Appendix F

BACKGROUND INFORMATION ON CULTURAL RESOURCES OF THE LORP PROJECT AREA

Summarized from "A Class III Cultural Resources Inventory for the Lower Owens River Project, Inyo County, California. Wendy J. Nelson (Farwestern Anthropological Research Group) and Rand Herbert (JRP Historical Consulting Services) August 2000

1.0 ENVIRONMENTAL CONTEXT

The Owens Valley lies within the southwest portion of the Basin and Range province, and like other valleys in this province, it is a closed basin bounded on either side by north-south trending mountains. The valley is a deep, wedge-shaped graben bordered on the west by the Sierra Nevada and on the east by the White-Inyo mountains. The valley extends 130 km and gently descends from a 1300-m elevation at the northern boundary, at the base of the Volcanic Tablelands, to an 1100-m elevation at its southern limit, just south of Owens Lake.

Formation of the Owens Valley has been a 10 million-year process, originating from tectonic activities resulting in an uplift of the Sierra Nevada and down-faulting of the valley floor. The granite peaks of the Sierra soar to heights between 3660 and 4400 m (12,000-14,000 ft) in elevation (Bateman 1978). The White-Inyo range consists of folded and faulted rocks that rise from a base level of 1200-1500 m (4,000-5,000 ft) in the valley to 4,343 m (14,246 ft) at the summit (Powell and Klieforth 1991). The process of down-faulting continues, as evidenced by the recent (A.D. 1872) Owens Valley earthquake, which caused a 23-ft vertical and 9-ft horizontal displacement. Volcanic activity dating from the last 100,000 to 200,000 years is responsible for the lava flows and cinder cones throughout the valley. The expansive alluvial fans and older sediments that fill the valley are the result of a combination of Pleistocene glaciation, volcanic activity, and the erosional and depositional forces of water flowing through the basin. These sediments, along the valley floor, can be up to 7500 ft thick (Bateman 1978).

The Owens River flows to the east of the Sierra, beginning just north of Long Valley, and enters Owens Valley along the southern periphery of the volcanic tablelands. The river runs southwards through the center of the valley, forming a deep channel interrupted by tributary streams and ephemeral drainages. Historically, the river emptied into Owens Lake south of Lone Pine. Today Owens Lake is little more than an intermittently flooded playa; however, prior to historic water diversions, the lake covered an area close to 260 sq km (100 sq mi), with a depth reaching 10 m (30 ft). The valley had a considerable larger area of wetlands before surface and ground water was diverted into the Los Angeles Aqueduct.

The modern climate in Owens Valleys is characterized by hot, dry summers and cold winters. Summer daytime temperatures in the valley may reach over 38° C (100° F); however; evening temperatures drop dramatically, producing a broad range of daily minimum and maximum temperatures. Winter lows in Independence often fall below -17° C (0° F), with average daily temperatures ranging from 4.4° to 9.6° C (December-March). Annual precipitation ranges from 13 to 18 cm (5 to 7 inches) and, due to the rain shadow effect of the Sierra Nevada, comes mostly in the form of winter snow (November-March). Summer thunderstorms do occur, but only minimal amounts of rain are recorded.

The distribution of plants and animals varies greatly between the valley floor and mountain crests. The plant communities along the valley floor are uniquely adapted to dry, windy, sunny conditions and alkaline soil. The project area is within the Desert Scrub zone, characterized by overlapping plant communities of sagebrush scrub and shadscale scrub. The sagebrush scrub includes big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus* sp.), Nevada ephedra (*Ephedra nevadensis*) and bitterbrush (*Purshia tridentata*), while the shadscale scrub is dominated by shadscale (*Atriplex* sp.), greasewood (*Sarcobatus vermiculatus*), alkali sacaton (*Sporobolus airodes*), and spiny hopsage (*Gryia spinosa*). Alkali marshes associated with shadscale scrub communities are dominated by saltgrass (*Distichlis spicata*). Riparian communities exist in and around perennial stream courses, channels, and the Owens River. Riparian flora includes cottonwood (*Populus fremontii*), willow (*Salix* sp.), common reeds (*Phragmites*) bulrushes (*Scirpus*), cattails (*Typha*) and introduced species of tamarisk. The growing season averages only 197 days but can be further limited by a lack of water. It is highly probable that prior to the historic diversion of groundwater and streams, the valley floor was less desert-like.

Fauna of the Desert Scrub community includes mule deer (Odocoileus hemionus), pronghorn (*Antilocapra americana*) cottontail rabbit (*Silvilagus* sp.), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), woodrat (*Neotoma* sp.), and a variety of squirrels (*Sciuridae*), pocket gophers (*Geomyidae*), and New World mice and rats (*Heteromyidae, Cricetidae*). In the past, it is likely that greater numbers of mountain sheep (*Ovis canadensis*) occupied the mountainous regions than at present. Birds inhabiting the valley floor include California quail (*Calipepla california*) and mountain quail (*Lophortyx californicus*), and the mourning dove (*Zenaida macroura*). Seasonal waterfowl include various members of the genus *Anas* (mallard, pintail, gadwall, widgeon, shoveller, and green-winged and cinnamon teal), canvasback (*Aythya valisineria*), ruddy duck (*Oxyura jamaicensis*) Canada (*Branta canadensis*) and snow (*Chen caerulescens*) geese, and merganser (*Mergus merganser*). Other aquatic birds of importance in the prehistoric diet were coots (*Fulica americana*) and grebes (*Podicipedidae*), with the latter once congregating en masse on Owens Lake (Delacorte and McGuire 1993; Wilde and Lawton 1976).

Cold-blooded vertebrates include various snakes, lizards and amphibians. Many of the fish in the Owens river system today are introduced species (e.g., brown trout); the surviving native fish include Owens chub (*Gila bicolor snyder*), Owens sucker (*Catostomus fumeiventris*), Owens dace (*Rhynichthys osculus*), and the Owens pupfish (*Cyprinodon radiosus*). Some of these fish were important food sources for the aboriginal occupants of the valley (Steward 1933). Another prehistorically important aquatic species was the freshwater mussel (*Anodonta californiensis*). Mussels once inhabited the slow-moving waters of the river and its tributary streams, before their population was depleted. The larvae of the brine fly (*Hydropyrus hyans*), occurring in the saline waters of Owens Lake, was also collected seasonally in large quantities and consumed by the aboriginal populations (Steward 1933; Wilke and Lawton 1976).

