens. This fee will be utilized to compensate the repository for storage space, cabinets or shelves, access or aisle space, a retrievable catalog system, additional preparation, specimen filing, and labor involved in the above. The repository reserves the right to charge the repositor for unpacking and placement of specimens in approved storage cabinets.

© 1996, The Society of Vertebrate Paleontology

NATIONAL REGISTER BULLETIN

Technical information on the the National Register of Historic Places: survey, evaluation, registration, and preservation of cultural resources

U.S. Department of the Interior
National Park Service
Cultural Resources
National Register, History and Education

How to Apply the National Register Criteria for Evaluation









The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to tribes.

The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

This material is partially based upon work conducted under a cooperative agreement with the National Conference of State Historic Preservation Officers and the U.S. Department of the Interior.

Date of publication: 1990; revised 1991, 1995, 1997. Revised for Internet 1995.

Cover

(Top Left) ***Criterion B - Frederick Douglass Home,*** *Washington, D.C. From 1877-1899, this was the home of Frederick Douglass, the former slave who rose to become a prominent author, abolitionist, editor, orator, and diplomat. (Walter Smalling, Jr.)*

(Top Right) ***Criterion D - Francis Canyon Ruin,*** *Blanco vicinity, Rio Arriba County, New Mexico. A fortified village site composed of 40 masonry-walled rooms arranged in a cluster of four house blocks. Constructed ca. 1716-1742 for protection against raiding Utes and Comanches, the site has information potential related to Navajo, Pueblo, and Spanish cultures. (Jon Samuelson)*

(Bottom Left) ***Criterion C - Bridge in Cherrytree Township,*** *Venago County, Pennsylvania. Built in 1882, this Pratt through truss bridge is significant for engineering as a well preserved example of a type of bridge frequently used in northwestern Pennsylvania in the late 19th century. (Pennsylvania Department of Transportation)*

(Bottom Right) ***Criterion A - Main Street/Market Square Historic District,*** *Houston, Harris County, Texas. Until well into the 20th century this district marked the bounds of public and business life in Houston. Constructed between the 1870s and 1920s, the district includes Houston's municipal and county buildings, and served as the city's wholesale, retail, and financial center. (Paul Hester)*

PREFACE

Preserving historic properties as important reflections of our American heritage became a national policy through passage of the Antiquities Act of 1906, the Historic Sites Act of 1935, and the National Historic Preservation Act of 1966, as amended. The Historic Sites Act authorized the Secretary of the Interior to identify and recognize properties of national significance (National Historic Landmarks) in United States history and archeology. The National Historic Preservation Act of 1966 authorized the Secretary to expand this recognition to properties of local and State significance in American history, architecture, archeology, engineering, and culture, and worthy of preservation. The National Register of Historic Places is the official list of these recognized properties, and is maintained and expanded by the National Park Service on behalf of the Secretary of the Interior.[1]

The National Register of Historic Places documents the appearance and importance of districts, sites, buildings, structures, and objects significant in our prehistory and history. These properties represent the major patterns of our shared local, State, and national experience. To guide the selection of properties included in the National Register, the National Park Service has developed the National Register Criteria for Evaluation. These criteria are standards by which every property that is nominated to the National Register is judged. In addition, the National Park Service has developed criteria for the recognition of nationally significant properties, which are designated National Historic Landmarks and prehistoric and historic units of the National Park System. Both these sets of criteria were developed to be consistent with the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation*, which are uniform, national standards for preservation activities.[2]

This publication explains how the National Park Service applies these criteria in evaluating the wide range of properties that may be significant in local, State, and national history.

It should be used by anyone who must decide if a particular property qualifies for the National Register of Historic Places.

Listing properties in the National Register is an important step in a nationwide preservation process. The responsibility for the identification, initial evaluation, nomination, and treatment of historic resources lies with private individuals, State historic preservation offices, and Federal preservation offices, local governments, and Indian tribes. The final evaluation and listing of properties in the National Register is the responsibility of the Keeper of the National Register.

This bulletin was prepared by staff of the National Register Branch, Interagency Resources Division, National Park Service, with the assistance of the History Division. It was originally issued in draft form in 1982. The draft was revised into final form by Patrick W. Andrus, Historian, National Register, and edited by Rebecca H. Shrimpton, Consulting Historian.

Beth L. Savage, National Register and Sarah Dillard Pope, National Register, NCSHPO coordinated the latest revision of this bulletin. Antionette J. Lee, Tanya Gossett, and Kira Badamo coordinated earlier revisions.

[1]Properties listed in the National Register receive limited Federal protection and certain benefits. For more information concerning the effects of listing, and how the National Register may be used by the general public and Certified Local Governments, as well as by local, State, and Federal agencies, and for copies of National Register Bulletins, contact the National Park Service, National Register, 1849 C Street, NW, NC400, Washington, D.C., 20240. Information may also be obtained by visiting the National Register Web site at **www.cr.nps.gov/nr** or by contacting any of the historic preservation offices in the States and territories.

[2]The *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* are found in the *Federal Register*, Vol. 48, No. 190 (Thursday, September 29, 1983). A copy can be obtained by writing the National Park Service, Heritage Preservation Services (at the address above).

TABLE OF CONTENTS

Preface i

I. Introduction 1

II. National Register Criteria for Evaluation 2

III. How to Use this Bulletin to Evaluate a Property 3

IV. How to Define Categories of Historic Properties 4

Building 4
Structure 4
Object 5
Site 5
District 5
- Concentration, Linkage, & Continuity of Features 5
- Significance 5
- Types of Features 5
- Geographical Boundaries 6
- Discontiguous Districts 6

V. How to Evaluate a Property Within its Historic Context 7

Understanding Historic Contexts 7
How to Evaluate a Property Within Its Historic Context 7
- Properties Significant Within More Than on Historic Context 9
- Comparing Related Properties 9

Local, State, and National Historic Contexts 9

VI. How to Identify the Type of Significance of a Property 11

Introduction 11
Criterion A: Event 12
- Understanding Criterion A 12
- Applying Criterion A 12
  - Types of Events 12
  - Association of the Property with the Events 12
  - Significance of the Association 12
  - Traditional Cultural Values 13

Criterion B: Person 14
- Understanding Criterion B 14
- Applying Criterion B 15
  - Significance of the Individual 15
  - Association with the Property 15
  - Comparison to Related Properties 15
  - Association with Groups 15
  - Association with Living Persons 16
  - Association with Architects/Artisans 16
  - Native American Sites 16

Criterion C: Design/Construction 17
- Understanding Criterion C 17
- Applying Criterion C 18

Distinctive Characteristics of Type, Period, and Method of Construction 18
Historic Adaptation of the Original Property 19
Works of a Master 20
Properties Possessing High Artistic Values 20

Criterion D: Information Potential 21
Understanding Criterion D 21
Applying Criterion D 21
Archeological Sites 21
Buildings, Structures, and Objects 21
Association with Human Activity 22
Establishing a Historic Context 22
Developing Research Questions 22
Establishing the Presence of Adequate Data 23
Integrity 23
Partly Excavated or Disturbed Properties 23
Completely Excavated Sites 24

VII. How to Apply the Criteria Considerations 25

Introduction 25
Criteria Consideration A: Religious Properties 26
Understanding Criteria Consideration A 26
Applying Criteria Consideration A 26
Eligibility for Historic Events 26
Eligibility for Historic Persons 27
Eligibility for Architectural or Artistic Distinction 28
Eligibility for Information Potential 28
Ability to Reflect Historic Associations 28

Criteria Consideration B: Moved Properties 29
Understanding Criteria Consideration B 29
Applying Criteria Consideration B 29
Eligibility for Architectural Value 29
Eligibility for Historic Associations 30
Setting and Environment 30
Association Dependent on the Site 30
Properties Designed to Be Moved 31
Artificially Created Groupings 31
Portions of Properties 31

Criteria Consideration C: Birthplaces and Graves 32
Understanding Criteria Consideration C 32
Applying Criteria Consideration C 32
Persons of Outstanding Importance 32
Last Surviving Property Associated with a Person 32
Eligibility for Other Associations 33

Criteria Consideration D: Cemeteries 34
Understanding Criteria Consideration D 34
Applying Criteria Consideration D 34
Persons of Transcendent Importance 34
Eligibility on the Basis of Age 35
Eligibility for Design 35
Eligibility for Association with Events 35
Eligibility for Information Potential 35
Integrity 36
National Cemeteries 36

Criteria Consideration E: Reconstructed Properties 37
Understanding Criteria Consideration E 37
Applying Criteria Consideration E 37
Accuracy of the Reconstruction 37
Suitable Environment 37
Restoration Master Plans 38

Last Surviving Property of a Type 38
Reconstructions Older than Fifty Years 38

Criteria Consideration F: Commemorative Properties 39
Understanding Criteria Consideration F 39
Applying Criteria Consideration F 39
Eligibility for Design 39
Eligibility for Age, Tradition, or Symbolic Value 40
Ineligibility as the Last Representative of an Event or Person 40

Criteria Consideration G: Properties that Have Achieved Significance Within the Past Fifty Years 41
Understanding Criteria Consideration G 41
Applying Criteria Consideration G 42
Eligibility for Exceptional Importance 42
Historical Perspective 42
National Park Service Rustic Architecture 42
Veterans Administration Hospitals 42
Comparison with Related Properties 42
World War II Properties 42
Eligibility for Information Potential 43
Historic Districts 43
Properties Over Fifty Years in Age, Under Fifty Years in Significance 43
Requirement to Meet the Criteria, Regardless of Age 43

VIII. How to Evaluate the Integrity of a Property 44

Introduction 44
Understanding the Aspects of Integrity 44
Location 44
Design 44
Setting 44
Materials 45
Workmanship 45
Feeling 45
Association 45
Assessing Integrity in Properties 45
Defining the Essential Physical Features 46
Visibility of the Physical Features 46
Comparing Similar Properties 47
Determining the Relevant Aspects of Integrity 48

IX. Summary of the National Historic Landmarks Criteria for Evaluation 50

X. Glossary 53

XI. List of National Register Bulletins 54

I. INTRODUCTION

The National Register is the nation's inventory of historic places and the national repository of documentation on the variety of historic property types, significance, abundance, condition, ownership, needs, and other information. It is the beginning of a national census of historic properties. The National Register Criteria for Evaluation define the scope of the National Register of Historic Places; they identify the range of resources and kinds of significance that will qualify properties for listing in the National Register. The Criteria are written broadly to recognize the wide variety of historic properties associated with our prehistory and history.

Decisions concerning the significance, historic integrity, documentation, and treatment of properties can be made reliably only when the resource is evaluated within its historic context. The historic context serves as the framework within which the National Register Criteria are applied to specific properties or property types. (See *Part V* for a brief discussion of historic contexts. Detailed guidance for developing and applying historic contexts is contained in *National Register Bulletin: How to Complete the National Register Registration Form* and *National Register Bulletin: How to Complete the National Register Multiple Property Documentation Form*)

The guidelines provided here are intended to help you understand the National Park Service's use of the Criteria for Evaluation, historic contexts, integrity, and Criteria Considerations, and how they apply to properties under consideration for listing in the National Register. Examples are provided throughout, illustrating specific circumstances in which properties are and are not eligible for the National Register. This bulletin should be used by anyone who is:

- Preparing to nominate a property to the National Register,
- Seeking a determination of a property's eligibility,
- Evaluating the comparable significance of a property to those listed in the National Register, or
- Expecting to nominate a property as a National Historic Landmark in addition to nominating it to the National Register.

This bulletin also contains a summary of the National Historic Landmarks Criteria for Evaluation (see *Part IX*). National Historic Landmarks are those districts, sites, buildings, structures, and objects designated by the Secretary of the Interior as possessing national significance in American history, architecture, archeology, engineering, and culture. Although National Register documentation includes a recommendation about whether a property is significant at the local, State, or national level, the only official designation of national significance is as a result of National Historic Landmark designation by the Secretary of the Interior, National Monument designation by the President of the United States, or establishment as a unit of the National Park System by Congress. These properties are automatically listed in the National Register.

II. THE NATIONAL REGISTER CRITERIA FOR EVALUATION

CRITERIA FOR EVALUATION:[3]

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history.

CRITERIA CONSIDERATIONS:

Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties *will qualify* if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

a. A religious property deriving primary significance from architectural or artistic distinction or historical importance; or

b. A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

c. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his or her productive life; or

d. A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or

e. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or

f. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or

g. A property achieving significance within the past 50 years if it is of exceptional importance.

[3]The Criteria for Evaluation are found in the *Code of Federal Regulations, Title 36, Part 60*, and are reprinted here in full.

III. HOW TO USE THIS BULLETIN TO EVALUATE A PROPERTY

For a property to qualify for the National Register it must meet one of the National Register Criteria for Evaluation by:

- **Being associated with an important historic context** *and*
- **Retaining historic integrity of those features necessary to convey its significance.**

Information about the property based on physical examination and documentary research is necessary to evaluate a property's eligibility for the National Register. Evaluation of a property is most efficiently made when following this sequence:

1. Categorize the property (Part IV). A property must be classified as a district, site, building, structure, or object for inclusion in the National Register.
2. **Determine which prehistoric or historic context(s) the property represents** (Part V). A property must possess significance in American history, architecture, archeology, engineering, or culture when evaluated within the historic context of a relevant geographic area.
3. Determine whether the property is significant under the National Register Criteria (Part VI). This is done by identifying the links to important events or persons, design or construction features, or information potential that make the property important.
4. Determine if the property represents a type usually excluded from the National Register (Part VII). If so, determine if it meets any of the Criteria Considerations.
5. Determine whether the property retains integrity (Part VIII). Evaluate the aspects of location, design, setting, workmanship, materials, feeling, and association that the property must retain to convey its historic significance.

If, after completing these steps, the property appears to qualify for the National Register, the next step is to prepare a written nomination. (Refer to *National Register Bulletin: How to Complete the National Register Registration Form.*)

IV. HOW TO DEFINE CATEGORIES OF HISTORIC PROPERTIES

The National Register of Historic Places includes significant properties, classified as buildings, sites, districts, structures, or objects. It is not used to list intangible values, except in so far as they are associated with or reflected by historic properties. The National Register does not list cultural events, or skilled or talented individuals, as is done in some countries. Rather, the National Register is oriented to recognizing physically concrete properties that are relatively fixed in location.

For purposes of National Register nominations, small groups of properties are listed under a single category, using the primary resource. For example, a city hall and fountain would be categorized by the city hall (building), a farmhouse with two outbuildings would be categorized by the farmhouse (building), and a city park with a gazebo would be categorized by the park (site). Properties with large acreage or a number of resources are usually considered districts. Common sense and reason should dictate the selection of categories.

BUILDING

A building, such as a house, barn, church, hotel, or similar construction, is created principally to shelter any form of human activity. "Building" may also be used to refer to a historically and functionally related unit, such as a courthouse and jail or a house and barn.

Buildings eligible for the National Register must include all of their basic structural elements. Parts of buildings, such as interiors, facades, or wings, are not eligible independent of the rest of the existing building. The whole building must be considered, and its significant features must be identified.

If a building has lost any of its basic structural elements, it is usually considered a "ruin" and is categorized as a site.

Examples of buildings include:

administration building
carriage house
church
city or town hall
courthouse
detached kitchen, barn, and privy
dormitory
fort
garage
hotel
house
library
mill building
office building
post office
school
social hall
shed
stable
store
theater
train station

STRUCTURE

The term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter.

Structures nominated to the National Register must include all of the extant basic structural elements. Parts of structures can not be considered eligible if the whole structure remains. For example, a truss bridge is composed of the metal or wooden truss, the abutments, and supporting piers, all of which, if extant, must be included when considering the property for eligibility.

If a structure has lost its historic configuration or pattern of organization through deterioration or demolition, it is usually considered a "ruin" and is categorized as a site.

Examples of structures include:

aircraft
apiary
automobile
bandstand
boats and ships
bridge
cairn
canal
carousel
corncrib
dam
earthwork
fence
gazebo
grain elevator
highway
irrigation system
kiln
lighthouse
railroad grade
silo
trolley car
tunnel
windmill

OBJECT

The term "object" is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed. Although it may be, by nature or design, movable, an object is associated with a specific setting or environment.

Small objects not designed for a specific location are normally not eligible. Such works include transportable sculpture, furniture, and other decorative arts that, unlike a fixed outdoor sculpture, do not possess association with a specific place.

Objects should be in a setting appropriate to their significant historic use, roles, or character. Objects relocated to a museum are inappropriate for listing in the National Register.

Examples of objects include:

boundary marker
fountain
milepost
monument
scupture
statuary

SITE

A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archeological value regardless of the value of any existing structure.

A site can possess associative significance or information potential or both, and can be significant under any or all of the four criteria. A site need not be marked by physical remains if it is the location of a prehistoric or historic event or pattern of events and if no buildings, structures, or objects marked it at the time of the events. However, when the location of a prehistoric or historic event cannot be conclusively determined because no other cultural materials were present or survive, documentation must be carefully evaluated to determine whether the traditionally recognized or identified site is accurate.