2.0 ETHNOGRAPHIC OVERVIEW

Ethnolinguistic data place the project sites within the territory of the Owens Valley Paiute, who at the time of Euroamerican contact populated lands within the Owens Valley (Heizer 1966; Steward 1933, 1938a). Earliest ethnographic treatment of the Owens Valley Paiute is by Kroeber (1925); however, most researchers rely on the works of Steward (1933, 1934, 1938a, 1938b) and Driver (1937). The Owens Valley Paiute originally spoke dialects of Mono within the Western Numic segment of the Numic branch of Uto-Aztecan (Liljeblad and Fowler 1986:412). At the time of contact, they occupied lands east of the crest of the Sierra Nevada, from below Mono Lake, where the Benton Range crosses Long Valley, southward along the Owens River just beyond Owens Lake and up the western slopes of the Inyo-White Range. Precontact population estimates range between 1,000 and 2,000, although most agree with the lower number (Chalfant 1922; Liljeblad and Fowler 1986; Steward 1933). Even the lower number would have made Owens Valley the most populated area in the Great Basin at that time.

3.0 SUBSISTENCE

The Owens Valley Paiute, in general, were hunter-gatherers whose settlement-subsistence system was driven by the seasonal and spatial availability of select food resources. In addition to these hunted and gathered foods, irrigation in the natural meadows increased the yield of certain tuberous plants. The maintenance of these irrigated lands and the subsequent harvest of the crops were skillfully orchestrated activities, extending over several seasons (Lawton et al. 1976; Steward 1933). Although these irrigated crops probably played a minor role in the overall diet, they would have been more reliable than wild plants (Delacorte 1990).

According to Steward (1933), seeds played an important role in the Paiute diet. Seed-bearing plants such as grasses (e.g., rice grass [Achnatherum hymenoides] and needlegrass [Stipa speciosa]), weedy annuals (e.g., sunflower [Helianthus sp.]), and some woody shrubs (e.g., sagebrush [Artemisia sp.] and saltbush [Atriplex sp]) grow in all biotic communities but are most abundant in desert scrub and riparian habitats from May to August. Seeds were collected and processed with the use of basketry seed beaters, winnowing or parching trays, and a variety of ground stone milling equipment (e.g., manos, mullers, and slab metates). Most harvested seeds were processed and stored for later consumption. The nut of the pinyon pine (Pinus monophylla) was as important as smaller seeds and provided winter sustenance (Steward 1933, 1938a). The pinyon pine grows in the White-Inyo Range at an elevation ranging from 6,000 to 8,000 ft. Pine nuts reach maturity in the late summer and can be harvested early (August), while in their green-cone stage, or later (through November), when the nuts have been released from the dry, brown cones. During years when the crops were abundant, nuts were harvested and stored for later use.

Other resources, such as roots and tubers, were available year-round in several biotic communities, although their nutritional content varied seasonally. Fruits and berries, ripe from May to August, sere often collected and sometimes dried and stored (Steward 1933). Brine fly pupae were collected from windrows along the shore of Owens Lake. Seeds, however, remained the preferred resource during spring and fall. In the early spring, when winter stores were exhausted, young shoots and greens were added to the diet.

Large game populations, mostly pronghorn and deer, were scarce even in the valley, as were the mountain sheep in the uplands. These animals were pursued when encountered. Methods of procurement for mountain sheep and deer included both individual and cooperative strategies (Delacorte 1985; Steward 1933, 1941). Strategies used by individual hunters included stalking or waiting in ambush, sometimes along migration trails, or, during the summer months, near perennial water sources. Communal efforts were seasonal and occurred typically in the fall when deer and antelope traveled in large herds (Steward 1938a). The most common practice involved the use of drivelines, either constructed or natural, that would end in a brush corral-type structure, where hunters would shoot and kill the animals en masse.

Several strategies were employed by the Paiute to capture the more prolific small mammals, birds, and reptiles. These tactics varied according to species, season, and local conditions. Lagomorphs, such as black-tailed jackrabbits and cottontails, were most abundant and could be hunted communally or by individuals. The former are particularly suitable for communal drives, while the latter can more successfully be taken by individuals. Although rabbit meat was an important staple of the Paiute diet, rabbits were equally valued for their pelts. Rabbit skins were woven into blankets, which was the primary form of clothing used during the winter. As it takes up to 75 pelts to make a blanket, it is necessary to take rabbits in large numbers. Communal efforts using several nets three feet high and up to 50 feet long were directed by the district headman. Individuals clubbed the rabbits or shot them with wooden-tipped arrows, keeping those they killed. A variety of trapping techniques were used to capture small animals, including rodents. Waterfowl hunters used blinds to camouflage themselves. Birds were captured using bows and arrows.

Fish were taken from the Owens River, its tributary streams, and sloughs. The Own sucker and Owens tui chub were part of the Paiute diet, and in some instances played an important role (Raymond and Sobel 1990). Individuals using arrows, wooden spears, hooks, or baskets captured fish. Communal fishing techniques involved the use of large nets or the poisoning of small pools. In both of these methods, fish were gathered by a large group of men and women. Fish were also apprehended from the creek beds and ditches when they became stranded by water levels lowered for irrigation. Freshwater molluscs were collected from the slow-moving waters of the river, streams, and sloughs. Recent research by Chatters (1999) indicates that mussels were exploited in the spring.

Salt, formed by a receding Owens Lake shoreline, was collected and formed into balls that were suitable for transporting. In addition to personal use, the salt was traded to Native American groups on the western side of the Sierra.

4.0 SOCIOPOLITICAL ORGANIZATION AND SETTLEMENT PATTERN

The Owens Valley Paiute were organized into districts, representing a village or cluster of villages. Districts were located throughout the valley. Members of each district held territory (e.g., seed collecting, hunting and fishing) in common and cooperated in joint pursuit of pronghorn, deer, and rabbit. A district headman, whose position was inherited, directed these communal activities. Irrigation in the Owens Valley was a complex communal effort, necessitating selection of a head irrigator on an annual basis.