A site may be a natural landmark strongly associated with significant prehistoric or historic events or patterns of events, if the significance of the natural feature is well documented through scholarly research. Generally, though, the National Register excludes from the definition of "site" natural waterways or bodies of water that served as determinants in the location of communities or were significant in the locality's subsequent economic development. While they may have been "avenues of exploration," the features most appropriate to document this significance are the properties built in association with the waterways.

Examples of sites include:

battlefield
campsite
cemeteries significant for information potential or historic association
ceremonial site
designed landscape
habitation site
natural feature (such as a rock formation) having cultural significance
petroglyph
rock carving
rock shelter
ruins of a building or structure
shipwreck
trail
village site

DISTRICT

A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

CONCENTRATION, LINKAGE, & CONTINUITY OF FEATURES

A district derives its importance from being a unified entity, even though it is often composed of a wide variety of resources. The identity of a district results from the interrelationship of its resources, which can convey a visual sense of the overall historic environment or be an arrangement of historically or functionally related properties. For example, a district can reflect one principal activity, such as a mill or a ranch, or it can encompass several interrelated activities, such as an area that includes industrial, residential, or commercial buildings, sites, structures, or objects. A district can also be a grouping of archeological sites related primarily by their common components; these types of districts often will not visually represent a specific historic environment.

SIGNIFICANCE

A district must be significant, as well as being an identifiable entity. It must be important for historical, architectural, archeological, engineering, or cultural values. Therefore, districts that are significant will usually meet the last portion of Criterion C plus Criterion A, Criterion B, other portions of Criterion C, or Criterion D.

TYPES OF FEATURES

A district can comprise both features that lack individual distinction and individually distinctive features that serve as focal points. It may even be considered eligible if all of the components lack individual distinction, provided that the grouping achieves significance as a whole within its historic context. In either case, the majority of the components that add to the district's historic character, even if they are individually undistinguished, must possess integrity, as must the district as a whole.

A district can contain buildings, structures, sites, objects, or open spaces that do not contribute to the significance of the district. The number of noncontributing properties a district can contain yet still convey its sense of time and place and historical development depends on how these properties affect the district's integrity. In archeological districts, the primary factor to be considered is the effect of any disturbances on the information potential of the district as a whole.

GEOGRAPHICAL BOUNDARIES

A district must be a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures, and objects, or by documented differences in patterns of historic development or associations. It is seldom defined, however, by the limits of current parcels of ownership, management, or planning boundaries. The boundaries must be based upon a shared relationship among the properties constituting the district.

DISCONTIGUOUS DISTRICTS

A district is usually a single geographic area of contiguous historic properties; however, a district can also be composed of two or more definable significant areas separated by nonsignificant areas. A discontiguous district is most appropriate where:

- Elements are spatially discrete;
- Space between the elements is not related to the significance of the district; and
- Visual continuity is not a factor in the significance.

In addition, a canal can be treated as a discontiguous district when the system consists of man-made sections of canal interspersed with sections of river navigation. For scattered archeological properties, a discontiguous district is appropriate when the deposits are related to each other through cultural affiliation, period of use, or site type.

It is not appropriate to use the discontiguous district format to include an isolated resource or small group of resources which were once connected to the district, but have since been separated either through demolition or new construction. For example, do not use the discontiguous district format to nominate individual buildings of a downtown commerical district that have become isolated through demolition.

Examples of districts include:

business districts
canal systems
groups of habitation sites
college campuses
estates and farms with large acreage/ numerous properties
industrial complexes
irrigation systems
residential areas
rural villages
transportation networks
rural historic districts



***Ordeman-Shaw Historic District**, Montgomery, Montgomery County, Alabama. Historic districts derive their identity from the interrationship of their resources. Part of the defining characteristics of this 19th century residential district in Montgomery, Alabama, is found in the rhythmic pattern of the rows of decorative porches. (Frank L. Thiermonge, III)*

V. HOW TO EVALUATE A PROPERTY WITHIN ITS HISTORIC CONTEXT

UNDERSTANDING HISTORIC CONTEXTS

To qualify for the National Register, a property must be significant; that is, it must represent a significant part of the history, architecture, archeology, engineering, or culture of an area, and it must have the characteristics that make it a good representative of properties associated with that aspect of the past. This section explains how to evaluate a property within its historic context.[4]

The significance of a historic property can be judged and explained only when it is evaluated within its historic context. Historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made clear. Historians, architectural historians, folklorists, archeologists, and anthropologists use different words to describe this phenomena such as trend, pattern, theme, or cultural affiliation, but ultimately the concept is the same.

The concept of historic context is not a new one; it has been fundamental to the study of history since the 18th century and, arguably, earlier than that. Its core premise is that resources, properties, or happenings in history do not occur in a vacuum but rather are part of larger trends or patterns.

In order to decide whether a property is significant within its historic context, the following five things must be determined:

- The facet of prehistory or history of the local area, State, or the nation that the property represents;
- Whether that facet of prehistory or history is significant;
- Whether it is a type of property that has relevance and importance in illustrating the historic context;
- How the property illustrates that history; and finally
- Whether the property possesses the physical features necessary to convey the aspect of prehistory or history with which it is associated.

These five steps are discussed in detail below. If the property being evaluated does represent an important aspect of the area's history or prehistory *and* possesses the requisite quality of integrity, then it qualifies for the National Register.

HOW TO EVALUATE A PROPERTY WITHIN ITS HISTORIC CONTEXT

Identify what the property represents: the theme(s), geographical limits, and chronological period that provide a perspective from which to evaluate the property's significance.

Historic contexts are historical patterns that can be identified through consideration of the history of the property and the history of the surrounding area. Historic contexts may have already been defined in your area by the State historic preservation office, Federal agencies, or local governments. In accordance with the National Register Criteria, the historic context may relate to one of the following:

- An event, a series of events or activities, or patterns of an area's development (Criterion A);
- Association with the life of an important person (Criterion B);
- A building form, architectural style, engineering technique, or artistic values, based on a stage of physical development, or the use of a material or method of construction that shaped the historic identity of an area (Criterion C); or
- A research topic (Criterion D).

[4] For a complete discussion of historic contexts, see *National Register Bulletin: Guidelines for Completing National Register of Historic Places Registration Forms.*

Determine how the theme of the context is significant in the history of the local area, the State, or the nation.

A theme is a means of organizing properties into coherent patterns based on elements such as environment, social/ethnic groups, transportation networks, technology, or political developments that have influenced the development of an area during one or more periods of prehistory or history. A theme is considered significant if it can be demonstrated, through scholarly research, to be important in American history. Many significant themes can be found in the following list of Areas of Significance used by the National Register.

AREAS OF SIGNIFICANCE

Agriculture
Architecture
Archeology
  Prehistoric
  Historic—Aboriginal
  Historic—Non-Aboriginal
Art
Commerce
Communications
Community Planning and Development
Conservation
Economics
Education
Engineering
Entertainment/Recreation
Ethnic Heritage
  Asian
  Black
  European
  Hispanic
  Native American
  Pacific Islander
  Other
Exploration/Settlement
Health/Medicine
Industry
Invention
Landscape Architecture
Law
Literature
Maritime History
Military
Performing Arts
Philosophy
Politics/Government
Religion
Science
Social History
Transportation
Other

Determine what the property type is and whether it is important in illustrating the historic context.

A context may be represented by a variety of important property types. For example, the context of "Civil War Military Activity in Northern Virginia" might be represented by such properties as: a group of mid-19th century fortification structures; an open field where a battle occurred; a knoll from which a general directed troop movements; a sunken transport ship; the residences or public buildings that served as company headquarters; a railroad bridge that served as a focal point for a battle; and earthworks exhibiting particular construction techniques.

Because a historic context for a community can be based on a distinct period of development, it might include numerous property types. For example, the context "Era of Industrialization in Grand Bay, Michigan, 1875 - 1900" could be represented by important property types as diverse as sawmills, paper mill sites, salt refining plants, flour mills, grain elevators, furniture factories, workers housing, commercial buildings, social halls, schools, churches, and transportation facilities.

A historic context can also be based on a single important type of property. The context "Development of County Government in Georgia, 1777 - 1861" might be represented solely by courthouses. Similarly, "Bridge Construction in Pittsburgh, 1870 - 1920" would probably only have one property type.

Determine how the property represents the context through specific historic associations, architectural or engineering values, or information potential (the Criteria for Evaluation).

For example, the context of county government expansion is represented under Criterion A by historic districts or buildings that reflect population growth, development patterns, the role of government in that society, and political events in the history of the State, as well as the impact of county government on the physical development of county seats. Under Criterion C, the context is represented by properties whose architectural treatments reflect their governmental functions, both practically and symbolically. (See *Part VI: How to Identify the Type of Significance of a Property.*)

Determine what physical features the property must possess in order for it to reflect the significance of the historic context.

These physical features can be determined after identifying the following:

- Which types of properties are associated with the historic context,
- The ways in which properties can represent the theme, and
- The applicable aspects of integrity.

Properties that have the defined characteristics are eligible for listing. (See *Part VIII: How to Evaluate the Integrity of a Property.*)

PROPERTIES SIGNIFICANT WITHIN MORE THAN ONE HISTORIC CONTEXT

A specific property can be significant within one or more historic contexts, and, if possible, all of these should be identified. For example, a public building constructed in the 1830s that is related to the historic context of Civil War campaigns in the area might also be related to the theme of political developments in the community during the 1880s. A property is only required, however, to be documented as significant in one context.

COMPARING RELATED PROPERTIES

Properties listed in the National Register must possess significance when evaluated in the perspective of their historic context. Once the historic context is established and the property type is determined, it is not necessary to evaluate the property in question against other properties *if*:

- It is the sole example of a property type that is important in illustrating the historic context or
- It clearly possesses the defined characteristics required to strongly represent the context.

If these two conditions do not apply, then the property will have to be evaluated against other examples of the property type to determine its eligibility. The geographic level (local, State, or national) at which this evaluation is made is the same as the level of the historic context. (See *Part V: How to Evaluate a Property Within Its Historic Context.*)

LOCAL, STATE, AND NATIONAL HISTORIC CONTEXTS

Historic contexts are found at a variety of geographical levels or scales. The geographic scale selected may relate to a pattern of historical development, a political division, or a cultural area. Regardless of the scale, the historic context establishes the framework from which decisions about the significance of related properties can be made.

LOCAL HISTORIC CONTEXTS

A local historic context represents an aspect of the history of a town, city, county, cultural area, or region, or any portions thereof. It is defined by the importance of the property, not necessarily the physical location of the property. For instance, if a property is of a type found throughout a State, or its boundaries extend over two States, but its importance relates only to a particular county, the property would be considered of local significance.

The level of context of archeological sites significant for their information potential depends on the scope of the applicable research design. For example, a Late Mississippian village site may yield information in a research design concerning one settlement system on a regional scale, while in another research design it may reveal information of local importance concerning a single group's stone tool manufacturing techniques or house forms. It is a question of how the available information potential is likely to be used.

STATE HISTORIC CONTEXTS

Properties are evaluated in a State context when they represent an aspect of the history of the State as a whole (or American Samoa, the District of Columbia, the Commonwealth of the Northern Mariana Islands, Guam, Puerto Rico, or the Virgin Islands). These properties do not necessarily have to belong to property types found throughout the entire State: they can be located in only a portion of the State's present political boundary. It is the property's historic context that must be important statewide. For example, the "cotton belt" extends through only a portion of Georgia, yet its historical development in the antebellum period affected the entire State. These State historic contexts may have associated properties that are statewide or locally significant representations. A cotton gin in a small town might be a locally significant representation of this context, while one of the largest cotton producing plantations might be of State significance.

A property whose historic associations or information potential appears to extend beyond a single local area might be significant at the State level. A property can be significant to more than one community or local area, however, without having achieved State significance.

A property that overlaps several State boundaries can possibly be significant to the State or local history of each of the States. Such a property is not necessarily of national significance, however, nor is it necessarily significant to all of the States in which it is located.

Prehistoric sites are not often considered to have "State" significance, per se, largely because States are relatively recent political entities and usually do not correspond closely to Native American political territories or cultural areas. Numerous sites, however, may be of significance to a large region that might geographically encompass parts of one, or usually several, States. Prehistoric resources that might be of State significance include regional sites that provide a diagnostic assemblage of artifacts for a particular cultural group or time period or that provide chronological control (specific dates or relative order in time) for a series of cultural groups.

NATIONAL HISTORIC CONTEXTS

Properties are evaluated in a national context when they represent an aspect of the history of the United States and its territories as a whole. These national historic contexts may have associated properties that are locally or statewide significant representations, as well as those of national significance.

Properties designated as nationally significant and listed in the National Register are the prehistoric and historic units of the National Park System and those properties that have been designated National Historic Landmarks. The National Historic Landmark criteria are the standards for nationally significant properties; they are found in the *Code of Federal Regulations, Title 36, Part 65* and are summarized in this bulletin in *Part IX: Summary of National Historic Landmarks Criteria for Evaluation.*

A property with national significance helps us understand the history of the nation by illustrating the nationwide impact of events or persons associated with the property, its architectural type or style, or information potential. It must be of exceptional value in representing or illustrating an important theme in the history of the nation.

Nationally significant properties do not necessarily have to belong to a property type found throughout the entire country: they can be located in only a portion of the present political boundaries. It is their historic context that must be important nationwide. For example, the American Civil War was fought in only a portion of the United States, yet its impact was nationwide. The site of a small military skirmish might be a locally significant representation of this national context, while the capture of the State's largest city might be a statewide significant representation of the national context.

When evaluating properties at the national level for designation as a National Historic Landmark, please refer to the National Historic Landmarks outline, *History and Prehistory in the National Park System and the National Historic Landmarks Program 1987.* (For more information about the National Historic Landmarks program, please write to the Department of the Interior, National Park Service, National Historic Landmarks, 1849 C Street, NW, NC400, Washington, DC 20240.)

VI. HOW TO IDENTIFY THE TYPE OF SIGNIFICANCE OF A PROPERTY

INTRODUCTION

When evaluated within its historic context, a property must be shown to be significant for *one or more of the four Criteria for Evaluation - A, B, C, or D* (listed earlier in *Part II*). The Criteria describe how properties are significant for their association with important events or persons, for their importance in design or construction, or for their information potential.

The basis for judging a property's significance and, ultimately, its eligibility under the Criteria is *historic context*. The use of historic context allows a property to be properly evaluated in a nearly infinite number of capacities. For instance, Criterion C: Design/Construction can accommodate properties representing construction types that are unusual or widely practiced, that are innovative or traditional, that are "high style" or vernacular, that are the work of a famous architect or an unknown master craftsman. *The key to determining whether the characteristics or associations of a particular property are significant is to consider the property within its historic context.*

After identifying the relevant historic context(s) with which the property is associated, the four Criteria are applied to the property. Within the scope of the historic context, the National Register Criteria define the kind of significance that the properties represent.

For example, within the context of "19th Century Gunpowder Production in the Brandywine Valley," Criterion A would apply to those properties associated with important events in the founding and development of the industry. Criterion B would apply to those properties associated with persons who are significant in the founding of the industry or associated with important inventions related to gunpowder manufacturing. Criterion C would apply to those buildings, structures, or objects whose architectural form or style reflect important design qualities integral to the industry. And Criterion D would apply to properties that can convey information important in our understanding of this industrial process. If a property qualifies under more than one of the Criteria, its significance under each should be considered, if possible, in order to identify all aspects of its historical value.

NATIONAL REGISTER CRITERIA FOR EVALUATION*

The National Register Criteria recognize different types of values embodied in districts, sites, buildings, structures, and objects. These values fall into the following categories:

Associative value (Criteria A and B): Properties significant for their association or linkage to events (Criterion A) or persons (Criterion B) important in the past.

Design or Construction value (Criterion C): Properties significant as representatives of the manmade expression of culture or technology.

Information value (Criterion D): Properties significant for their ability to yield important information about prehistory or history.

*For a complete listing of the Criteria for Evaluation, refer to Part II of this bulletin.

CRITERION A: EVENT

Properties can be eligible for the National Register if they are associated with events that have made a significant contribution to the broad patterns of our history.

UNDERSTANDING CRITERION A: EVENT

To be considered for listing under Criterion A, a property must be associated with one or more events important in the defined historic context. Criterion A recognizes properties associated with single events, such as the founding of a town, or with a pattern of events, repeated activities, or historic trends, such as the gradual rise of a port city's prominence in trade and commerce. The event or trends, however, must clearly be important within the associated context: settlement, in the case of the town, or development of a maritime economy, in the case of the port city. Moreover, the property must have an important association with the event or historic trends, and it must retain historic integrity. (See *Part V: How to Evaluate a Property Within its Historic Context.)*

Several steps are involved in determining whether a property is significant for its associative values:

- Determine the nature and origin of the property,
- Identify the historic context with which it is associated, and
- Evaluate the property's history to determine whether it is associated with the historic context in any important way.

APPLYING CRITERION A: EVENT

TYPES OF EVENTS

A property can be associated with either (or both) of two types of events:

- A specific event marking an important moment in American prehistory or history and
- A pattern of events or a historic trend that made a significant contribution to the development of a community, a State, or the nation.

Refer to the sidebar on the right for a list of specific examples.