The annual round began in the early spring on the valley floor by collecting new roots, shoots, greens, and early ripening seeds. Those who wintered in the pinyon camps returned to the valley floor at this time, bringing with them whatever pine nuts they had left. Summer was spent in semipermanent villages located on the valley floor near the river, streams, or drainages. Subsistence activities included seed collecting, root gathering, and fishing. During this time small family groups left the village to collect specific resources. For several weeks during the fall, large aggregations of people participated in communal activities such as rabbit drives and festivals. Fall marked the beginning of pine nut collecting, which according to Steward (1933, 1938a) was the most important subsistence activity for the Owens Valley Paiute. If the pinyon crop was favorable, the people established winter encampments in the Inyo-White mountains near their caches; if not, they returned to the lowland village sites and subsisted on stored seeds.

Villages generally were situated on the lower reaches of an alluvial fan, upstream from the mouth of a major creek. The common permanent Owens Valley Paiute house or toni was hemispheric, framed with strong willow poles, and thatched with multiple courses of tule, cattail or grass. Such houses varied from 12 to 20 feet in diameter, and six to nine feet in height.

Steward noted that "villages were comparatively large and closely spaced on Owens River" (Steward 1938a:223). Several ethnographic village sites identified by Steward are situated within or very near the project area.

5.0 MARRIAGE AND TRADE NETWORKS

The Owens Valley Paiute practiced what is generally termed band exogamy, which in their case meant village exogamy. Villages were made up of several extended families, all considered relatives. Although children were affiliated with their mother's village, they could not marry into their father's village either (Steward 1933:294). Marriages usually were arranged by parents and typically transpired between districts within the valley. The large number of districts made it unnecessary to go outside the valley boundaries to find eligible spouses, and, in some way, may have contributed to the overall sociopolitical unity observed in the Owens Valley.

Economic exchange within and between districts, in addition to trade with neighboring groups, was well established. Trade routes traversed the Sierra to accommodate commerce with western populations (e.g., Yokuts, Plains Miwok). Items traded west included tobacco, pine nuts, salt, obsidian, and rabbit-skin blankets; in return, the Owens Valley Paiute and Western Mono received shell money, acorn, berries, and baskets (Steward 1933).

6.0 PREHISTORIC OVERVIEW

6.1 Prehistoric Overview

The earliest investigations in Owens Valley sought primarily to record Paiute material culture (Mallery 1886, 1893), while later researchers took a more systematic approach in their attempts to identify patterns of site distribution in the valley (Campbell 1949; Davis 1964; Lanning 1963; F. Riddell 1958; H. Riddell 1951). Perhaps the most important contribution made during the 1940s-60s was the effort to build a regionally synthetic cultural chronology. Two of the best examples of chronology building from this period come from studies of INY-2 and INY-

372. INY-2, the Cottonwood Creek site, is the site type for Cottonwood series projectile points and Owens Valley Brown Ware (Riddell 1951). INY-372, the Rose Spring site, is the site type for Rose Spring series projectile points, but more important, Lanning's (1963) work at this site represents the first attempt to show significant changes in material culture through time. Bettinger's research, begun in the 1970s, is significant not only because it helped clarify temporal relationships, but because it introduced explanatory models designed to address issues about regional adaptations (Bettinger 1975, 1976, 1977, 1978a, 1978b, 1979, 1982a, 1982b, 1983, 1989, 1991; see also Bettinger and Baumhoff 1982, 1983). Research in Owens Valley within the last two decades, including contract investigations, has made important contributions to our overall understanding of prehistoric adaptations, and provide us with a 10,000 year prehistory of aboriginal settlement (e.g., Basgall 1987, 1989a, 1989b; Basgall and Giambastiani 1995; Basgall and McGuire 1988; Delacorte 1985, 1990, 1991, 1999, Delacorte and McGuire 1993; Gilreath 1995; Gilreath and Hildebrandt 1997; Gilreath and Nelson 1999; Hall 1980, 1983, 1990, 1991; Jackson 1985; McGuire and Garfinkle 1980; Nelson 1999; Schroth 1994; Yohe 1992). What follows is a summary review of these investigations, place within the cultural framework proposed by Bettinger and Taylor (1974) and recognizing five temporal periods. The sequence begins with an Early Holocene (Mohave) segment predating 7500 B.P.; a Middle Holocene (Pinto/Little Lake) interval between 7500 and 3500 B.P.; the Newberry period ranging from 3500 to 1350 B.P., followed by the Haiwee period, between 1350 and 650 B.P., and ending with the Marana period, from 650 B.P. to contact.

6.2 Early Holocene (Pre-7500 B.P.)

Evidence for Early Holocene human occupation in the region is limited to a few broadly dispersed sites. Early Holocene components are identified at the Stahl site at Little Lake (Harrington 1957; Meighan 1981), INY-30 (Basgall and McGuire 1988), two sites in the Mono Basin (Hall 1991), and the Komodo site in Long Valley (Basgall 1987, 1989a). Artifactual hallmarks for these early sites include Great Basin Stemmed, Fish Slough Side-notched (Basgall et al, 1995), and Concave-based projectile point series, and a variety of significantly formalized flake tools (e.g., scrapers, gravers, etc.).

Archaeological Investigations indicate that Early Holocene populations were small, covered a large territory, and exploited a highly variable range of plant and animal resources. Toolstone material in general and obsidian in particular derive from various sources throughout eastern California, indicating a highly mobile settlement pattern. Furthermore, low artifact densities imply only brief occupations at these sites.