ASSOCIATION OF THE PROPERTY WITH THE EVENTS

The property you are evaluating must be documented, through accepted means of historical or archeological research (including oral history), to have existed at the time of the event or pattern of events *and* to have been associated with those events. A property is *not* eligible if its associations are speculative. For archeological sites, well reasoned inferences drawn from data recovered at the site can be used to establish the association between the site and the events.

SIGNIFICANCE OF THE ASSOCIATION

Mere association with historic events or trends is not enough, in and of itself, to qualify under Criterion A: the property's specific association must be considered important as well. For example, a building historically in commercial use must be shown to have been significant in commercial history.

EXAMPLES OF PROPERTIES ASSOCIATED WITH EVENTS

Properties associated with specific events:

- *The site of a battle.*
- *The building in which an important invention was developed.*
- *A factory district where a significant strike occurred.*
- *An archeological site at which a major new aspect of prehistory was discovered, such as the first evidence of man and extinct Pleistocene animals being contemporaneous.*
- *A site where an important facet of European exploration occurred.*

Properties associated with a pattern of events:

- *A trail associated with western migration.*
- *A railroad station that served as the focus of a community's transportation system and commerce.*
- *A mill district reflecting the importance of textile manufacturing during a given period.*
- *A building used by an important local social organization.*
- *A site where prehistoric Native Americans annually gathered for seasonally available resources and for social interaction.*
- *A downtown district representing a town's growth as the commercial focus of the surrounding agricultural area.*

TRADITIONAL CULTURAL VALUES

Traditional cultural significance is derived from the role a property plays in a community's historically rooted beliefs, customs, and practices. Properties may have significance under Criterion A if they are associated with events, or series of events, significant to the cultural traditions of a community.[5]

Eligible

- A hilltop associated in oral historical accounts with the founding of an Indian tribe or society is eligible.
- A rural community can be eligible whose organization, buildings, or patterns of land use reflect the cultural traditions valued by its long-term residents.
- An urban neighborhood can be eligible as the traditional home of a particular cultural group and as a reflection of its beliefs and practices.

Not Eligible

- A site viewed as sacred by a recently established utopian or religious community does not have traditional cultural value and is not eligible.



Criterion A - The Old Brulay Plantation, *Brownsville vicinity, Cameron county, Texas. Historically significant for its association with the development of agriculture in southeast Texas, this complex of 10 brick buildings was constructed by George N. Brulay, a French immigrant who introduced commercial sugar production and irrigation to the Rio Grande Valley. (Photo by Texas Historical Commission).*

[5] For more information, refer to *National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties.*

CRITERION B: PERSON

Properties may be eligible for the National Register if they are associated with the lives of persons significant in our past.

UNDERSTANDING CRITERION B: PERSON[6]

Criterion B applies to properties associated with individuals whose specific contributions to history can be identified and documented. Persons "significant in our past" refers to individuals whose activities are demonstrably important within a local, State, or national historic context. The criterion is generally restricted to those properties that illustrate (rather than commemorate) a person's important achievements. (The policy regarding commemorative properties, birthplaces, and graves is explained further in *Part VIII: How to Apply the Criteria Considerations.)*

Several steps are involved in determining whether a property is significant for its associative values under Criterion B. First, determine the importance of the individual. Second, ascertain the length and nature of his/her association with the property under study and identify the other properties associated with the individual. Third, consider the property under Criterion B, as outlined below.

EXAMPLES OF PROPERTIES ASSOCIATED WITH PERSONS

Properties associated with a Significant Person:

- *The home of an important merchant or labor leader.*
- *The studio of a significant artist.*
- *The business headquarters of an important industrialist.*



Criterion B - The William Whitney House, *Hinsdale, DuPage County, Illinois. This building is locally significant for its historical association with William Whitney, the founder of the town of Hinsdale, Illinois. Whitney, a citizen of New York State, moved to Illinois, established the town, and while living here between 1870 and 1879 was a prominent local businessman and politician. (Photo by Frederick C. Cue).*

[6] For further information on properties eligible under Criterion B, refer to *National Register Bulletin: Guidelines for Evaluating and Documenting Properties Associated with Significant Persons.*

APPLYING CRITERION B: PERSON

SIGNIFICANCE OF THE INDIVIDUAL

The persons associated with the property must be *individually* significant within a historic context. A property is not eligible if its only justification for significance is that it was owned or used by a person who is a member of an identifiable profession, class, or social or ethnic group. It must be shown that the person gained importance within his or her profession or group.

Eligible

- The residence of a doctor, a mayor, or a merchant is eligible under Criterion B if the person was significant in the field of medicine, politics, or commerce, respectively.

Not Eligible

- A property is not eligible under Criterion B if it is associated with an individual about whom no scholarly judgement can be made because either research has not revealed specific information about the person's activities and their impact, or there is insufficient perspective to determine whether those activities or contributions were historically important.

ASSOCIATION WITH THE PROPERTY

Properties eligible under Criterion B are usually those associated with a person's *productive* life, reflecting the time period when he or she achieved significance. In some instances this may be the person's home; in other cases, a person's business, office, laboratory, or studio may best represent his or her contribution. Properties that pre- or post-date an individual's significant accomplishments are usually not eligible. (See *Comparison to Related Properties*, below, for exceptions to this rule.)

The individual's association with the property must be documented by accepted methods of historical or archeological research, including written or oral history. Speculative associations are not acceptable. For archeological sites, well reasoned inferences drawn from data recovered at the site are acceptable.

COMPARISON TO RELATED PROPERTIES

Each property associated with an important individual should be compared to other associated properties to identify those that best represent the person's historic contributions. The best representatives usually are properties associated with the person's adult or *productive* life. Properties associated with an individual's formative or later years may also qualify if it can be demonstrated that the person's activities during this period were historically significant *or* if no properties from the person's productive years survives. Length of association is an important factor when assessing several properties with similar associations.

A community or State may contain several properties eligible for associations with the same important person, if each represents a different aspect of the person's productive life. A property can also be eligible if it has brief but consequential associations with an important individual. (Such associations are often related to specific events that occurred at the property and, therefore, it may also be eligible under Criterion A.)

ASSOCIATION WITH GROUPS

For properties associated with several community leaders or with a prominent family, it is necessary to identify specific individuals and to explain their significant accomplishments.

Eligible

- A residential district in which a large number of prominent or influential merchants, professionals, civic leaders, politicians, etc., lived will be eligible under Criterion B if the significance of one or more specific individual residents is explicitly justified.
- A building that served as the seat of an important family is eligible under Criterion B if the significant accomplishments of one or more individual family members is explicitly justified.

Not Eligible

- A residential district in which a large number of influential persons lived is not eligible under Criterion B if the accomplishments of a specific individual(s) cannot be documented. If the significance of the district rests in the cumulative importance of prominent residents, however, then the district might still be eligible under Criterion A. Eligibility, in this case, would be based on the broad pattern of community development, through which the neighborhood evolved into the primary residential area for this class of citizens.
- A building that served as the seat of an important family will not be eligible under Criterion B if the significant accomplishments of individual family members cannot be documented. In cases where a succession of family members have lived in a house and collectively have had a demonstrably significant impact on the community, as a family, the house is more likely to be significant under Criterion A for association with a pattern of events.

ASSOCIATION WITH LIVING PERSONS

Properties associated with living persons are usually not eligible for inclusion in the National Register. Sufficient time must have elapsed to assess both the person's field of endeavor and his/her contribution to that field. Generally, the person's active participation in the endeavor must be finished for this historic perspective to emerge. (See Criteria Considerations C and G in *Part VII: How to Apply the Criteria Considerations.)*

ASSOCIATION WITH ARCHITECTS/ARTISANS

Architects, artisans, artists, and engineers are often represented by their works, which are eligible under Criterion C. Their homes and studios, however, can be eligible for consideration under Criterion B, because these usually are the properties with which they are most personally associated.

NATIVE AMERICAN SITES

The known major villages of individual Native Americans who were important during the contact period or later can qualify under Criterion B. As with all Criterion B properties, the individual associated with the property must have made some specific important contribution to history. Examples include sites significantly associated with Chief Joseph and Geronimo.[7]

[7] For more information, refer to *National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties.*

CRITERION C: DESIGN/CONSTRUCTION

Properties may be eligible for the National Register if they embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.



Richland Plantation, *East Feliciana Parish, Louisiana. Properties can qualify under Criterion C as examples of high style architecture. Built in the 1830s, Richland is a fine example of a Federal style residence with a Greek Revival style portico. (Photo by Dave Gleason).*

UNDERSTANDING CRITERION C: DESIGN/ CONSTRUCTION

This criterion applies to properties significant for their physical design or construction, including such elements as architecture, landscape architecture, engineering, and artwork. To be eligible under Criterion C, a property must meet *at least one* of the following requirements:

- Embody distinctive characteristics of a type, period, or method of construction.
- Represent the work of a master.
- Possess high artistic value.
- Represent a significant and distinguishable entity whose components may lack individual distinction.

The first requirement, that properties "embody the distinctive characteristics of a type, period, or method of construction," refers to the way in which a property was conceived, designed, or fabricated by a people or culture in past periods of history. "The work of a master" refers to the technical or aesthetic achievements of an architect or craftsman. "High artistic values" concerns the expression of aesthetic ideals or preferences and applies to aesthetic achievement.

Resources "that represent a significant and distinguishable entity whose components may lack individual distinction" are called "districts." In the Criteria for Evaluation (as published in the *Code of Federal Regulations* and reprinted here in Part II), districts are defined within the context of Criterion C. *Districts, however, can be considered for eligibility under all the Criteria,* individually or in any combination, as is appropriate. For this reason, the full discussion of districts is contained in *Part IV: How to Define Categories of Historic Properties.* Throughout the bulletin, however, districts are mentioned within the context of a specific subject, such as an individual Criterion.



Grant Family House*, Saco vicinity, York County, Maine. Properties possessing high artistic value meet Criterion C through the expression of aesthetic ideals or preferences. The Grant Family House, a modest Federal style residence, is significant for its remarkably well-preserved stenciled wall decorative treatment in the entry hall and parlor. Painted by an unknown artist ca. 1825, this is a fine example of 19th century New England regional artistic expression. (Photo by Kirk F. Mohney).*

EXAMPLES OF PROPERTIES ASSOCIATED WITH DESIGN/ CONSTRUCTION

Properties associated with design and construction:

- *A house or commercial building representing a significant style of architecture.*
- *A designed park or garden associated with a particular landscape design philosophy.*
- *A movie theater embodying high artistic value in its decorative features.*
- *A bridge or dam representing technological advances.*

APPLYING CRITERION C: DESIGN/ CONSTRUCTION

DISTINCTIVE CHARACTERISTICS OF TYPE, PERIOD, AND METHOD OF CONSTRUCTION

This is the portion of Criterion C under which most properties are eligible, for it encompasses all architectural styles and construction practices. To be eligible under this portion of the Criterion, a property must clearly illustrate, through "distinctive characteristics," the following:

- The pattern of features common to a particular class of resources,
- The individuality or variation of features that occurs within the class,
- The evolution of that class, or
- The transition between classes of resources.

Distinctive Characteristics: "Distinctive characteristics" are the physical features or traits that commonly recur in individual types, periods, or methods of construction. To be eligible, a property must clearly contain enough of those characteristics to be considered a true representative of a particular type, period, or method of construction.

Characteristics can be expressed in terms such as form, proportion, structure, plan, style, or materials. They can be general, referring to ideas of design and construction such as basic plan or form, or they can be specific, referring to precise ways of combining particular kinds of materials.

Eligible

- A building eligible under the theme of Gothic Revival architecture must have the distinctive characteristics that make up the vertical and picturesque qualities of the style, such as pointed gables, steep roof pitch, board and batten siding, and ornamental bargeboard and veranda trim.
- A late Mississippian village that illustrates the important concepts in prehistoric community design and planning will qualify.
- A designed historic landscape will qualify if it reflects a historic trend or school of theory and practice, such as the City Beautiful Movement, evidencingdistinguished design, layout, and the work of skilled craftsmanship.

Not Eligible

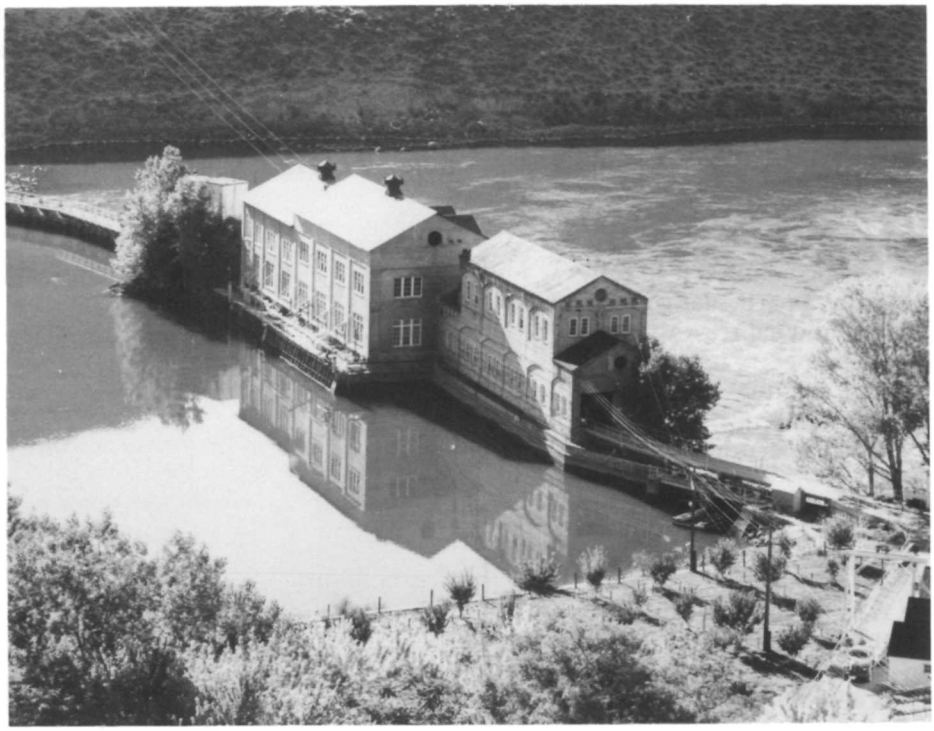
- A commercial building with some Art Deco detailing is not eligible under Criterion C if the detailing was added merely as an afterthought, rather than fully integrated with overall lines and massing typical of the Art Deco style or the transition between that and another style.
- A designed landscape that has had major changes to its historic design, vegetation, original boundary, topography/ grading, architectural features, and circulation system will not qualify.

Type, Period, and Method of Construction: "Type, period, or method of construction" refers to the way certain properties are related to one another by cultural tradition or function, by dates of construction or style, or by choice or availability of materials and technology.

A structure is eligible as a specimen of its type or period of construction if it is an important example (within its context) of building practices of a particular time in history. For properties that represent the variation, evolution, or transition of construction types, it must be demonstrated that the variation, etc., was an important phase of the architectural development of the area or community in that it had an impact as evidenced by later buildings. A property is not eligible, however, simply because it has been identified as the only such property ever fabricated; it must be demonstrated to be significant as well.

Eligible

- A building that has some characteristics of the Romanesque Revival style and some characteristics of the Commercial style can qualify if it illustrates the transition of architectural design and the transition itself is considered an important architectural development.
- A Hopewellian mound, if it is an important example of mound building construction techniques, would qualify as a method or type of construction.
- A building which illustrates the early or the developing technology of particular structural systems, such as skeletal steel framing, is eligible as an example of a particular method of construction.



Swan Falls Dam and Power Plant, *Murphy vicinity, Ada County, Idaho. Significant works of engineering can qualify under Criterion C. Built between 1900-1907 the Swan Falls Dam and Power Plant across the Snake River is one of the early hydroelectric plants in the State of Idaho. (Photo by H.L. Hough).*



Looney House, *Asheville vicinity, St. Clair County, Alabama. Examples of vernacular styles of architecture can qualify under Criterion C. Built ca. 1818, the Looney House is significant as possibly the State's oldest extant two-story dogtrot type of dwelling. The defining open center passage of the dogtrot was a regional building response to the southern climate. (Photo by Carolyn Scott).*

HISTORIC ADAPTATION OF THE ORIGINAL PROPERTY

A property can be significant not only for the way it was originally constructed or crafted, but also for the way it was adapted at a later period, or for the way it illustrates changing tastes, attitudes, and uses over a period of time.

A district is eligible under this guideline if it illustrates the evolution of historic character of a place over a particular span of time.

Eligible

- A Native American irrigation system modified for use by Europeans could be eligible if it illustrates the technology of either or both periods of construction.
- An early 19th century farmhouse modified in the 1880s with Queen Anne style ornamentation could be significant for the modification itself, if it represented a local variation or significant trend in building construction or remodelling, was the work of a local master (see *Works of a Master* on page 20), or reflected the tastes of an important person associated with the property at the time of its alteration.
- A district encompassing the commercial development of a town between 1820 and 1910, characterized by buildings of various styles and eras, can be eligible.