6.3 Middle Holocene (7500-3500 B.P.)

Growing evidence of differences within this period has led to a recent tendency to separately characterize early (3500 to 2000 B.P.) From late (200-1350 B.P.) Newberry phases. This tendency however, has yet to find its way into published literature. The early settlement pattern changes only slightly from those observed in the mid-Holocene, marked by a continuing expansion of the resource base as well as the intensity with which the resources were exploited. Later Newberry-aged deposits are spread throughout eastern California (Basgall and Giambastiani 1995; Basgall and McGuire 1988; Bettinger 1991; Bettinger et al. 1984; Delacorte 1999; Delacorte and McGuire 1993; Gilreath 1995; Gilreath and Hildebrandt 1997; Hall 1990). This later pattern is characterized by an increased occupation of some sites as long-term residential bases or continuous reoccupation of localities for a variety of activities (e.g., hunting, butchering, toolstone quarrying, resource extraction and/or processing). Investigations suggest occupation of these localities were by smaller groups (i.e., "task forces") who left the residential base in pursuit of particular resources that would be brought back to the residential unit. Populations were still very mobile during this period, but an increased and persistent use of seasonal residential bases occurred. Although a large variety of plant and animal resources were exploited, a continued emphasis on vegetal resources is reflected by the increased occurrence of milling equipment in Newberry-age artifact assemblages.

6.4 Haiwee Period (1350-650 B.P.)

The patterns of increased occupation of residential bases and intensified resource use observed in the late Newberry period continued into the Haiwee. Like the Newberry period, Haiwee sites have been identified throughout the valley (Bettinger 1975, 1989; Burton 1986, 1990; Delacorte 1999; Delacorte and McGuire 1993; Delacorte et al. 1995; Gilreath 1995; Hall 1990; Lanning 1963). In contrast, however, Haiwee sites also occur in a variety of localities often considered marginal environments (Basgall and Giambastiani 1995; Bettinger 1989, 1991; Delacorte 1990; Hall 1980; Nelson 1999).

The Haiwee period is also marked by the occurrence of Rose spring series projectile points, as well as the manufacture and use of expedient stone tools, and changes in obsidian procurement strategies (see Gilreath and Hildebrandt 1997). Subsistence intensification, identified by the increased use of high-cost procurement strategies for seeds and nuts, escalates during this period. Settlements continue to show a reduction in residential mobility and an overall increase in social complexity, reflected, for example, in the presence of structures such as sweat houses (Delacorte and McGuire 1993).

6.5 Marana Period (650 B.P. - Contact)

The Marana period is the last phase of prehistoric occupation in the valley. Additional evidence for increasing social complexity comes from the presence of artifacts linked to trans-Sierran trade (e.g., marine shell beads and ornaments). Marana assemblages differ from those encountered at Haiwee sites with the addition of pottery and mussel shell, a decrease in projectile point size, and comparatively little flaked stone tool manufacture. Subsistence strategies centered around an increased reliance on high cost/low yield resources (e.g., grass seed, pine nuts, freshwater mussels, and small animals).

Hallmarks for the Marana period are cottonwood and desert side-notched projectile pints and Owens Valley Brown Ware pottery. These artifacts, when found with Euroamerican items such as glass beads signal contact-period occupation. The ethnographic village on Cottonwood Creek (archaeological site INY-2) provides the clearest example for this era (Riddell 1951).

6.5 Research Issues

The Inyo-Mono region in general and the Owens Valley in particular have been the focus of numerous archaeological studies, most occurring within the past two decades. Research issues for this region have been well defined and include settlement-subsistence patterns, obsidian exchange and procurement, sociopolitical organization, Numic development and spread, vulcanism and occupation, high altitude adaptations, incipient agriculture, paleoenvironment, chronology, technology, and economic organization, among others (see Gilreath and Nelson

1999:16, Table 3). Some of these topics are more appropriate for large-scale projects (e.g., Numic spread) or region- specific endeavors (e.g., volcanism, high altitude adaptations), others are general enough to be applicable to most projects (e.g., settlement-subsistence patterns and chronology). The following are offered as examples of recent CRM-generated and academically-motivated works that address these topics: Arkush 1995; Basgall and Giambastiani 1995; Bettinger 1991, 1999; Delacorte 1999; Delacorte and McGuire 1993; Gilreath 1995; Gilreath and Hildebrandt 1997; McGuire 1994; Nelson 1999; Reynolds 1996; Schroth 1994; and Yohe 1992. These research issues provide broad guidelines for determining NRHP eligibility of prehistoric archaeological sites in the project area.

7.0 HISTORIC OVERVIEW

7.1 Early Settlement Of The Owens Valley

Owens Valley is located in Inyo County, which lies along the eastern edge of California. The valley contains such diverse geographic elements as Mount Whitney (elevation 14,495 feet), the highest peak in the United States outside of Alaska, and Death Valley, which contains the lowest elevation on the continent (282 feet below sea level), (Abeloe 1966:113-114). The highest peaks of the Sierra Nevada Mountains form the western boundary, while the rugged White and Inyo Mountains rise nearly as high on the east. The history of settlement in the Owens Valley largely resembles that of the many other areas of the west, where prospectors came first, followed by cattlemen and settlers. In addition, the controversy over water that developed at the beginning of the 20th century also makes the history of the Owens Valley in some ways emblematic with that of the rest of California. As with the state, it was the development of water resources that most shaped patterns of settlement and prosperity of the valley (Kahrl, W.L. 1982:vii-viii).

Before 1861, when the first dwellings were erected in Owens Valley, the only Euro-American population consisted of prospectors, mountain men and other travelers who passed through the valley on their way to the coast or gold fields. Trappers and mountain men may have entered the valley as early as 1826, but Joseph Reddeford Walker made the first recorded exploration of the valley in 1834. He returned in 1843 and again in 1845. Mormons immigrating to San Bernardino also passed through Inyo County beginning in 1847. Two years later, the William Lewis Manly and Jayhawker parties also attempted to enter the Owens valley by crossing Death Valley on their way to the California gold fields in 1849; many party members died in the harsh conditions found in the desert to the east (Abeloe 1966:114-116). The valley remained isolated, and it was largely ignored until July 1859, when Captain J.W. Davidson entered the Owens Valley to investigate problems that ranchers in Santa Clara and San Fernando were having with Paiute Indians. The beginnings of mining and subsequent timber cutting activity in the region soon began to affect the Paiutes' food supply; they responded by stealing cattle. Captain Davidson suggested that the government give the valley to the Paiutes as a reservation, but soon settlers invaded and drove off the Indians. Hostilities with the Paiutes continued until 1866 (Sauder 1994:31-33).