WORKS OF A MASTER

A master is a figure of generally recognized greatness in a field, a known craftsman of consummate skill, or an anonymous craftsman whose work is distinguishable from others by its characteristic style and quality. The property must express a particular phase in the development of the master's career, an aspect of his or her work, or a particular idea or theme in his or her craft.

A property is not eligible as the work of a master, however, simply because it was designed by a prominent architect. For example, not every building designed by Frank Lloyd Wright is eligible under this portion of Criterion C, although it might meet other portions of the Criterion, for instance as a representative of the Prairie style.

The work of an unidentified craftsman is eligible if it rises above the level of workmanship of the other properties encompassed by the historic context.

PROPERTIES POSSESSING HIGH ARTISTIC VALUES

High artistic values may be expressed in many ways, including areas as diverse as community design or planning, engineering, and sculpture. A property is eligible for its high artistic values if it so fully articulates a particular concept of design that it expresses an aesthetic ideal. A property is not eligible, however, if it does not express aesthetic ideals or design concepts more fully than other properties of its type.

Eligible

- A sculpture in a town square that epitomizes the design principles of the Art Deco style is eligible.
- A building that is a classic expression of the design theories of the Craftsman Style, such as carefully detailed handwork, is eligible.
- A landscaped park that synthesizes early 20th century principles of landscape architecture and expresses an aesthetic ideal of environment can be eligible.
- Properties that are important representatives of the aesthetic values of a cultural group, such as petroglyphs and ground drawings by Native Americans, are eligible.

Not Eligible

- A sculpture in a town square that is a typical example of sculpture design during its period would not qualify for high artistic value, although it might be eligible if it were significant for other reasons.
- A building that is a modest example (within its historic context) of the Craftsman Style of architecture, or a landscaped park that is characteristic of turn of the century landscape design would not qualify for high artistic value.

A Significant and Distinguishable Entity Whose Components May Lack Individual Distinction. This portion of Criterion C refers to districts. For detailed information on districts, refer to *Part IV* of this bulletin.

CRITERION D: INFORMATION POTENTIAL

Properties may be eligible for the National Register if they have yielded, or may be likely to yield, information important in prehistory or history.

UNDERSTANDING CRITERION D: INFORMATION POTENTIAL

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Criterion D encompasses the properties that have the potential to answer, in whole or in part, those types of research questions. The most common type of property nominated under this Criterion is the archeological site (or a district comprised of archeological sites). Buildings, objects, and structures (or districts comprised of these property types), however, can also be eligible for their information potential.

Criterion D has two requirements, which must *both* be met for a property to qualify:

- The property must have, or have had, information to contribute to our understanding of human history or prehistory, and
- The information must be considered important.

Under the first of these requirements, a property is eligible if it has been used as a source of data and contains more, as yet unretrieved data. A property is also eligible if it has not yet yielded information but, through testing or research, is determined a likely source of data.

Under the second requirement, the information must be carefully evaluated within an appropriate context to determine its importance. Information is considered "important" when it is shown to have a significant bearing on a research design that addresses such areas as: 1) current data gaps or alternative theories that challenge existing ones or 2) priority areas identified under a State or Federal agency management plan.

APPLYING CRITERION D: INFORMATION POTENTIAL

ARCHEOLOGICAL SITES

Criterion D most commonly applies to properties that contain or are likely to contain information bearing on an important archeological research question. The property must have characteristics suggesting the likelihood that it possesses configurations of artifacts, soil strata, structural remains, or other natural or cultural features that make it possible to do the following:

- Test a hypothesis or hypotheses about events, groups, or processes in the past that bear on important research questions in the social or natural sciences or the humanities; or
- Corroborate or amplify currently available information suggesting that a hypothesis is either true or false; or
- Reconstruct the sequence of archeological cultures for the purpose of identifying and explaining continuities and discontinuities in the archeological record for a particular area.

BUILDINGS, STRUCTURES, AND OBJECTS

While most often applied to archeological districts and sites, Criterion D can also apply to buildings, structures, and objects that contain important information. In order for these types of properties to be eligible under Criterion D, they themselves must be, or must have been, the principal source of the important information.

Eligible

- A building exhibiting a local variation on a standard design or construction technique can be eligible if study could yield important information, such as how local availability of materials or construction expertise affected the evolution of local building development.

Not Eligible

- The ruins of a hacienda once contained murals that have since been destroyed. Historical documentation, however, indicates that the murals were significant for their highly unusual design. The ruins can not be eligible under Criterion D for the importance of the destroyed murals if the information is contained only in the documentation.



Criterion D - Champe-Fremont 1 Archeological Site, *Omaha vicinity, Douglas County, Nebraska. This archeological site, dating from ca. 1100-1450 A.D., consists of pit houses and storage pits which have the potential to yield important information concerning the subsistence patterns, religious and mortuary practices, and social organization of the prehistoric residents of eastern Nebraska. (Nebraska State Historical Society)*

ASSOCIATION WITH HUMAN ACTIVITY

A property must be associated with *human activity* and be critical for understanding a site's historic environment in order to be eligible under Criterion D. A property can be linked to human activity through events, processes, institutions, design, construction, settlement, migration, ideals, beliefs, lifeways, and other facets of the development or maintenance of cultural systems.

The natural environment associated with the properties was often very different from that of the present and strongly influenced cultural development. Aspects of the environment that are pertinent to human activities should be considered when evaluating properties under Criterion D.

Natural features and paleontological (floral and faunal) sites are not usually eligible under Criterion D in and of themselves. They can be eligible, however, if they are either directly related to human activity or critical to understanding a site's historic environment. In a few cases, a natural feature or site unmarked by cultural materials, that is primarily eligible under Criterion A, may also be eligible under Criterion D, *if* study of the feature, or its location, setting, etc. (usually in the context of data gained from other sources), will yield important information about the event or period with which it is associated.

ESTABLISHING A HISTORIC CONTEXT

The information that a property yields, or will yield, must be evaluated within an appropriate historic context. This will entail consulting the body of information already collected from similar properties or other pertinent sources, including modern and historic written records. The researcher must be able to anticipate if and how the potential information will affect the definition of the context. The information likely to be obtained from a particular property must confirm, refute, or supplement in an important way existing information.

A property is *not* eligible if it cannot be related to a particular time period or cultural group and, as a result, lacks any historic context within which to evaluate the importance of the information to be gained.

DEVELOPING RESEARCH QUESTIONS

Having established the importance of the information that may be recovered, it is necessary to be explicit in demonstrating the connection between the important information and a specific property. One approach is to determine if specific important research questions can be answered by the data contained in the property. Research questions can be related to property-specific issues, to broader questions about a large geographic area, or to theoretical issues independent of any particular geographic location. These questions may be derived from the academic community or from preservation programs at the local, regional, State, or national level. Research questions are usually developed as part of a "research design," which specifies not only the questions to be asked, but also the types of data needed to supply the answers, and often the techniques needed to recover the data.

Eligible

- When a site consisting of a village occupation with midden deposits, hearths, ceramics, and stratified evidence of several occupations is being evaluated, three possible research topics could be: 1) the question of whether the site occupants were indigenous to the area prior to the time of occupation or recent arrivals, 2) the investigation of the settlement-subsistence pattern of the occupants, 3) the question of whether the region was a center for the domestication of plants. Specific questions could include: A) Do the deposits show a sequential development or sudden introduction of Ceramic Type X? B) Do the dates of the occupations fit our expectations based on the current model for the reoccupation behavior of slash-and-burn agriculturalists? C) Can any genetic changes in the food plant remains be detected?

Not Eligible

- A property is not eligible if so little can be understood about it that it is not possible to determine if specific important research questions can be answered by data contained in the property.

ESTABLISHING THE PRESENCE OF ADEQUATE DATA

To support the assertion that a property has the data necessary to provide the important information, the property should be investigated with techniques sufficient to establish the presence of relevant data categories. What constitutes appropriate investigation techniques would depend upon specific circumstances including the property's location, condition, and the research questions being addressed, and could range from surface survey (or photographic survey for buildings), to the application of remote sensing techniques or intensive subsurface testing. Justification of the research potential of a property may be based on analogy to another better known property if sufficient similarities exist to establish the appropriateness of the analogy.

Eligible

- Data requirements depend on the specific research topics and questions to be addressed. To continue the example in "Developing Research Questions" above, we might want to ascertain the following with reference to questions A, B, and C: A) The site contains Ceramic Type X in one or more occupation levels and we expect to be able to document the local evaluation of the type or its intrusive nature. B) The hearths contain datable carbon deposits and are associated with more than one occupation. C) The midden deposits show good floral/faunal preservation, and we know enough about the physical evolution of food plants to interpret signs that suggest domestication.

Not Eligible

- Generally, if the applicable research design requires clearly stratified deposits, then subsurface investigation techniques must be applied. A site composed only of surface materials can not be eligible for its potential to yield information that could only be found in stratified deposits.

INTEGRITY

The assessment of integrity for properties considered for information potential depends on the data requirements of the applicable research design. A property possessing information potential does not need to recall *visually* an event, person, process, or construction technique. It is important that the significant data contained in the property remain sufficiently intact to yield the expected important information, if the appropriate study techniques are employed.

Eligible

- An irrigation system significant for the information it will yield on early engineering practices can still be eligible even though it is now filled in and no longer retains the appearance of an open canal.

Not Eligible

- A plowed archeological site contains several superimposed components that have been mixed to the extent that artifact assemblages cannot be reconstructed. The site cannot be eligible if the data requirements of the research design call for the study of artifacts specific to one component.

PARTLY EXCAVATED OR DISTURBED PROPERTIES

The current existence of appropriate physical remains must be ascertained in considering a property's ability to yield important information. Properties that have been partly excavated or otherwise disturbed and that are being considered for their potential to yield additional important information must be shown to retain that potential in their remaining portions.

Eligible

- A site that has been partially excavated but still retains substantial intact deposits (or a site in which the remaining deposits are small but contain critical information on a topic that is not well known) is eligible.

Not Eligible

- A totally collected surface site or a completely excavated buried site is not eligible since the physical remains capable of yielding important information no longer exist at the site. (See *Completely Excavated Sites*, on page 24, for exception.) Likewise, a site that has been looted or otherwise disturbed to the extent that the remaining cultural materials have lost their important depositional context (horizontal or vertical location of deposits) is not eligible.
- A reconstructed mound or other reconstructed site will generally not be considered eligible, because original cultural materials or context or both have been lost.

COMPLETELY EXCAVATED SITES

Properties that have yielded important information in the past and *that no longer retain additional* research potential (such as completely excavated archeological sites) must be assessed essentially as historic sites under Criterion A. Such sites must be significant for associative values related to: 1) the importance of the data gained or 2) the impact of the property's role in the history of the development of anthropology/ archeology or other relevant disciplines. Like other historic properties, the site must retain the ability to convey its association as the former repository of important information, the location of historic events, or the representative of important trends.

Eligible

- A property that has been excavated is eligible if the data recovered was of such importance that it influenced the direction of research in the discipline, as in a site that clearly established the antiquity of the human occupation of the New World. (See Criterion A in *Part VI: How to Identify the Type of Significance of a Property* and Criteria Consideration G in *Part VII: How to Apply the Criteria Considerations.*)

Not Eligible

- A totally excavated site that at one time yielded important information but that no longer can convey either its historic/ prehistoric utilization or significant modern investigation is not eligible.

VII. HOW TO APPLY THE CRITERIA CONSIDERATIONS

INTRODUCTION

Certain kinds of properties are not usually considered for listing in the National Register: religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties achieving significance within the past fifty years. These properties *can* be eligible for listing, however, if they meet special requirements, called Criteria Considerations, in addition to meeting the regular requirements (that is, being eligible under one or more of the four Criteria and possessing integrity). *Part VII* provides guidelines for determining which properties must meet these special requirements and for applying each Criteria Consideration.

The Criteria Considerations need to be applied only to *individual* properties. Components of eligible districts do not have to meet the special requirements unless they make up the majority of the district or are the focal point of the district. These are the general steps to follow when applying the Criteria Considerations to your property:

- Before looking at the Criteria Considerations, make sure your property meets one or more of the four Criteria for Evaluation and possesses integrity.
- If it does, check the Criteria Considerations (next column) to see if the property is of a type that is usually excluded from the National Register. The sections that follow also list specific examples of properties of each type. If your property clearly *does not* fit one of these types, then it does not need to meet any special requirements.
- If your property *does* fit one of these types, then it must meet the special requirements stipulated for that type in the Criteria Considerations.

CRITERIA CONSIDERATIONS*

Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past fifty years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

a. a religious property deriving primary significance from architectural or artistic distinction or historical importance; or

b. a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

c. a birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his or her productive life; or

d. a cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, from association with historic events; or

e. a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or

f. a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or,

g. a property achieving significance within the past 50 years if it is of exceptional importance.

*The Criteria Considerations are taken from the Criteria for Evaluation, found in the *Code of Federal Regulations, Title 36, Part 60.*

CRITERIA CONSIDERATION A: RELIGIOUS PROPERTIES

A religious property is eligible if it derives its primary significance from architectural or artistic distinction or historical importance.

UNDERSTANDING CRITERIA CONSIDERATION A: RELIGIOUS PROPERTIES

A religious property requires justification on architectural, artistic, or historic grounds to avoid any appearance of judgment by government about the validity of any religion or belief. Historic significance for a religious property cannot be established on the merits of a religious doctrine, but rather, for architectural or artistic values or for important historic or cultural forces that the property represents. A religious property's significance under Criterion A, B, C, or D must be judged in purely secular terms. A religious group may, in some cases, be considered a cultural group whose activities are significant in areas broader than religious history.

Criteria Consideration for Religious Properties applies:

- If the resource was constructed by a religious institution.
- If the resource is presently owned by a religious institution or is used for religious purposes.
- If the resource was owned by a religious institution or used for religious purposes during its Period of Significance.
- If Religion is selected as an Area of Significance.

Examples of Properties that MUST Meet Criteria Consideration A: Religious Properties

- *A historic church where an important non-religious event occurred, such as a speech by Patrick Henry.*
- *A historic synagogue that is significant for architecture.*
- *A private residence is the site of a meeting important to religious history.*
- *A commercial block that is currently owned as an investment property by a religious institution.*
- *A historic district in which religion was either a predominant or significant function during the period of significance.*

Example of Properties that DO NOT Need to Meet Criteria Consideration A: Religious Properties

- *A residential or commercial district that currently contains a small number of churches that are not a predominant feature of the district.*
- *A town meeting hall that serves as the center of community activity and houses a wide variety of public and private meetings, including religious service. The resource is significant for architecture and politics, and the religious function is incidental.*
- *A town hall, significant for politics from 1875 to 1925, that housed religious services during the 1950s. Since the religious function occurred after the Period of Significance, the Criteria Consideration does not apply.*

APPLYING CRITERIA CONSIDERATION A: RELIGIOUS PROPERTIES

ELIGIBILITY FOR HISTORIC EVENTS

A religious property can be eligible under Criterion A for any of three reasons:

- It is significant under a theme in the history of religion having secular scholarly recognition; or
- It is significant under another historical theme, such as exploration, settlement, social philanthropy, or education; or
- It is significantly associated with traditional cultural values.

RELIGIOUS HISTORY

A religious property can be eligible if it is directly associated with either a specific event or a broad pattern in the history of religion.

Eligible

- The site of a convention at which a significant denominational split occurred meets the requirements of Criteria Consideration A. Also eligible is a property that illustrates the broad impact of a religious institution on the history of a local area.

Not Eligible

- A religious property cannot be eligible simply because was the place of religious services for a community, or was the oldest structure used by a religious group in a local area.

OTHER HISTORICAL THEMES

A religious property can be eligible if it is directly associated with either a specific event or a broad pattern that is significant in another historic context. A religious property would also qualify if it were significant for its associations that illustrate the importance of a particular religious group in the social, cultural, economic, or political history of the area. Eligibility depends on the importance of the event or broad pattern and the role of the specific property.

Eligible

- A religious property can qualify for its important role as a temporary hospital during the Revolutionary War, or if its school was significant in the history of education in the community.

Not Eligible

- A religious property is not significant in the history of education in a community simply because it had occasionally served as a school.

TRADITIONAL CULTURAL VALUES

When evaluating properties associated with traditional cultures, it is important to recognize that often these cultures do not make clear distinctions between what is secular and what is sacred. Criteria Consideration A is not intended to exclude traditional cultural resources merely because they have religious uses or are considered sacred. A property or natural feature important to a traditional culture's religion and mythology is eligible if its importance has been ethnohistorically documented and if the site can be clearly defined. It is critical, however, that the activities be documented and that the associations not be so diffuse that the physical resource cannot be adequately defined.[8]

Eligible

- A specific location or natural feature that an Indian tribe believes to be its place of origin and that is adequately documented qualifies under Criteria Consideration A.

ELIGIBILITY FOR HISTORIC PERSONS

A religious property can be eligible for association with a person important in religious history, if that significance has scholarly, secular recognition or is important in other historic contexts. Individuals who would likely be considered significant are those who formed or significantly influenced an important religious institution or movement, or who were important in the social, economic, or political history of the area. Properties associated with individuals important only within the context of a single congregation and lacking importance in any other historic context would not be eligible under Criterion B.

Eligible

- A religious property strongly associated with a religious leader, such as George Whitefield or Joseph Smith, is eligible.

[8] For more information on applying Criteria Consideration A to traditional cultural properties, refer to *National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties.*

ELIGIBILITY FOR ARCHITECTURAL OR ARTISTIC DISTINCTION

A religious property significant for its architectural design or construction should be evaluated as are other properties under Criterion C; that is, it should be evaluated within an established architectural context and, if necessary, compared to other properties of its type, period, or method of construction. (See "Comparing Related Properties" in *Part V: How to Evaluate a Property Within Its Historic Context.)*

Eligible

- A historic camp meeting district that meets the requirements of Criterion C for its significance as a type of construction is eligible.

ELIGIBILITY FOR INFORMATION POTENTIAL

A religious property, whether a district, site, building, structure, or object, is eligible if it can yield important information about the religious practices of a cultural group or other historic themes. This kind of property should be evaluated as are other properties under Criterion D, in relation to similar properties, other information sources, and existing data gaps.

Eligible

- A 19th century camp meeting site that could provide information about the length and intensity of site use during revivals of the Second Great Awakening is eligible.
- Rock cairns or medicine wheels that had a historic religious mythological function and can provide information about specific cultural beliefs are eligible.

ABILITY TO REFLECT HISTORIC ASSOCIATIONS

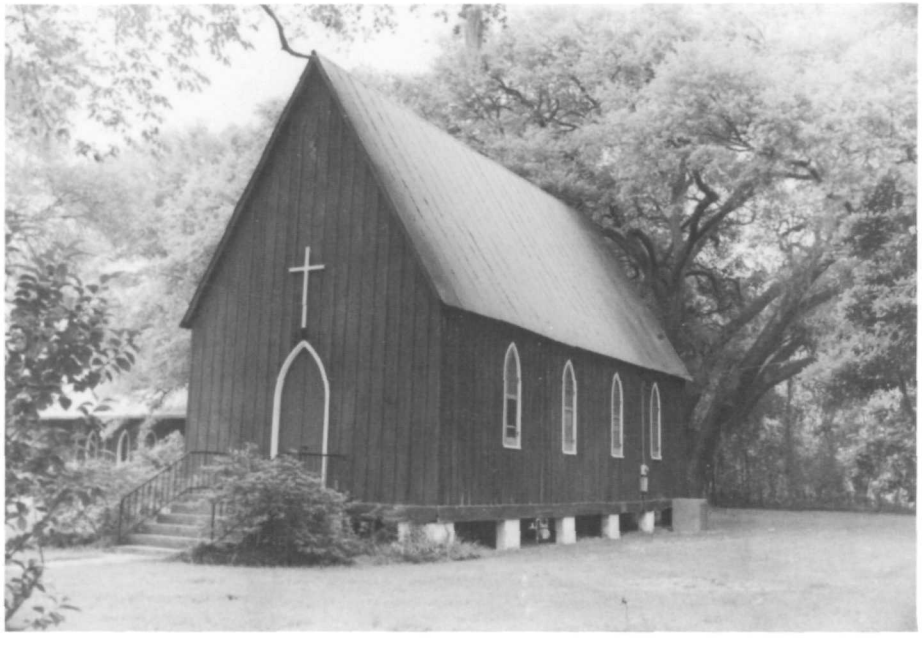
As with all eligible properties, religious properties must physically represent the period of time for which they are significance. For instance, a recent building that houses an older congregation cannot qualify based on the historic activities of the group because the current building does not convey the earlier history. Likewise, an older building that housed the historic activities of the congregation is eligible if it still physically represents the period of the congregation's significance. However, if an older building has been remodeled to the extent that its appearance dates from the time of the remodeling, it can only be eligible if the period of significance corresponds with the period of the alterations.

Eligible

- A church built in the 18th century and altered beyond recognition in the 19th century is eligible only if the additions are important in themselves as an example of late 19th century architecture or as a reflection of an important period of the congregation's growth.

Not Eligible

- A synagogue built in the 1920s cannot be eligible for the important activities of its congregation in the 18th and 19th centuries. It can only be eligible for significance obtained after its construction date.
- A rural 19th century frame church recently sheathed in brick is not eligible because it has lost its characteristic appearance and therefore can no longer convey its 19th century significance, either for architectural value or historic association.



Criteria Consideration A - Religious Properties. *A religious property can qualify as an exception to the Criteria if it is architecturally significant.* ***The Church of the Navity*** *in Rosedale, Iberville Parish, Louisiana, qualified as a rare example in the State of a 19th century small frame Gothic Revival style chapel. (Robert Obier)*

CRITERIA CONSIDERATION B: MOVED PROPERTIES

A property removed from its original or historically significant location can be eligible if it is significant primarily for architectural value or it is the surviving property most importantly associated with a historic person or event.

UNDERSTANDING CRITERIA CONSIDERATION B: MOVED PROPERTIES

The National Register criteria limit the consideration of moved properties because significance is embodied in locations and settings as well as in the properties themselves. Moving a property destroys the relationships between the property and its surroundings and destroys associations with historic events and persons. A move may also cause the loss of historic features such as landscaping, foundations, and chimneys, as well as loss of the potential for associated archeological deposits. Properties that were moved *before* their period of significance do not need to meet the special requirements of Criteria Consideration B.

One of the basic purposes of the National Register is to encourage the preservation of historic properties as living parts of their communities. In keeping with this purpose, it is not usual to list artificial groupings of buildings that have been created for purposes of interpretation, protection, or maintenance. Moving buildings to such a grouping destroys the integrity of location and setting, and can create a false sense of historic development.

APPLYING CRITERIA CONSIDERATION B: MOVED PROPERTIES

ELIGIBILITY FOR ARCHITECTURAL VALUE

A moved property significant under Criterion C must retain enough historic features to convey its architectural values and retain integrity of design, materials, workmanship, feeling, and association.

Examples of Properties that MUST Meet Criteria Consideration B: Moved Properties

- *A resource moved from one location on its original site to another location on the property, during or after its Period of Significance.*
- *A district in which a significant number of resources have been moved from their original location.*
- *A district which has one moved building that makes an especially significant contribution to the district.*
- *A portable resource, such as a ship or railroad car, that is relocated to a place incompatible with its original function.*
- *A portable resource, such as a ship or railroad car, whose importance is critically linked to its historic location or route and that is moved.*

Examples of Properties that DO NOT Need to Meet Criteria Consideration B: Moved Properties

- *A property that is moved prior to its Period of Significance.*
- *A district in which only a small percentage of typical buildings in a district are moved.*
- *A moved building that is part of a complex but is of less significance than the remaining (unmoved) buildings.*
- *A portable resource, such as a ship or railroad car, that is eligible under Criterion C and is moved within its natural setting (water, rails, etc.).*
- *A property that is raised or lowered on its foundations.*

ELIGIBILITY FOR HISTORIC ASSOCIATIONS

A moved property significant under Criteria A or B must be demonstrated to be the surviving property most importantly associated with a particular historic event or an important aspect of a historic person's life. The phrase "most importantly associated" means that it must be the single surviving property that is most closely associated with the event or with the part of the person's life for which he or she is significant.

Eligible

- A moved building occupied by an business woman during the majority of her productive career would be eligible if the other extant properties are a house she briefly inhabited prior to her period of significance and a commercial building she owned after her retirement.

Not Eligible

- A moved building associated with the beginning of rail transportation in a community is not eligible if the original railroad station and warehouse remained intact on their original sites.

SETTING AND ENVIRONMENT

In addition to the requirements above, moved properties must still have an orientation, setting, and general environment that are comparable to those of the historic location and that are compatible with the property's significance.

Eligible

- A property significant as an example of mid-19th century rural house type can be eligible after a move, provided that it is placed on a lot that is sufficient in size and character to recall the basic qualities of the historic environment and setting, and provided that the building is sited appropriately in relation to natural and manmade surroundings.

Not Eligible

- A rural house that is moved into an urban area and a bridge that is no longer situated over a waterway are not eligible.

ASSOCIATION DEPENDENT ON THE SITE

For a property whose design values or historical associations are directly dependent on its location, any move will cause the property to lose its integrity and prevent it from conveying its significance.

Eligible

- A farm structure significant only as an example of a method of construction peculiar to the local area is still eligible if it is moved within that local area and the new setting is similar to that of the original location.

Not Eligible

- A 19th century rural residence that was designed around particular topographic features, reflecting that time period's ideals of environment, is not eligible if moved.

PROPERTIES DESIGNED TO BE MOVED

A property designed to move or a property frequently moved during its historic use must be located in a historically appropriate setting in order to qualify, retaining its integrity of setting, design, feeling, and association. Such properties include automobiles, railroad cars and engines, and ships.

Eligible

- A ship docked in a harbor, a locomotive on tracks or in a railyard, and a bridge relocated from one body of water to another are eligible.

Not Eligible

- A ship on land in a park, a bridge placed in a pasture, or a locomotive displayed in an indoor museum are not eligible.

ARTIFICIALLY CREATED GROUPINGS

An artificially created grouping of buildings, structures, or objects is not eligible unless it has achieved significance since the time of its assemblage. It cannot be considered as a reflection of the time period when the individual buildings were constructed.

Eligible

- A grouping of moved historic buildings whose creation marked the beginning of a major concern with past lifestyles can qualify as an early attempt at historic preservation and as an illustration of that generation's values.

Not Eligible

- A rural district composed of a farmhouse on its original site and a grouping of historic barns recently moved onto the property is not eligible.

PORTIONS OF PROPERTIES

A moved *portion* of a building, structure, or object is not eligible because, as a fragment of a larger resource, it has lost integrity of design, setting, materials, workmanship, and location.

CRITERIA CONSIDERATION C: BIRTHPLACES OR GRAVES

A birthplace or grave of a historical figure is eligible if the person is of outstanding importance and if there is no other appropriate site or building directly associated with his or her productive life.

UNDERSTANDING CRITERIA CONSIDERATION C: BIRTHPLACES AND GRAVES

Birthplaces and graves often attain importance as reflections of the origins of important persons or as lasting memorials to them. The lives of persons significant in our past normally are recognized by the National Register through listing of properties illustrative of or associated with that person's productive life's work. Birthplaces and graves, as properties that represent the beginning and the end of the life of distinguished individuals, may be temporally and geographically far removed from the person's significant activities, and therefore are not usually considered eligible.

Examples of Properties that MUST Meet Criteria Consideration C: Birthplaces and Graves

- *The birthplace of a significant person who lived elsewhere during his or her Period of Significance.*
- *A grave that is nominated for its association with the significant person buried in it.*
- *A grave that is nominated for information potential.*

Examples of Properties that DO NOT Need to Meet Criteria Consideration C: Birthplaces and Graves

- *A house that was inhabited by a significant person for his or her entire lifetime.*
- *A grave located on the grounds of the house where a significant person spent his or her productive years.*

APPLYING CRITERIA CONSIDERATION C: BIRTHPLACES AND GRAVES

PERSONS OF OUTSTANDING IMPORTANCE

The phrase "a historical figure of outstanding importance" means that in order for a birthplace or grave to qualify, it cannot be simply the birthplace or grave of a person significant in our past (Criterion B). It must be the birthplace or grave of an individual who was of outstanding importance in the history of the local area, State, or nation. The birthplace or grave of an individual who was one of several people active in some aspect of the history of a community, a state, or the Nation would not be eligible.

LAST SURVIVING PROPERTY ASSOCIATED WITH A PERSON

When an geographical area strongly associated with a person of outstanding importance has lost all other properties directly associated with his or her formative years or productive life, a birthplace or grave may be eligible.

ELIGIBILITY FOR OTHER ASSOCIATIONS

A birthplace or grave can also be eligible if it is significant for reasons other than association with the productive life of the person in question. It can be eligible for significance under Criterion A for association with important events, under Criterion B for association with the productive lives of *other* important persons, or under Criterion C for architectural significance. A birthplace or grave can also be eligible in rare cases if, after the passage of time, it is significant for its commemorative value. (See Criteria Consideration F for a discussion of commemorative properties.) A birthplace or grave can also be eligible under Criterion D if it contains important information on research, *e.g.*, demography, pathology, mortuary practices, socioeconomic status differentiation.



Criteria Consideration C - Birthplaces. *A birthplace of a historical figure is eligible if the person is of outstanding importance and there is no other appropriate site or building associated with his or her productive life. The* ***Walter Reed Birthplace,*** *Gloucester vicinity, Gloucester County, Virginia is the most appropriate remaining building associated with the life of the man who, in 1900, discovered the cause and mode of transmission of the great scourge of the tropics, yellow fever. (Virginia Historic Landmarks Commission)*

CRITERIA CONSIDERATION D: CEMETERIES

A cemetery is eligible if it derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events.

UNDERSTANDING CRITERIA CONSIDERATION D: CEMETERIES

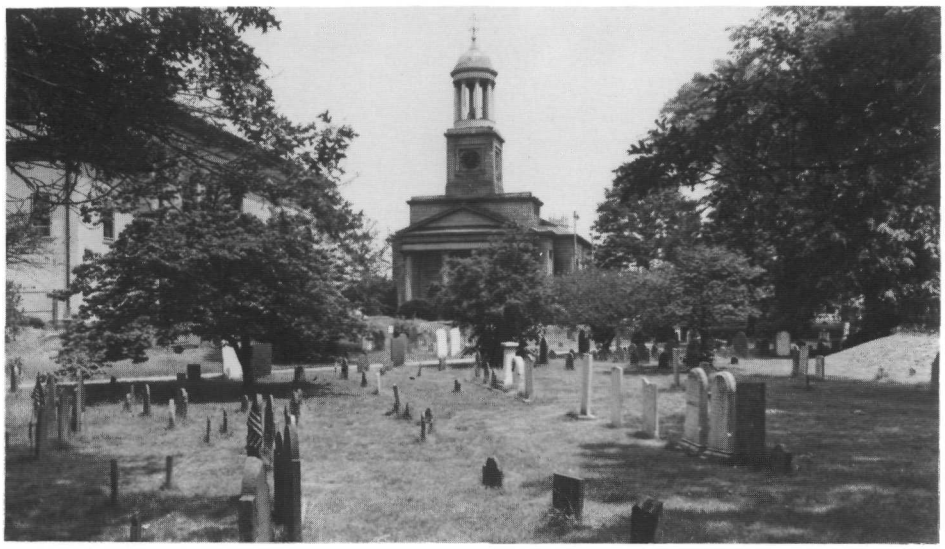
A cemetery is a collection of graves that is marked by stones or other artifacts or that is unmarked but recognizable by features such as fencing or depressions, or through maps, or by means of testing. Cemeteries serve as a primary means of an individual's recognition of family history and as expressions of collective religious and/or ethnic identity. Because cemeteries may embody values beyond personal or family-specific emotions, the National Register criteria allow for listing of cemeteries under certain conditions.

Examples of Properties that MUST Meet Criteria Consideration D: Cemeteries

- *A cemetery that is nominated individually for Criterion A, B, or C.*

Examples of Properties that DO NOT Need to Meet Criteria Consideration D: Cemeteries

- *A cemetery that is nominated along with its associated church, but the church is the main resource nominated.*
- *A cemetery that is nominated under Criterion D for information potential.*
- *A cemetery that is nominated as part of a district but is not the focal point of the district.*



Criteria Consideration D - Cemeteries. *The* ***Hancock Cemetery,*** *Quincy, Norfolk County, Massachusetts meets the exception to the Criteria because it derives its primary significance from its great age (the earliest burials date from 1640) and from the distinctive design features found in its rich collection of late 17th and early 18th century funerary art. (N. Hobart Holly)*

APPLYING CRITERIA CONSIDERATION D: CEMETERIES

PERSONS OF TRANSCENDENT IMPORTANCE

A cemetery containing the graves of persons of transcendent importance may be eligible. To be of transcendent importance the persons must have been of great eminence in their fields of endeavor or had a great impact upon the history of their community, State, or nation. (A single grave that is the burial place of an important person and is located in a larger cemetery that does not qualify under this Criteria Consideration should be treated under Criteria Consideration C: Birthplaces and Graves.)

Eligible

- A historic cemetery containing the graves of a number of persons who were exceptionally significant in determining the course of a State's political or economic history during a particular period is eligible.

Not Eligible

- A cemetery containing graves of State legislators is not eligible if they simply performed the daily business of State government and did not have an outstanding impact upon the nature and direction of the State's history.

ELIGIBILITY ON THE BASIS OF AGE

Cemeteries can be eligible if they have achieved historic significance for their relative great age in a particular geographic or cultural context.

Eligible

- A cemetery dating from a community's original 1830s settlement can attain significance from its association with that very early period.

ELIGIBILITY FOR DESIGN

Cemeteries can qualify on the basis of distinctive design values. These values refer to the same design values addressed in Criterion C and can include aesthetic or technological achievement in the fields of city planning, architecture, landscape architecture, engineering, mortuary art, and sculpture. As for all other nominated properties, a cemetery must clearly express its design values and be able to convey its historic appearance.

Eligible

- A Victorian cemetery is eligible if it clearly expresses the aesthetic principles related to funerary design for that period, through such features as the overall plan, landscaping, statuary, sculpture, fencing, buildings, and grave markers.