Two events in the northern part of the state influenced the beginning of settlement in the Owens Valley: a decrease of mining activity in the western Sierras that coincided with the discovery of gold in the Owens Valley in 1859, and the California drought in the early 1860s. As the production in the placer mines in the western Sierra Nevada began to decline, the discovery of gold at Monoville in 1859 and Aurora in 1860 caused miners to swarm to the area. For a time, Aurora even rivaled Virginia City as a mining center. During the drought in California that crippled California's cattle industry, cattlemen also arrived in the valley looking for fresh grazing land. To supply the booming mining towns, cattle ranchers in the San Joaquin Valley and vicinity such as Samuel A. Bishop, responded with cattle drives into the Owens Valley (Kahrl 1982:34). In 1861, A. Van Fleet and three other men drove their herds into the valley and built a sod and stone hut four miles northeast of what is now Bishop. That same month Charles Putnam built a cabin on Little Pine Creek and opened a trading post. Samuel Bishop and other settlers also arrived 1861, settling around what become known as Bishop Creek, calling their settlement San Francis Ranch. This settlement eventually became the town of Bishop, which thrived because of the rich farmland surrounding it and because it served mining camps in the Inyo Range.

On July 4, 1862, Lieutenant Colonel George S. Evans, along with 201 men of the 2nd Calvary California Volunteers established a camp on Oak Creek, two miles north of Putnam's trading post on Lone Pine Creek, naming it Camp Independence. Troops were maintained there until 1877 when the army abandoned the post. The town of Independence grew around Putnam's trading post. When prospectors discovered gold in the Inyo Mountains to the east in 1862, Independence became a trade center for the mines. In March 1866, settlers laid out the townsite, and later that year with the establishment of Inyo County, Independence became the county seat (Abeloe 1966:114-117).

By the fall of 1863, increasing numbers of settlers and miners were entering the valley. Besides Monoville and Aurora, many other mining camps sprang up (Sauder 1994:29-30). Another of the first prominent early mining camps was Owensville, four miles northwest of Bishop, which for a brief period was the principal settlement in the northern part of the valley. Would-be settlers made more than 50 homestead claims of 160 acres each there. By 1864, however, Owensville was in decline. In 1865, prospectors discovered silver at Cerro Gordo in the White Mountains to the east of Owens Lake. This boom coincided with a boom in the Los Angeles basin, and the two areas became linked through trade (Costello and Marvin 1992). By 1866 troubles with the local Paiutes that began in the late 1850s ended, and many new mining camps sprang up. These camps, San Carlos, Bend City, Galena, and Riverside, boomed in the 1860s and 1870s, but soon became ghost towns. The most prosperous mines nearest the valley were those at Cerro Gordo that produced silver, lead and zinc, and during the 1870s, the population of the region was several thousand. Cerro Gordo played out by 1870, and miners moved on to Bodie and other strikes. The Panamint Mining Company was organized in 1875, and its camp became notorious as one of the wildest camps in the history of California. The mining from there faded, however, and Panamint too declined by 1877 (Abeloe 1966:117-119).

7.2 Development Of Irrigation

With the decline of mining, patterns of settlement in the Owens Valley revolved around agriculture and cattle raising. Settlement in California generally followed a typical pattern where people settled where they had access to water (Kahrl 1982:27). In 1880, most of the land in the Owens Valley was still open to settlement, as most of the already claimed land was clustered around streams flowing from the Sierras. By 1887, however, valley landowners began irrigation enterprises to tap the flow of the Owens River to attempt to generate the agricultural potential of the valley. Congress helped make this possible in 1887 when it extended the Lassen County Desert Land Act to the rest of the West. The new Desert Land Act allowed settlers to claim large enough tracts of land in arid areas to make their reclamation efforts worthwhile. Nonetheless, it also led to speculation and abuses by some cattle ranchers, who simply wanted to control large areas and had no intention of improving the land through excavations of irrigation systems (Sauder 1994:77-79).

The Paiutes built the first irrigation canals in the valley, and their system was quickly taken over and expanded by white settlers (Costello and Marvin 1992). Initially, individual canal companies governed the course of irrigated agriculture in the Owens Valley. Most of the canals in the valley were financed and built on a cooperative basis. To serve the dry land northeast of Bishop, local enterprises constructed two parallel ditches, the McNalley Ditch and Fish Slough Canal, in 1887. Another of the first irrigation enterprises further south resulted in the construction of the Big Pine Canal to irrigate land east of Big Pine. Between Big Pine and Independence by 1884 there were approximately ten parcels taken up by settlers; of these six were in the area south of the location of the modern Los Angeles Aqueduct in Township 11 S / R 34 East MDBM. Early county maps do not indicate if these settlers constructed irrigation canals to supply these properties, although records indicate that some farmers in the Owens Valley excavated rough ditches using Fresno scrapers, a horse-drawn scoop that created a wide, characteristically U-shaped ditch (Sauder 1994:78-79; Map of Inyo County 1884). The geometry of a ditch built with a Fresno scraper is dictated in part by the ability of the team of horses to pull the scraper up the side of the ditch, resulting in a wide and shallow cross-section.

By 1885, seven ditches were in operation in the Owens Valley as a whole, primarily in the area around Bishop, resulting in a rush for unclaimed land the following year. As a result of the Desert Land Act and the promising extension of irrigation, much of the land of the valley was under claim by 1890. By this time two large irrigation companies, the Owens River Canal Company serving the land to the west and southwest of Bishop, and the Eastside Canal Company serving the area around Independence and the lands to the south, were largely responsible for opening up land for settlement. With development along these canal systems, the land in the center of the valley was open for speculation (Sauder 1994:80-83).