Not Eligible

- A cemetery cannot be eligible for design values if it no longer conveys its historic appearance because of the introduction of new grave markers.

ELIGIBILITY FOR ASSOCIATION WITH EVENTS

Cemeteries may be associated with historic events including specific important events or general events that illustrate broad patterns.

Eligible

- A cemetery associated with an important Civil War battle is eligible.
- A cemetery associated with the settlement of an area by an ethnic or cultural group is eligible if the movement of the group into the area had an important impact, if other properties associated with that group are rare, and if few documentary sources have survived to provide information about the group's history.

Not Eligible

- A cemetery associated with a battle in the Civil War does not qualify if the battle was not important in the history of the war.
- A cemetery associated with an area's settlement by an ethnic or cultural group is not eligible if the impact of the group on the area cannot be established, if other extant historic properties better convey association with the group, or if the information that the cemetery can impart is available in documentary sources.

ELIGIBILITY FOR INFORMATION POTENTIAL

Cemeteries, both historic and prehistoric, can be eligible if they have the potential to yield important information. The information must be important within a specific context and the potential to yield information must be demonstrated.

A cemetery can qualify if it has potential to yield important information provided that the information it contains is not available in extant documentary evidence.

Eligible

- A cemetery associated with the settlement of a particular cultural group will qualify if it has the potential to yield important information about subjects such as demography, variations in mortuary practices, or the study of the cause of death correlated with nutrition or other variables.

INTEGRITY

Assessing the integrity of a historic cemetery entails evaluating principal design features such as plan, grave markers, and any related elements (such as fencing). Only that portion of a historic cemetery that retains its historic integrity can be eligible. If the overall integrity has been lost because of the number and size of recent grave markers, some features such as buildings, structures, or objects that retain integrity may be considered as individual properties if they are of such historic or artistic importance that they individually meet one or more of the requirements listed above.

NATIONAL CEMETERIES

National Cemeteries administered by the Veterans Administration are eligible because they have been designated by Congress as primary memorials to the military history of the United States. Those areas within a designated national cemetery that have been used or prepared for the reception of the remains of veterans and their dependents, as well as any landscaped areas that immediately surround the graves may qualify. Because these cemeteries draw their significance from the presence of the remains of military personnel who have served the country throughout its history, the age of the cemetery is not a factor in judging eligibility, although integrity must be present.

A national cemetery or a portion of a national cemetery that has only been set aside for use in the future is not eligible.

CRITERIA CONSIDERATION E: RECONTRUCTED PROPERTIES

A reconstructed property is eligible when it is accurately executed in a suitable environment *and* presented in a dignified manner as part of a restoration master plan *and* when no other building or structure with the same associations has survived. All three of these requirements must be met.

UNDERSTANDING CRITERIA CONSIDERATION E: RECONSTRUCTED PROPERTIES

"Reconstruction" is defined as the reproduction of the exact form and detail of a vanished building, structure, object, or a part thereof, as it appeared at a specific period of time. Reconstructed buildings fall into two categories: buildings wholly constructed of new materials and buildings reassembled from some historic and some new materials. Both categories of properties present problems in meeting the integrity requirements of the National Register criteria.

Examples of Properties that MUST Meet Criteria Consideration E: Reconstructed Properties

- *A property in which most or all of the fabric is not original.*
- *A district in which an important resource or a significant number of resources are reconstructions.*

Examples of Properties that DO NOT Need to Meet Criteria Consideration E: Reconstructed Properties

- *A property that is remodeled or renovated and still has the majority of its original fabric.*

APPLYING CRITERIA CONSIDERATION E: RECONSTRUCTED PROPERTIES

ACCURACY OF THE RECONSTRUCTION

The phrase "accurately executed" means that the reconstruction must be based upon sound archeological, architectural, and historic data concerning the historic construction and appearance of the resource. That documentation should include both analysis of any above or below ground material and research in written and other records.

SUITABLE ENVIRONMENT

The phrase "suitable environment" refers to: 1) the physical context provided by the historic district and 2) any interpretive scheme, if the historic district is used for interpretive purposes. This means that the reconstructed property must be located at the same site as the original. It must also be situated in its original grouping of buildings, structures, and objects (as many as are extant), and that grouping must retain integrity. In addition, the reconstruction must not be misrepresented as an authentic historic property.

Eligible

- A reconstructed plantation manager's office building is considered eligible because it is located at its historic site, grouped with the remaining historic plantation buildings and structures, and the plantation as a whole retains integrity. Interpretation of the plantation district includes an explanation that the manager's office is not the original building, but a reconstruction.

Not Eligible

- The same reconstructed plantation manager's office building would not qualify if it were rebuilt at a location different from that of the original building, or if the district as a whole no longer reflected the period for which it is significant, or if a misleading interpretive scheme were used for the district or for the reconstruction itself.

RESTORATION MASTER PLANS

Being presented "as part of a restoration master plan" means that: 1) a reconstructed property is an essential component in a historic district and 2) the reconstruction is part of an overall restoration plan for an entire district. "Restoration" is defined as accurately recovering the form and details of a property and its setting as it appeared at a particular period by removing later work or by replacing missing earlier work (as opposed to completely rebuilding the property). The master plan for the entire property must emphasize restoration, not reconstruction. In other words, the master plan for the entire resource would not be acceptable under this consideration if it called for reconstruction of a majority of the resource.

Eligible

- A reconstructed plantation manager's office is eligible if the office were an important component of the plantation *and* if the reconstruction is one element in an overall plan for restoring the plantation *and* if no other building or structure with the same associations has survived.
- The reconstruction of the plantation manager's office building can be eligible only if the majority of buildings, structures, and objects that comprised the plantation are extant and are being restored. For guidance regarding restoration see the *Secretary of the Interior's Standards for Historic Preservation Projects.*

LAST SURVIVING PROPERTY OF A TYPE

This consideration also stipulates that a reconstruction can qualify if, in addition to the other requirements, no other building, object, or structure with the same association has survived. A reconstruction that is part of a restoration master plan is appropriate only if: 1) the property is the only one in the district with which a particular important activity or event has been historically associated or 2) no other property with the same associative values has survived.

RECONSTRUCTIONS OLDER THAN FIFTY YEARS

After the passage of fifty years, a reconstruction may attain its own significance for what it reveals about the period in which it was built, rather than the historic period it was intended to depict. On that basis, a reconstruction can possibly qualify under any of the Criteria.

CRITERIA CONSIDERATION F: COMMEMORATIVE PROPERTIES

A property primarily commemorative in intent can be eligible if design, age, tradition, or symbolic value has invested it with its own historical significance.

UNDERSTANDING CRITERIA CONSIDERATION F: COMMEMORATIVE PROPERTIES

Commemorative properties are designed or constructed after the occurrence of an important historic event or after the life of an important person. They are not directly associated with the event or with the person's productive life, but serve as evidence of a later generation's assessment of the past. Their significance comes from their value as cultural expressions at the date of their creation. Therefore, a commemorative property generally must be over fifty years old and must possess significance based on its own value, not on the value of the event or person being memorialized.

Examples of Properties that MUST Meet Criteria Consideration F: Commemorative Properties

- *A property whose sole or primary function is commemorative or in which the commemorative function is of primary significance.*

Examples of Properties that DO NOT Need to Meet Criteria Consideration F: Commemorative Properties

- *A resource that has a non-commemorative primary function or significance.*
- *A single marker that is a component of a district (whether contributing or non-contributing).*

APPLYING CRITERIA CONSIDERATION F: COMMEMORATIVE PROPERTIES

ELIGIBILITY FOR DESIGN

A commemorative property derives its design from the aesthetic values of the period of its creation. A commemorative property, therefore, may be significant for the architectural, artistic, or other design qualities of its own period in prehistory or history.

Eligible

- A commemorative statue situated in a park or square is eligible if it expresses the aesthetics or craftsmanship of the period when it was made, meeting Criterion C.
- A late 19th century statue erected on a courthouse square to commemorate Civil War veterans would qualify if it reflects that era's shared perception of the noble character and valor of the veterans and their cause. This was commonly conveyed by portraying idealized soldiers or allegorical figures of battle, victory, or sacrifice.

ELIGIBILITY FOR AGE, TRADITION, OR SYMBOLIC VALUE

A commemorative property cannot qualify for association with the event or person it memorializes. A commemorative property may, however, acquire significance after the time of its creation through *age, tradition,* or *symbolic* value. This significance must be documented by accepted methods of historical research, including written or oral history, and must meet one or more of the Criteria.

Eligible

- A commemorative marker erected by a cultural group that believed the place was the site of its origins is eligible if, for subsequent generations of the group, the marker itself became the focus of traditional association with the group's historic identity.
- A building erected as a monument to an important historical figure will qualify if through the passage of time the property itself has come to symbolize the value placed upon the individual and is widely recognized as a reminder of enduring principles or contributions valued by the generation that erected the monument.
- A commemorative marker erected early in the settlement or development of an area will qualify if it is demonstrated that, because of its relative great age, the property has long been a part of the historic identity of the area.

Not Eligible

- A commemorative marker erected in the past by a cultural group at the site of an event in its history would not be eligible if the marker were significant only for association with the event, and it had not become significant itself through tradition.
- A building erected as a monument to an important historical figure would not be eligible if its only value lay in its association with the individual, and it has not come to symbolize values, ideas, or contributions valued by the generation that erected the monument.
- A commemorative marker erected to memorialize an event in the community's history would not qualify simply for its association with the event it memorialized.

INELIGIBILITY AS THE LAST REPRESENTATIVE OF AN EVENT OR PERSON

The loss of properties directly associated with a significant event or person does not strengthen the case for consideration of a commemorative property. Unlike birthplaces and graves, a commemorative property usually has no direct historic association. The commemorative property can qualify for historic association only if it is clearly significant in its own right, as stipulated above.

CRITERIA CONSIDERATION G: PROPERTIES THAT HAVE ACHIEVED SIGNIFICANCE WITHIN THE LAST FIFTY YEARS[9]

A property achieving significance within the last fifty years is eligible if it is of exceptional importance.

UNDERSTANDING CRITERIA CONSIDERATION G: PROPERTIES THAT HAVE ACHIEVED SIGNIFICANCE WITHIN THE LAST FIFTY YEARS

The National Register Criteria for Evaluation exclude properties that achieved significance within the last fifty years unless they are of exceptional importance. Fifty years is a general estimate of the time needed to develop historical perspective and to evaluate significance. This consideration guards against the listing of properties of passing contemporary interest and ensures that the National Register is a list of truly historic places.

Examples of Properties that MUST Meet Criteria Consideration G: Properties that Have Achieved Significance Within the Last Fifty Years

- *A property that is less than fifty years old.*
- *A property that continues to achieve significance into a period less than fifty years before the nomination.*
- *A property that has non-contiguous Periods of Significance, one of which is less than fifty years before the nomination.*
- *A property that is more than fifty years old and had no significance until a period less than fifty years before the nomination.*

Examples of Properties that DO NOT Need to Meet Criteria Consideration G: Properties that Have Achieved Significance Within the Last Fifty Years

- *A resource whose construction began over fifty years ago, but the completion overlaps the fifty year period by a few years or less.*
- *A resource that is significant for its plan or design, which is over fifty years old, but the actual completion of the project overlaps the fifty year period by a few years.*
- *A historic district in which a few properties are newer than fifty years old, but the majority of properties and the most important Period of Significance are greater than fifty years old.*

[9] For more information on Criteria Consideration G, refer to *National Register Bulletin: Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Last Fifty Years.*

APPLYING CRITERIA CONSIDERATION G: PROPERTIES THAT HAVE ACHIEVED SIGNIFICANCE WITHIN THE PAST FIFTY YEARS

ELIGIBILITY FOR EXCEPTIONAL IMPORTANCE

The phrase "exceptional importance" may be applied to the extraordinary importance of an event or to an entire category of resources so fragile that survivors of any age are unusual. Properties listed that had attained significance in less than fifty years include: the launch pad at Cape Canaveral from which men first traveled to the moon, the home of nationally prominent playwright Eugene O'Neill, and the Chrysler Building (New York) significant as the epitome of the "Style Moderne" architecture.

Properties less than fifty years old that qualify as exceptional because the entire category of resources is fragile include a recent example of a traditional sailing canoe in the Trust Territory of the Pacific Islands, where because of rapid deterioration of materials, no working Micronesian canoes exist that are more than twenty years old. Properties that by their nature can last more than fifty years cannot be considered exceptionally important because of the fragility of the class of resources.

The phrase "exceptional importance" does not require that the property be of national significance. It is a measure of a property's importance within the appropriate historic context, whether the scale of that context is local, State, or national.

Eligible

- The General Laundry Building in New Orleans, one of the few remaining Art Deco Style buildings in that city, was listed in the National Register when it was forty years old because of its exceptional importance as an example of that architectural style.

HISTORICAL PERSPECTIVE

A property that has achieved significance within the past fifty years can be evaluated only when sufficient historical perspective exists to determine that the property is exceptionally important. The necessary perspective can be provided by scholarly research and evaluation, and must consider both the historic context and the specific property's role in that context.

In many communities, properties such as apartment buildings built in the 1950s cannot be evaluated because there is no scholarly research available to provide an overview of the nature, role, and impact of that building type within the context of historical and architectural developments of the 1950s.

NATIONAL PARK SERVICE RUSTIC ARCHITECTURE

Properties such as structures built in a rustic style by the National Park Service during the 1930s and 1940s can be evaluated because a broad study, *National Park Service Rustic Architecture* (1977), provides the context for evaluating properties of this type and style. Specific examples were listed in the National Register prior to reaching fifty years of age when documentation concerning the individual properties established their significance within the historical and architectural context of the type and style.

VETERANS ADMINISTRATION HOSPITALS

Hospitals less than fifty years old that were constructed by the Veterans Bureau and Veterans Administration can be evaluated because the collection of forty-eight facilities built between 1920 and 1946 has been analyzed in a study prepared by the agency. The study provided a historic and architectural context for development of veteran's care within which hospitals could be evaluated. The exceptional importance of specific individual facilities constructed within the past fifty years could therefore be determined based on their role and their present integrity.

COMPARISON WITH RELATED PROPERTIES

In justifying exceptional importance, it is necessary to identify other properties within the geographical area that reflect the same significance or historic associations and to determine which properties *best* represent the historic context in question. Several properties in the area could become eligible with the passage of time, but few will qualify now as exceptionally important.

POST-WORLD WAR II PROPERTIES

Properties associated with the post-World War II era must be identified and evaluated to determine which ones in an area could be judged exceptionally important. For example, a public housing complex may be eligible as an outstanding expression of the nation's post-war urban policy. A military installation could be judged exceptionally important because of its contribution to the Cold War arms race. A church building in a Southern city may have served as the pivotal rallying point for the city's most famous civil rights protest. A post-war suburban subdivision may be the best reflection of contemporary siting and design tenets in a metropolitan area. In each case, the nomination preparer must justify the *exceptional* importance of the property relative to similar properties in the community, State, or nation.

ELIGIBILITY FOR INFORMATION POTENTIAL

A property that has achieved significance within the past fifty years can qualify under Criterion D only if it can be demonstrated that the information is of exceptional importance within the appropriate context and that the property contains data superior to or different from those obtainable from other sources, including other culturally related sites. An archeological site less than fifty years old may be eligible if the former inhabitants are so poorly documented that information about their lifeways is best obtained from examination of the material remains.

Eligible

- Data such as the rate of adoption of modern technological innovations by rural tenant farmers in the 1950s may not be obtainable through interviews with living persons but could be gained by examination of homesites.

Not Eligible

- A recent archeological site such as the remains of a Navajo sheep corral used in the 1950s would not be considered exceptionally significant for its information potential on animal husbandry if better information on the same topic is available through ethnographic studies or living informants.

HISTORIC DISTRICTS

Properties which have achieved significance within the past fifty years can be eligible for the National Register if they are an integral part of a district which qualifies for National Register listing. This is demonstrated by documenting that the property dates from within the district's defined Period of Significance and that it is associated with one or more of the district's defined Areas of Significance.

Properties less than fifty years old may be an integral part of a district when there is sufficient perspective to consider the properties as historic. This is accomplished by demonstrating that: 1) the district's Period of Significance is justified as a discrete period with a defined beginning and end, 2) the character of the district's historic resources is clearly defined and assessed, 3) specific resources in the district are demonstrated to date from that discrete era, and 4) the majority of district properties are over fifty years old. In these instances, it is not necessary to prove exceptional importance of either the district itself or the less-than-fifty-year-old properties. Exceptional importance still must be demonstrated for district where the majority of properties or the major Period of Significance is less than fifty years old, and for less-than-fifty-year-old properties which are nominated individually.

PROPERTIES MORE THAN FIFTY YEARS IN AGE, LESS THAN FIFTY YEARS IN SIGNIFICANCE

Properties that are more than fifty years old, but whose significant associations or qualities are less than fifty years old, must be treated under the fifty year consideration.

Eligible

- A building constructed early in the twentieth century (and having no architectural importance), but that was associated with an important person during the 1950s, must be evaluated under Criteria Consideration G because the Period of Significance is within the past fifty years. Such a property would qualify if the person was of exceptional importance.