The progress of the canals continued slowly, in part because many absentee speculators claimed land but did not contribute to developing an irrigation system. Additionally, the trend of settlers forsaking agriculture for cattle raising continued, adding to the consolidation of large cattle ranches, and the demise of the ideal 160-acre homestead. As a result of the slow progress of finishing proposed irrigation systems, by the end of the 1890s only 57 miles of canal were in operation; and of the 250 miles of canal that had been planned, few had been diverting Owens River water long enough to make their construction cost worthwhile to farmers at that time (Sauder 1994:83). In 1899, there were 424 farms in operation on 141,059 acres in the valley, but only 42,740 acres were planted. However, 85% of the farms and 94% of improved land was under irrigation, and 110 miles of canals had been dug. By 1889 Inyo County ranked ninth among 58 counties in California in terms of irrigated area. Most of the irrigated land in the Owens Valley was used for the cultivation of hay, alfalfa, cereal grasses and corn (Kahrl 1982:36-37). By 1901 18 ditches and canals were in operation, diverting Owens River water throughout the valley, creating an irrigation system 200 miles long, most of which was in the north end of the valley due to compact settlement there. Although the valley was in economic decline during the last two decades of the century, irrigation construction continued under the promise that a railroad extension would soon find its way into the valley. After the arrival of the Carson and Colorado Railroad in 1883, however, many settlers realized that cattle were a more lucrative export than grains and other crops. During this time, farm sizes generally grew, as they shifted to cattle ranching (Sauder 1994:84-85; Inyo Register 1892, 1901).

The residents of Owens Valley had to wait until the turn of the century for another mining boom to fuel the local economy. Gold strikes in western Nevada created cash markets for farm goods and a demand for agricultural land, which the Owens Valley supplied. Also at this time, the Bishop Light and Power Company was established to supply local needs. Soon purchased by the Colorado-based Nevada-California Power Company, it became the Southern Sierras Power Company, and the Owens Valley became an export center for electricity. After the Nevada gold strikes, local miners attempted to revive the Cerro Gordo mines. These mines began producing great quantities of zinc between 1911 and 1919, and Cerro Gordo and the railroad town of Keeler enjoyed temporary good fortune.

Real estate speculation played an important role in Owens Valley economic growth at this time. By 1900, most good land was already under patent, and many landowners took the commercial advantage in speculation, and in promoting recreational use of the area. Between 1900 and 1910 the valley's growth was primarily centered in towns, and the number of farms remained rather constant. However, irrigated acreage rose from 41,000 acres to 65,000 acres between 1900 and 1920. The value of agricultural products rose steadily into the 1920s. During the 1880s, stock raising was paramount to agriculture, and although this trend continued into the 1900s, both forms of production rose steadily. Most growth occurred between 1910 and 1920, during a period of coexistence between local farming and City water interests, but by the early 1920s developments ended and decline set in (Walton 1992:132-140).

7.3 U.S. Reclamation Service And Reclamation Plans

The Owens River drains some 2,800 square miles of watershed. In the summers, the river could not supply all the canals that drew from it, while in the high-water period, late spring and early summer, lowlands were sometimes flooded (Chalfant 1922:338). At the turn of the century, promotion of irrigation became the leading cause for a national movement that was important to the arid west and particularly California. In this spirit, the US Reclamation Service was empowered to protect unpatented lands with a potential for improving irrigation in the Owens Valley. Its enabling act in 1902 gave the Reclamation Service power to withdraw unpatented lands from settlement to protect lands in the potential project area from speculation. The service estimated that some 110,000 acres in the Owens Valley were suitable for such projects, and proceeded to set aside a total of over 560,000 acres in the valley from settlement by 1903 (Kahrl 1982:41). Favorable engineering reports estimated that a dam and reservoir could increase by two or three times the amount of existing irrigated land and enhance agricultural production in the valley (Walton 1992:143).

The Reclamation Service proposed building a storage reservoir at the head of Owens River to store water for its project. The Service's engineers proposed a 140-foot high dam to impound 260,000-acre feet of water, along with the construction of canals to the east and west to irrigate and drain lands. The aim of this project was to irrigate all existing cultivated land in the valley, plus an additional 106,241 acres (Chalfant 1922:340). The idea, which by 1904 was endorsed by local landowners, was to reduce excessive use of irrigation by many farmers, which was turning prime agriculture land into bogs. With the realization that an extensive irrigation project would benefit the valley, residents allowed the Reclamation Service to assume charge of all existing canals (Kahrl 1982:51-52). This concept, however, was superceded by the plans Los Angeles had for tapping the Owens River for urban use.

7.4 The Los Angeles Aqueduct

Other interests also saw the potential of Owens Valley irrigation, but not in producing an agricultural oasis. Private surveys as early as 1885 and 1891 showed the possibility of establishing a canal to transport water 235 miles south from the Owens Valley to Los Angeles. Fred Eaton and William Mulholland, who were both instrumental in transferring Los Angeles' water supply from private to municipal ownership to acquire funding for waterworks in order to turn the growing city into an oasis, promoted this idea as early as 1892. Mulholland became the chief engineer of the Los Angeles Aqueduct, and Eaton, a former mayor of Los Angeles, became a large landowner in the Owens Valley. By 1903, the Reclamation Service suspended work on its projects to await a bedrock test at the Long Valley Dam site — the potential site for its reservoir. At this time, the Reclamation Service's enthusiasm for new and expanded projects in the Owens Valley was waning, and additional pressure from Los Angeles caused the project to be suspended until the City was able to acquire the land and right of way for its aqueduct (Kahrl 1982:47).

By 1900, with the population of Los Angeles climbing to over 100,000, residents and officials began to realize the need for an increased water supply. In 1902 the citizens of Los Angeles approved a bond issue of $2 million in order to transfer the existing private water company to municipal ownership. In 1905, citizens voted another bond issue of $1.5 million for the purchase of Owens Valley land and water rights, and in 1907 they approved another bond issue of $23 million for the construction of an aqueduct. By 1910, the City's population had risen to well over 300,000, further increasing the need for a sustainable water supply (LADWP 1952).