REQUIREMENT TO MEET THE CRITERIA, REGARDLESS OF AGE

Properties that are less than fifty years old and are not exceptionally important will *not* automatically qualify for the National Register once they are fifty years old. In order to be listed in the National Register, all properties, regardless of age, must be demonstrated to meet the Criteria for Evaluation.

VIII. HOW TO EVALUATE THE INTEGRITY OF A PROPERTY

INTRODUCTION

Integrity is the ability of a property to convey its significance. To be listed in the National Register of Historic Places, a property must not only be shown to be significant under the National Register criteria, but it also must have integrity. The evaluation of integrity is sometimes a subjective judgment, but it must always be grounded in an understanding of a property's physical features and how they relate to its significance.

Historic properties either retain integrity (this is, convey their significance) or they do not. Within the concept of integrity, the National Register criteria recognizes seven aspects or qualities that, in various combinations, define integrity.

To retain historic integrity a property will always possess several, and usually most, of the aspects. The retention of specific aspects of integrity is paramount for a property to convey its significance. Determining *which* of these aspects are most important to a particular property requires knowing why, where, and when the property is significant. The following sections define the seven aspects and explain how they combine to produce integrity.

SEVEN ASPECTS OF INTEGRITY

- Location
- Design
- Setting
- Materials
- Workmanship
- Feeling
- Association

UNDERSTANDING THE ASPECTS OF INTEGRITY

LOCATION

Location is the place where the historic property was constructed or the place where the historic event occurred. The relationship between the property and its location is often important to understanding why the property was created or why something happened. The actual location of a historic property, complemented by its setting, is particularly important in recapturing the sense of historic events and persons. Except in rare cases, the relationship between a property and its historic associations is destroyed if the property is moved. (See Criteria Consideration B in *Part VII: How to Apply the Criteria Considerations*, for the conditions under which a moved property can be eligible.)

DESIGN

Design is the combination of elements that create the form, plan, space, structure, and style of a property. It results from conscious decisions made during the original conception and planning of a property (or its significant alteration) and applies to activities as diverse as community planning, engineering, architecture, and landscape architecture. Design includes such elements as organization of space, proportion, scale, technology, ornamentation, and materials.

A property's design reflects historic functions and technologies as well as aesthetics. It includes such considerations as the structural system; massing; arrangement of spaces; pattern of fenestration; textures and colors of surface materials; type, amount, and style of ornamental detailing; and arrangement and type of plantings in a designed landscape.

Design can also apply to districts, whether they are important primarily for historic association, architectural value, information potential, or a combination thereof. For districts significant primarily for historic association or architectural value, design concerns more than just the individual buildings or structures located within the boundaries. It also applies to the way in which buildings, sites, or structures are related: for example, spatial relationships between major features; visual rhythms in a streetscape or landscape plantings; the layout and materials of walkways and roads; and the relationship of other features, such as statues, water fountains, and archeological sites.

SETTING

Setting is the physical environment of a historic property. Whereas location refers to the specific place where a property was built or an event occurred, setting refers to the *character* of the place in which the property played its historical role. It involves *how*, not just where, the property is situated and its relationship to surrounding features and open space.

Setting often reflects the basic physical conditions under which a property was built and the functions it was intended to serve. In addition, the way in which a property is positioned in its environment can reflect the designer's concept of nature and aesthetic preferences.

The physical features that constitute the setting of a historic property can be either natural or manmade, including such elements as:

- Topographic features (a gorge or the crest of a hill);
- Vegetation;
- Simple manmade features (paths or fences); and
- Relationships between buildings and other features or open space.

These features and their relationships should be examined not only within the exact boundaries of the property, but also between the property and its *surroundings*. This is particularly important for districts.

MATERIALS

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. The choice and combination of materials reveal the preferences of those who created the property and indicate the availability of particular types of materials and technologies. Indigenous materials are often the focus of regional building traditions and thereby help define an area's sense of time and place.

A property must retain the key exterior materials dating from the period of its historic significance. If the property has been rehabilitated, the historic materials and significant features must have been preserved. The property must also be an actual historic resource, not a recreation; a recent structure fabricated to look historic is not eligible. Likewise, a property whose historic features and materials have been lost and then reconstructed is usually not eligible. (See Criteria Consideration E in *Part VII: How to Apply the Criteria Considerations* for the conditions under which a reconstructed property can be eligible.)

WORKMANSHIP

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. It is the evidence of artisans' labor and skill in constructing or altering a building, structure, object, or site. Workmanship can apply to the property as a whole or to its individual components. It can be expressed in vernacular methods of construction and plain finishes or in highly sophisticated configurations and ornamental detailing. It can be based on common traditions or innovative period techniques.

Workmanship is important because it can furnish evidence of the technology of a craft, illustrate the aesthetic principles of a historic or prehistoric period, and reveal individual, local, regional, or national applications of both technological practices and aesthetic principles. Examples of workmanship in historic buildings include tooling, carving, painting, graining, turning, and joinery. Examples of workmanship in prehistoric contexts include Paleo-Indian clovis projectile points; Archaic period beveled adzes; Hopewellian birdstone pipes; copper earspools and worked bone pendants; and Iroquoian effigy pipes.

FEELING

Feeling is a property's expression of the aesthetic or historic sense of a particular period of time. It results from the presence of physical features that, taken together, convey the property's historic character. For example, a rural historic district retaining original design, materials, workmanship, and setting will relate the feeling of agricultural life in the 19th century. A grouping of prehistoric petroglyphs, unmarred by graffiti and intrusions and located on its original isolated bluff, can evoke a sense of tribal spiritual life.

ASSOCIATION

Association is the direct link between an important historic event or person and a historic property. A property retains association if it *is* the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer. Like feeling, association requires the presence of physical features that convey a property's historic character. For example, a Revolutionary War battlefield whose natural and manmade elements have remained intact since the 18th century will retain its quality of association with the battle.

Because feeling and association depend on individual perceptions, their retention *alone* is never sufficient to support eligibility of a property for the National Register.

ASSESSING INTEGRITY IN PROPERTIES

Integrity is based on significance: why, where, and when a property is important. Only after significance is fully established can you proceed to the issue of integrity.

The steps in assessing integrity are:

- Define the **essential physical features** that must be present for a property to represent its significance.
- Determine whether the **essential physical features are visible** enough to convey their significance.
- Determine whether the property needs to be **compared with similar properties.** And,
- Determine, based on the significance and essential physical features, **which aspects of integrity** are particularly vital to the property being nominated and if they are present.

Ultimately, the question of integrity is answered by whether or not the property retains the **identity** for which it is significant.

DEFINING THE ESSENTIAL PHYSICAL FEATURES

All properties change over time. It is not necessary for a property to retain all its historic physical features or characteristics. The property must retain, however, the essential physical features that enable it to convey its historic identity. The essential physical features are those features that define both *why* a property is significant (Applicable Criteria and Areas of Significance) and *when* it was significant (Periods of Significance). They are the features without which a property can no longer be identified as, for instance, a late 19th century dairy barn or an early 20th century commercial district.

CRITERIA A AND B

A property that is significant for its historic association is eligible if it retains the essential physical features that made up its character or appearance during the period of its association with the important event, historical pattern, or person(s). If the property is a site (such as a treaty site) where there are no material cultural remains, the setting must be intact.

Archeological sites eligible under Criteria A and B must be in overall good condition with excellent preservation of features, artifacts, and spatial relationships to the extent that these remains are able to convey important associations with events or persons.

CRITERION C

A property important for illustrating a particular architectural style or construction technique must retain most of the physical features that constitute that style or technique. A property that has lost some historic materials or details can be eligible *if* it retains the majority of the features that illustrate its style in terms of the massing, spatial relationships, proportion, pattern of windows and doors, texture of materials, and ornamentation. The property is not eligible, however, if it retains some basic features conveying massing but has lost the majority of the features that once characterized its style.

Archeological sites eligible under Criterion C must be in overall good condition with excellent preservation of features, artifacts, and spatial relationships to the extent that these remains are able to illustrate a site type, time period, method of construction, or work of a master.

CRITERION D

For properties eligible under Criterion D, including archeological sites and standing structures studied for their information potential, less attention is given to their overall condition, than it they were being considered under Criteria A, B, or C. Archeological sites, in particular, do not exist today exactly as they were formed. There are always cultural and natural processes that alter the deposited materials and their spatial relationships.

For properties eligible under Criterion D, integrity is based upon the property's potential to yield specific data that addresses important research questions, such as those identified in the historic context documentation in the Statewide Comprehensive Preservation Plan or in the research design for projects meeting the *Secretary of the Interior's Standards for Archeological Documentation.*

INTERIORS

Some historic buildings are virtually defined by their exteriors, and their contribution to the built environment can be appreciated even if their interiors are not accessible. Examples of this would include early examples of steel-framed skyscraper construction. The great advance in American technology and engineering made by these buildings can be read from the outside. The change in American popular taste during the 19th century, from the symmetry and simplicity of architectural styles based on classical precedents, to the expressions of High Victorian styles, with their combination of textures, colors, and asymmetrical forms, is readily apparent from the exteriors of these buildings.

Other buildings "are" interiors. The Cleveland Arcade, that soaring 19th century glass-covered shopping area, can only be appreciated from the inside. Other buildings in this category would be the great covered train sheds of the 19th century.

In some cases the loss of an interior will disqualify properties from listing in the National Register—a historic concert hall noted for the beauty of its auditorium and its fine acoustic qualities would be the type of property that if it were to lose its interior, it would lose its value as a historic resource. In other cases, the overarching significance of a property's exterior can overcome the adverse effect of the loss of an interior.

In borderline cases particular attention is paid to the significance of the property and the remaining historic features.

HISTORIC DISTRICTS

For a district to retain integrity as a whole, the majority of the components that make up the district's historic character must possess integrity even if they are individually undistinguished. In addition, the relationships among the district's components must be substantially unchanged since the period of significance.

When evaluating the impact of intrusions upon the district's integrity, take into consideration the relative number, size, scale, design, and location of the components that do not contribute to the significance. A district is not eligible if it contains so many alterations or new intrusions that it no longer conveys the sense of a historic environment.

A component of a district cannot contribute to the significance if:

- it has been substantially altered since the period of the district's significance *or*
- it does not share the historic associations of the district.

VISIBILITY OF PHYSICAL FEATURES

Properties eligible under Criteria A, B, and C must not only retain their essential physical features, but the features must be visible enough to convey their significance. This means that even if a property is physically intact, its integrity is questionable if its significant features are concealed under modern construction. Archeological properties are often the exception to this; by nature they usually do not require visible features to convey their significance.

NON-HISTORIC EXTERIORS

If the historic *exterior* building material is covered by non-historic material (such as modern siding), the property can still be eligible *if* the significant form, features, and detailing are not obscured. If a property's exterior is covered by a non-historic false-front or curtain wall, the property will not qualify under Criteria A, B, or C, because it does not retain the visual quality necessary to convey historic or architectural significance. Such a property also cannot be considered a contributing element in a historic district, because it does not add to the district's sense of time and place. If the false front, curtain wall, or non-historic siding is removed and the original building materials are intact, then the property's integrity can be re-evaluated.

PROPERTY CONTAINED WITHIN ANOTHER PROPERTY

Some properties contain an earlier structure that formed the nucleus for later construction. The exterior property, if not eligible in its own right, can qualify on the basis of the interior property *only if* the interior property can yield significant information about a specific construction technique or material, such as rammed earth or tabby. The interior property *cannot* be used as the basis for eligibility if it has been so altered that it no longer contains the features that could provide important information, or if the presence of important information cannot be demonstrated.

SUNKEN VESSELS

A sunken vessel can be eligible under Criterion C as embodying the distinctive characteristics of a method of construction if it is structurally intact. A *deteriorated* sunken vessel, no longer structurally intact, can be eligible under Criterion D if the remains of either the vessel or its contents is capable of yielding significant information. For further information, refer to *National Register Bulletin: Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places.*

Natural Features

A natural feature that is associated with a historic event or trend, such as a rock formation that served as a trail marker during westward expansion, must retain its historic appearance, unobscured by modern construction or landfill. Otherwise it is not eligible, even though it remains intact.

COMPARING SIMILAR PROPERTIES

For some properties, comparison with similar properties should be considered during the evaluation of integrity. Such comparison may be important in deciding what physical features are essential to properties of that type. In instances where it has not been determined what physical features a property must possess in order for it to reflect the significance of a historic context, comparison with similar properties should be undertaken during the evaluation of integrity. This situation arises when scholarly work has not been done on a particular property type or when surviving examples of a property type are extremely rare. (See **Comparing Related Properties** in *Part V: How to Evaluate a Property within its Historic Context.)*

RARE EXAMPLES OF A PROPERTY TYPE

Comparative information is particularly important to consider when evaluating the integrity of a property that is a rare surviving example of its type. The property must have the essential physical features that enable it to convey its historic character or information. The rarity and poor condition, however, of other extant examples of the type may justify accepting a greater degree of alteration or fewer features, provided that enough of the property survives for it to be a significant resource.

Eligible

- A one-room schoolhouse that has had all original exterior siding replaced and a replacement roof that does not exactly replicate the original roof profile can be eligible if the other extant rare examples have received an even greater degree of alteration, such as the subdivision of the original one-room plan.

Not Eligible

- A mill site contains information on how site patterning reflects historic functional requirements, but parts of the site have been destroyed. The site is not eligible for its information potential if a comparison of other mill sites reveals more intact properties with complete information.

DETERMINING THE RELEVANT ASPECTS OF INTEGRITY

Each type of property depends on certain aspects of integrity, more than others, to express its historic significance. Determining which of the aspects is most important to a particular property requires an understanding of the property's significance and its essential physical features.

CRITERIA A AND B

A property important for association with an event, historical pattern, or person(s) ideally might retain *some* features of all seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Integrity of design and workmanship, however, might not be as important to the significance, and would not be relevant if the property were a site. A basic integrity test for a property associated with an important event or person is whether a historical contemporary would recognize the property as it exists today.

For archeological sites that are eligible under Criteria A and B, the seven aspects of integrity can be applied in much the same way as they are to buildings, structures, or objects. It is important to note, however, that the site must have *demonstrated* its ability to convey its significance, as opposed to sites eligible under Criterion D where only the potential to yield information is required.

Eligible

A mid-19th century waterpowered mill important for its association with an area's industrial development is eligible if:

- it is still on its original site (**Location**), and
- the important features of its setting are intact (**Setting**), and
- it retains most of its historic materials (**Materials**), and
- it has the basic features expressive of its design and function, such as configuration, proportions, and window pattern (**Design**).

Not Eligible

A mid-19th century waterpowered mill important for its association with an area's industrial development is not eligible if:

- it has been moved (**Location, Setting, Feeling**, and **Association**), or
- substantial amounts of new materials have been incorporated (**Materials, Workmanship,** and **Feeling**), or
- it no longer retains basic design features that convey its historic appearance or function (**Design, Workmanship,** and **Feeling**).

CRITERION C

A property significant under Criterion C must retain those physical features that characterize the type, period, or method of construction that the property represents. Retention of design, workmanship, and materials will usually be more important than location, setting, feeling, and association. Location and setting will be important, however, for those properties whose design is a reflection of their immediate environment (such as designed landscapes and bridges).

For archeological sites that are eligible under Criterion C, the seven aspects of integrity can be applied in much the same way as they are to buildings, structures, or objects. It is important to note, however, that the site must have *demonstrated* its ability to convey its significance, as opposed to sites eligible under Criterion D where only the *potential* to yield information is required.

Eligible

A 19th century wooden covered bridge, important for illustrating a construction type, is eligible if:

- the essential features of its design are intact, such as abutments, piers, roof configuration, and trusses (**Design, Workmanship,** and **Feeling**), and
- most of the historic materials are present (**Materials, Workmanship**, and **Feeling**), and
- evidence of the craft of wooden bridge technology remains, such as the form and assembly technique of the trusses (**Workmanship**).
- Since the design of a bridge relates directly to its function as a transportation crossing, it is also important that the bridge still be situated over a waterway (**Setting, Location, Feeling,** and **Association**).

Not Eligible

For a 19th century wooden covered bridge, important for its construction type, replacement of some materials of the flooring, siding, and roofing would not necessarily damage its integrity. Integrity would be lost, however, if:

- the abutments, piers, or trusses were substantially altered (**Design, Workmanship,** and **Feeling**) or
- considerable amounts of new materials were incorporated (**Materials, Workmanship,** and **Feeling**).
- Because environment is a strong factor in the design of this property type, the bridge would also be ineligible if it no longer stood in a place that conveyed its function as a crossing (**Setting, Location, Feeling,** and **Association**).

CRITERION D

For properties eligible under Criterion D, setting and feeling may not have direct bearing on the property's ability to yield important information. Evaluation of integrity probably will focus primarily on the location, design, materials, and perhaps workmanship.

Eligible

A multicomponent prehistoric site important for yielding data on changing subsistence patterns can be eligible if:

- floral or faunal remains are found in clear association with cultural material (**Materials** and **Association**) and
- the site exhibits stratigraphic separation of cultural components (**Location**).

Not Eligible

A multicomponent prehistoric site important for yielding data on changing subsistence patterns would not be eligible if:

- floral or faunal remains were so badly decomposed as to make identification impossible (**Materials**), or
- floral or faunal remains were disturbed in such a manner as to make their association with cultural remains ambiguous (**Association**), or
- the site has lost its stratigraphic context due to subsequent land alterations (**Location**).

Eligible

A lithic scatter site important for yielding data on lithic technology during the Late Archaic period can be eligible if:

- the site contains lithic debitage, finished stone tools, hammerstones, or antler flakers (**Material** and **Design**), and
- the site contains datable material (**Association**).

Not Eligible

A lithic scatter site important for yielding data on lithic technology during the Late Archaic period would not be eligible if:

- the site contains natural deposits of lithic materials that are impossible to distinguish from culturally modified lithic material (**Design**) or
- the site does not contain any temporal diagnostic evidence that could link the site to the Late Archaic period (**Association**).

IX. SUMMARY OF THE NATIONAL HISTORIC LANDMARKS CRITERIA FOR EVALUATION

A property being nominated to the National Register may also merit consideration for potential designation as a National Historic Landmark. Such consideration is dependent upon the stringent application of the following distinct set of criteria (found in the *Code of Federal Regulations, Title 36, Part 65*).

NATIONAL HISTORIC LANDMARKS CRITERIA

The quality of national significance is ascribed to districts, sites, buildings, structures, and objects that possess exceptional value or quality in illustrating or interpreting the heritage of the United States in history, architecture, archeology, engineering, and culture and that possess a high degree of integrity of location, design, setting, materials, workmanship, feeling, and association, and:

1. That are associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained; or
2. That are associated importantly with the lives of persons nationally significant in the history of the United States; or
3. That represent some great idea or ideal of the American people; or
4. That embody the distinguishing characteristics of an architectural type specimen exceptionally valuable for a study of a period, style or method of construction, or that represent a significant, distinctive and exceptional entity whose components may lack individual distinction; or
5. That are composed of integral parts of the environment not sufficiently significant by reason of historical association or artistic merit to warrant individual recognition but collectively compose an entity of exceptional historical or artistic significance, or outstandingly commemorate or illustrate a way of life or culture; or
6. That have yielded or may be likely to yield information of major scientific importance by revealing new cultures, or by shedding light upon periods of occupation over large areas of the United States. Such sites are those which have yielded, or which may reasonably be expected to yield, data affecting theories, concepts and ideas to a major degree.

NATIONAL HISTORIC LANDMARK EXCLUSIONS

Ordinarily, cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings and properties that have achieved significance within the past fifty years are not eligible for designation. If such properties fall within the following categories they may, nevertheless, be found to qualify:

1. A religious property deriving its primary national significance from architectural or artistic distinction or historical importance; or
2. A building or structure removed from its original location but which is nationally significant primarily for its architectural merit, or for association with persons or events of transcendent importance in the nation's history and the association consequential; or
3. A site of a building or structure no longer standing but the person or event associated with it is of transcendent importance in the nations's history and the association consequential; or

4. A birthplace, grave or burial if it is of a historical figure of transcendent national significance and no other appropriate site, building, or structure directly associated with the productive life of that person exists; or
5. A cemetery that derives its primary national significance from graves of persons of transcendent importance, or from an exceptionally distinctive design or an exceptionally significant event; or
6. A reconstructed building or ensemble of buildings of extraordinary national significance when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other buildings or structures with the same association have survived; or
7. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own national historical significance; or
8. A property achieving national significance within the past 50 years if it is of extraordinary national importance.

COMPARING THE NATIONAL HISTORIC LANDMARKS CRITERIA AND THE NATIONAL REGISTER CRITERIA

In general, the instructions for preparing a National Register nomination and the guidelines stated in this bulletin for applying the National Register Criteria also apply to Landmark nominations and the use of the Landmark criteria. While there are specific distinctions discussed below, *Parts IV and V* of this bulletin apply equally to National Register listings and Landmark nominations. That is, the categories of historic properties are defined the same way; historic contexts are identified similarly; and comparative evaluation is carried out on the same principles enumerated in *Part V*.

There are some differences between National Register and National Historic Landmarks Criteria. The following is an explanation of how each Landmark Criterion compares with its National Register Criteria counterpart:

CRITERION 1

This Criterion relates to National Register Criterion A. Both cover properties associated with events. The Landmark Criterion, however, requires that the events associated with the property be *outstandingly* represented by that property and that the property be related to the broad national patterns of U.S. history. Thus, the quality of the property to convey and interpret its meaning must be of a higher order and must relate to national themes rather than the narrower context of State or local themes.

CRITERION 2

This Criterion relates to National Register Criterion B. Both cover properties associated with significant people. The Landmark Criterion differs in that it specifies that the association of a person to the property in question be an important one and that the person associated with the property be of *national* significance.

CRITERION 3

This Criterion has no counterpart among the National Register Criteria. It is rarely, if ever, used alone. While not a landmark at present, the Liberty Bell is an object that might be considered under this Criterion. The application of this Criterion obviously requires the most careful scrutiny and would apply only in rare instances involving ideas and ideals of the highest order.

CRITERION 4

This Criterion relates to National Register Criterion C. Its intent is to qualify exceptionally important works of architecture or collective elements of architecture extraordinarily significant as an ensemble, such as a historic district. Note that the language is more restrictive than that of the National Register Criterion in requiring that a candidate in architecture be "a specimen exceptionally valuable for the study of a period, style, or method of construction" rather than simply embodying distinctive characteristics of a type, period, or method of construction. With regard to historic districts, the Landmarks Criterion requires an entity that is distinctive and exceptional. Unlike National Register Criterion C, this Criterion will not qualify the works of a master, per se, but only such works which are exceptional or extraordinary. Artistic value is considered only in the context of history's judgement in order to avoid current conflicts of taste.

CRITERION 5

This Criterion does not have a strict counterpart among the National Register Criteria. It may seem redundant of the latter part of Landmark Criterion 4. It is meant to cover collective entities such as Greenfield Village and historic districts like New Bedford, Massachusetts, which qualify for their collective association with a nationally significant event, movement, or broad pattern of national development.

CRITERION 6

The National Register counterpart of this is Criterion D. Criterion 6 was developed specifically to recognize archeological sites. All such sites must address this Criterion. The following are the qualifications that distinguish this Criterion from its National Register counterpart: the information yielded or likely to be yielded must be of *major* scientific importance by revealing new cultures, or by shedding light upon periods of occupation *over large areas* of the United States. Such sites should be expected to yield data affecting *theories, concepts, and ideas* to a *major degree.*

The data recovered or expected to be recovered must make a major contribution to the existing corpus of information. Potentially recoverable data must be likely to revolutionize or substantially modify a major theme in history or prehistory, resolve a substantial historical or anthropological debate, or close a serious gap in a major theme of U. S. history or prehistory.

EXCLUSIONS AND EXCEPTIONS TO THE EXCLUSIONS

This section of the National Historic Landmarks Criteria has its counterpart in the National Register's "Criteria Considerations." The most abundant difference between them is the addition of the qualifiers "national," "exceptional," or "extraordinary" before the word significance. Other than this, the following are the most notable distinctions:

EXCLUSION 2

Buildings moved from their original location, qualify only if one of two conditions are met: 1) the building is nationally significant for architecture, *or* 2) the persons or events with which they are associated are of *transcendent* national significance and the association is consequential.

Transcendent significance means an order of importance higher than that which would ordinarily qualify a person or event to be nationally significant. A consequential association is a relationship to a building that had an evident impact on events, rather than a connection that was incidental and passing.

EXCLUSION 3

This pertains to the site of a structure no longer standing. There is no counterpart to this exclusion in the National Register Criteria. In order for such a property to qualify for Landmark designation it must meet the second condition cited for Exclusion 2.

EXCLUSION 4

This exclusion relates to Criteria Consideration C of the National Register Criteria. The only difference is that a burial place qualifies for Landmark designation only if, in addition to other factors, the person buried is of *transcendent* national importance.

When evaluating properties at the national level for designation as a National Historic Landmark, please refer to the National Historic Landmarks outline, *History and Prehistory in the National Park System and the National Historic Landmarks Program, 1987*. (For more information about the National Historic Landmarks program, please write to Department of the Interior, National Park Service, National Historic Landmarks, 1849 C Street, NW, NC400, Washington, DC 20240.)

X. GLOSSARY

Associative Qualities - An aspect of a property's history that links it with historic events, activities, or persons.

Code of Federal Regulations - Commonly referred to as "CFR." The part containing the National Register Criteria is usually referred to as 36 CFR 60, and is available from the National Park Service.

CLG - Certified Local Government.

Culture - A group of people linked together by shared values, beliefs, and historical associations, together with the group's social institutions and physical objects necessary to the operation of the institution.

Cultural Resource - See Historic Resource.

Evaluation - Process by which the significance and integrity of a historic property are judged and eligibility for National Register listing is determined.

Historic Context - An organizing structure for interpreting history that groups information about historic properties that share a common theme, common geographical area, and a common time period. The development of historic contexts is a foundation for decisions about the planning, identification, evaluation, registration, and treatment of historic properties, based upon comparative historic significance.

Historic Integrity - The unimpaired ability of a property to convey its historical significance.

Historic Property - See Historic Resource.

Historic Resource - Building, site, district, object, or structure evaluated as historically significant.

Identification - Process through which information is gathered about historic properties.

Listing - The formal entry of a property in the National Register of Historic Places. See also, Registration.

Nomination - Official recommendation for listing a property in the National Register of Historic Places.

Property Type - A grouping of properties defined by common physical and associative attributes.

Registration - Process by which a historic property is documented and nominated or determined eligible for listing in the National Register.

Research Design - A statement of proposed identification, documentation, investigation, or other treatment of a historic property that identifies the project's goals, methods and techniques, expected results, and the relationship of the expected results to other proposed activities or treatments.

XI. LIST OF NATIONAL REGISTER BULLETINS

The Basics
How to Apply National Register Criteria for Evaluation *

Guidelines for Completing National Register of Historic Places Form
Part A: How to Complete the National Register Form *
Part B: How to Complete the National Register Multiple Property Documentation Form *

Researching a Historic Property *

Property Types
Guidelines for Evaluating and Documenting Historic **Aids to Navigation** *

Guidelines for Identifying, Evaluating and Registering **America's Historic Battlefields**

Guidelines for Evaluating and Registering Historical **Archeological Sites**

Guidelines for Evaluating and Documenting Historic **Aviation Properties**

Guidelines for Evaluating and Registering **Cemeteries and Burial Places**

How to Evaluate and Nominate **Designed Historic Landscapes** *

Guidelines for Identifying, Evaluating and Registering Historic **Mining Sites**

How to Apply National Register Criteria to **Post Offices** *

Guidelines for Evaluating and Documenting **Properties Associated with Significant Persons**

Guidelines for Evaluating and Documenting **Properties That Have Achieved Significance Within the Last Fifty Years** *

Guidelines for Evaluating and Documenting **Rural Historic Landscapes** *

Guidelines for Evaluating and Documenting **Traditional Cultural Properties** *

Nominating Historic **Vessels and Shipwrecks** to the National Register of Historic Places

Technical Assistance
Defining Boundaries for National Register Properties*

Guidelines for Local Surveys: A Basis for Preservation Planning *

How to Improve the Quality of Photographs for National Register Nominations

National Register Casebook: Examples of Documentation *

Using the UTM Grid System to Record Historic Sites

To order these publications, write to: National Register of Historic Places, National Park Service, 1849 C St., NC 400, NW, Washington, D.C. 20240, or e-mail at: nr_reference@nps.gov. Publications marked with an asterisk (*) are also available in electronic form at **www.cr.nps.gov/nr**.

U.S. GOVERNMENT PRINTING OFFICE: 2005—717-788

CALIFORNIA ARCHAEOLOGY

Michael J. Moratto

INFOTEC Development, Inc.
Sonora, California
and
California Academy of Sciences
San Francisco, California

with contributions by

David A. Fredrickson
Sonoma State University
Rohnert Park, California

Christopher Raven
Desert Institute of Geography
Sacramento, California

Claude N. Warren
University of Nevada, Las Vegas
Las Vegas, Nevada

with a foreword by
Francis A. Riddell

1984

ACADEMIC PRESS, INC.
Harcourt Brace Jovanovich, Publishers

Orlando San Diego San Francisco New York London
Toronto Montreal Sydney Tokyo São Paulo

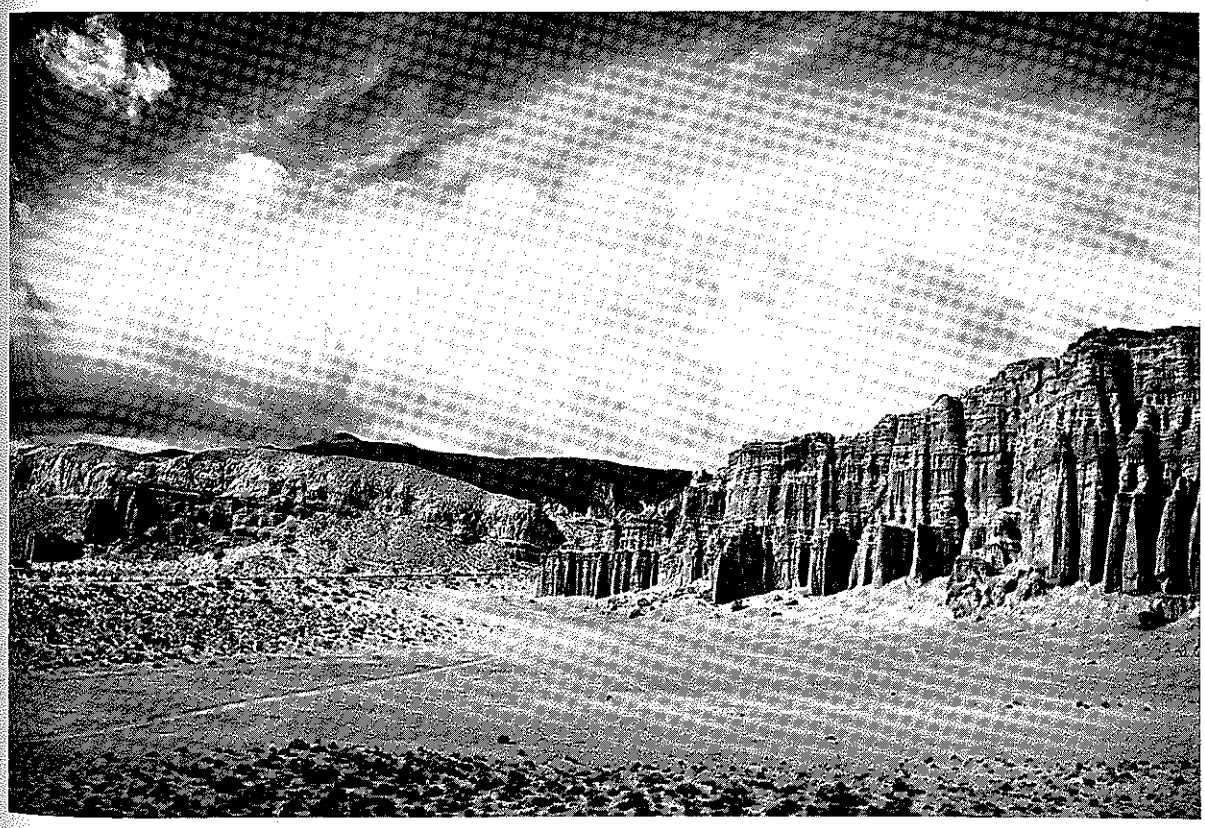
r foothill villages were
tlements were located
ne west was disrupted;
ts (e.g., shell beads and
buried with the dead;
ents may reflect eco-
a deterioration of the
ifts (see Moratto *et al.*
recorded as the Sweet-
ymond, and Sawtooth

cial integration were
d in part from move-
he Miwok (Horseshoe
ick Rock, Vermilion).
n groups—the Washo
(Pla-101A), Yokuts
Phase)—claimed the
graphically (Table 7.2
calities were densely
esidents situated near
country. Principal vil-
eremonial centers of
res were reintegrated
lifornia—factors that
stability. Late pre-
n coincided with the
Moratto *et al.* 1978).
es. First, as a result of
rom western Califor-
tury after A.D. 1770.
3 devastated foothill
ver. Then, as coastal
er neophytes of vari-
re repatriated in the
8–1860 severely dis-
d often triggered the
l the miners. Finally,
he 1850s further co-
accelerated cultural
haeological record of

8. The Desert Region

Claude N. Warren

> The Indians who live in the little oases where fresh water is found have a well-defined tradition of a great flood which once covered all of this territory from the far south well up the slopes of the San Jacinto and San Bernardino Mountains. They have no idea as to the exact time of this flood, and the gray-haired old patriarchs relate that their fathers told them of a time when they used to go into the valley that is now a dry, sandy waste and catch an abundance of fish. But there came a time when the waters receded and left millions of fish on the beach, whereupon the wild animals came down from the mountains to feast themselves, and were in such numbers that the Indians were forced to flee for their lives.
>
> *Anonymous (1891:2)*



Red Rock Canyon, Kern County. (Photograph by Mary Hill; courtesy of Mary Hill.)