City officials wasted no time in acquiring land in the Owens Valley for their irrigation project. By 1904, the City had already acquired 40 miles of riparian land along the Owens River. Initially the City acquired lands below the proposed point of diversion above Independence, but later, in order to get additional water it acquired irrigated lands above that point and transferred water obtained there into the aqueduct. The City also installed wells to secure groundwater from beneath the purchased lands (Harding 1960:121)1. In 1907, the Reclamation Service filed an official proclamation of abandonment of its project in the Owens Valley, and surrendered the project to the City for $14,000 for work already done (Chalfant 1922:348). The City was influential in getting the Federal Government to withdraw additional land in the valley from settlement, until it could acquire necessary land and water rights. In 1907, President Theodore Roosevelt signed a proclamation extending the eastern boundary of the Sierra Forest Reserve to include the Owens Valley (Hoffman 1981:138-39).

Land in the upper end of the valley was suited for agriculture, but that in the southern end was not, allowing Fred Eaton to easily acquire large tracts for the City in this area. He also bought the Thomas B. Rickey lands in 1905, on which was the proposed site of the Reclamation Service's reservoir. By making it known that the Reclamation Service was about to suspend its operations, Eaton was able to convince many ranchers to sell their lands to the City lest they revert to desert (Kahrl 1982:64-69). Thus, the City held much of the valuable land in the Owens Valley and proceeded to acquire the right of way for the aqueduct from the federal government. Having secured the right of way for most of the distance, Los Angeles had to purchase privately-held land in the valley. By 1908, Owens Valley landowners had sold the

City some 192 parcels (Walton 1992:153). Between 1906 when Congress made public lands available to Los Angeles, and 1916, the City bought 125,000 acres of privately owned lands. At this point, the City's holdings comprised nearly all agricultural land in the valley. Later the City also acquired lands and properties in the towns not directly used for producing water (Harding 1960:121).

The City began construction of the aqueduct in 1907 and completed its work by the end of 1913. In 1908 alone there were some 20 lawsuits involving the aqueduct (Hoffman 1981:147). The aqueduct extended 233 miles from Tinemaha Reservoir north of Owens Lake to storage reservoirs in the San Fernando Valley (Hoffman 1981:138). This undertaking, one of the nation's largest at that time, required the construction of 142 tunnels totaling 53 miles in length, 60 miles of open canal, 97 miles of concrete conduit, 12 miles of steel siphons, 120 miles of railroad, 500 miles of highways and trails, two power plants to service construction, 169 miles of transmission lines, and 240 miles of telephone wire (Chalfant 1922:374; see also Kahrl 1982:159). Additionally, as a cost saving measure the City constructed a cement plant at Monolith, near the halfway point of the aqueduct, that used indigenous Owens Valley tufa to make cement (Kahrl 1982:160). The entire project was finished at a cost of $24,600,000, close to original estimates (Chalfant 1922:374; Hoffman 1981:141). The City employed up to 4,000 workers at any given time on the project, most of who were municipal employees. The labor pool was aided after 1907 because of national financial panic and a downturn in mining operations, with the result that there was a surplus of miners in the area available for digging tunnels (Kahrl 1982:160).

Before the completion of the aqueduct, Owens Lake was at the end of the Owens River. With the diversion of water into the aqueduct, the lakebed became dry, exposing its brine-laden bed. This environment drew chemical companies to extract brine and other chemicals exposed in the dry lakebed. In 1938, the run off water in the valley exceeded the City's diversions into the aqueduct, and the lakebed was again flooded. The chemical companies, who were leasing chemical interests from the state, sued for losses caused by the flood. In more recent decades, the dry lakebed has been assumed to cause air pollution problems in the vicinity.

Despite the Owens Lake flood in 1938, the City was generally hard pressed to increase its available water supply, for the City's population grew to over a million by 1930. To remedy this problem, the City constructed a tunnel into the Mono Basin to the north in 1940. The City diverted water from the tributaries of Mono Lake into the Owens River and captured the water at the diversion point of the aqueduct. Construction was eventually completed at the Long Valley reservoir site to regulate the flow of water in 1941 (LADWP 1952). This reservoir became known as Crowley Lake.

Hydroelectric power paralleled water development as a municipal enterprise in the Owens Valley. In 1906 as the City was making preparations to construct its aqueduct, the City commissioned E.F. Scattergood as consulting engineer to analyze the potential for generating hydroelectric power along the aqueduct. As part of its preparations for constructing the aqueduct, the City built its first power plant in the Owens Valley on Division Creek in 1908. In 1910 citizens voted a $6.5 million power bond issue, and in 1914 with the aqueduct completed, they voted an additional $6.4 million bond issue to establish municipal control of power distribution.

At the time of the aqueduct's completion, the Southern Sierras Power Company was the largest private hydroelectric developer in the valley, with five power plants and 125 miles of transmission line. By 1919 however, the Southern Sierras Power Company only generated 200 million kilowatt hours, far from City estimates of the valley's potential. Additionally, the competing interests of Inyo and Kern Counties and the Mojave Desert for power development led to slow progress in hydroelectric development. Power development was even further complicated in the Owens Valley due to competing interests and resulting legal battles between the Southern Sierras and other power companies, the owners of the principal irrigation ditches who sought to create a combined irrigation/power project by constructing a reservoir at Fish Slough, and the LADWP. Negotiations between the associated ditch owners and the Southern Sierras Power Company eventually broke down, which led the way for the realization of the LADWP's plan of a reservoir at Long Valley to supercede valley residents' plans for a Fish Slough reservoir (Kahrl 1982:235-45).

By 1919, the City was still far from developing the estimated potential for power generation along the aqueduct. City engineers decided that substantial increases in power productivity could not be reached until the aqueduct system could be extended into the Mono Basin, in order to take advantage of the 2200-foot drop that the Owens River takes through the Owens Gorge below Long Valley. Because such a project required the acquisition of additional lands in the Mono Basin and the development of a storage site, hydroelectric development would have to wait until the 1940s and the completion of the Long Valley Reservoir (Kahrl 1982:235-45).

It was not until 1952 that the first power reached Los Angeles from the Owens Gorge, 10 miles north of Bishop, where construction on the City's largest hydroelectric project along the aqueduct had been going on since 1947. This $43 million project entailed digging four tunnels, and the construction of three power plants; 258 miles of transmission line ran over 1275 steel towers from the Owens Gorge to Receiving Station E in North Hollywood carrying 112,500 kilowatts of electriCity. Additionally as part of the project, the LADWP constructed the Pleasant Valley Reservoir above the gorge to regulate the flow of water (LADWP 1951a:5, 1951b:8, 1955:8, 1956:12-13). With the Owens Gorge Project complete, LADWP's total water and power investment in the Owens Valley reached approximately $150 million (LADWP 1955:8).

7.5 The Effect On The Owens Valley

The construction of the initial aqueduct did not affect Owens Valley agriculture much, because the aqueduct intake was located south of most of the agricultural land of the valley. In 1919 however, a drought prompted the City to tap ground water and pump it into the aqueduct, consequently lowering the water table of the valley. Los Angeles also stepped up its acquisition of land, water rights and ditch companies along the entire Owens River north to Bishop. Acquisitions by the City went from a half dozen a year to 104 in 1923, 250 in 1924 and up to 450 by 1926. It was at this point that residents of the valley began to realize that their agricultural interests were truly threatened by the aqueduct (Hoffman 1981:174,179; Walton 1992:157).

In the Owens Valley the drought diversion and declining agricultural prices contributed to hard times. Under the threat that agriculture would further suffer as a result of the aqueduct, Owens Valley landowners initiated a movement for the creation of a water district in the valley in 1920, which culminated with the formation of the Owens Valley Water District in December

1922. For landowners, the creation of a water district was the best protection against encroachment from Los Angeles, and for the City, such an organization was easier to deal with than numerous landowners. Difficulties arose around the sale of bonds, however, and the district made few improvements (Adams 1929:364-365). By 1929, the Owens Valley Irrigation District was still legally organized, but had no plans for development. The City, which was not a supporter of the district, had purchased most of the land within it. Los Angeles refused to recognize the water district, and a period of "water war" ensued. This time was characterized by patterns of violence and negotiations, and peaked between 1923 and 1927. In May 1924 the aqueduct wall was dynamited just northwest of Lone Pine. Later the same year in the same area, a large group of citizens took over the Alabama Gates and Spillway, and turned the aqueduct flow back into the Owens River. A four-day standoff ensued, until both Owens Valley residents and the City agreed to arbitration, but no settlement was ever reached (Chalfant 1922:391-92). By 1925 Los Angeles realized that the best way to win was to buy up as much land and as many water rights as possible. By the end of 1926, Los Angeles controlled 90% of Owens Valley water (Walton 1992:189). By 1930, Owens Valley Irrigation District bonds and interest were in default (Adams 1929:365).

The decline of Owens Valley was exacerbated in 1927 with the failure of Watterson's Inyo Bank. Wilfred and Mark Watterson, prominent business leaders and proponents of the Owens Valley Irrigation District were convicted of diverting bank funds to their other flagging businesses. The State Superintendent of Banks discovered that while the Inyo County Bank claimed to have $190,000, it actually only held $11,000. As a result, the State Superintendent of Banks closed the five branches of the bank, and the savings it held were lost and its credit failed (Chalfant 1922:397). To counter this loss, a local citizens' committee urged Los Angeles to go ahead with new planned construction that would provide jobs for valley residents. As a climax, the largest number of property sales to the City occurred in 1931, in the form of a block settlement of $5.6 million for 867 businesses and residential properties in Laws, Bishop, Big Pine, Independence and Lone Pine. By 1930, the population of Bishop had declined by 35%, and Los Angeles' acquisitions reduced the number of operating farms by 58% (Walton 1992:191). In general however, according to several historians of the Owens Valley, the City's economic treatment of landowners was fair (Harding 1960:123; Sauder 1982, Walton 1992, and others make similar claims).

Between 1930 and 1970 the Owens Valley moved away from an agricultural economy and local trade to a service economy fueled by tourism. The City began to lease town and farm lands and properties that it acquired during the previous decade to fuel the demand of tourism and recreation, but these sales and leases had restrictive clauses relating to water use (Harding 1960:123). Stock raising assumed dominance over field crops because it required less water. However, cattle-raising lessees often found themselves at odds with expanding service enterprises. This level of dependence on an outside economy turned the Owens Valley in a virtual colony of Los Angeles (Walton 1992:200). Some Los Angeles officials even harbored plans of turning the Owens Valley into a park for the City. Even though such plans never were adopted, with Inyo National Forest currently drawing more tourists each year than Yellowstone, the valley has become focused on recreation (Costello and Marvin 1992:13). In succeeding decades acreage devoted to grazing increased and many cultivated fields became large ranches managed on behalf of the City.

Despite the valley's slow return to prosperity in the towns, the City still maintained control on the water supply throughout the valley. By most measures, the Paiute population was hit the hardest; by the early 1930s, 94% of the Indian population did not own or lease land. Paiute lands were generally considered worthless and scattered throughout the valley, but under federal law, the City was required to supply these lands with water. To resolve the situation, the City offered the Paiutes an area of concentrated, more arable lands in exchange for their diverse holdings. As a result, the Paiutes exchanged 2,914 acres of marginal land for 1,392 acres of arable land around Bishop, Big Pine and Lone Pine (Walton 1992:199-221).

Except for developments in hydroelectric power, the Owens Valley remained relatively quiet until the mid 1960s. In 1964, the LADWP built a second aqueduct through the Owens Valley, which increased the City's water supply by 25%. It was completed in 1969 at a cost of $90 million. During the 1970s, a new wave of protest erupted in the Owens Valley reminiscent of the 1920s, followed by lawsuits and violence. In 1976, the diversion spill gates near Lone Pine were blown up, and a number of environmental lawsuits were filed against the City. As the second aqueduct increased the drainage of Mono Lake tributaries to 300 million gallons annually, environmentalists fought to protect the lake. Because of these developments, Owens Valley residents found new allies in the environmental movements of the 1970s-80s. The resulting verdicts in these court cases mandated decreased diversions from the Mono basin (Hoffman 1981:266-269).

Water development is an important theme in the history of California, especially in the semi-arid southern part of the state. While the Los Angeles aqueduct created much strain on the Owens Valley, its vast resources were effectively used to develop modern urban structures that could not thrive without the water that the valley supplied.