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A Culture Resource Overview of the Bureau of Land Management Coleville, Bodie, Benton, and Owens Valley Planning Units, California

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with the assistance of
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cultural resources publications

anthropology–history

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EXECUTIVE SUMMARY

This report represents a contribution to a number of regional (ie. planning unit) studies commissioned by the Bureau of Land Management for lands under its control in the State of California.

The intent of these various studies is to provide the Bureau of Land Management (BLM) with an overview and synthesis of the existing cultural resource information, including historic, prehistoric and ethnographic data available for designated study areas as mandated by various federal government laws and Executive Orders. The study area, in this case, is restricted to the Coleville/Bodie/Benton and Owens Valley Planning Units of the Bakersfield District Office, Bureau of Land Management. The purpose of this report is to provide a compilation and synthesis of data on the cultural resources within the various planning units that can serve as background information in BLM Environmental Analysis Records (EAR), Environmental Statements (ES), Unit Resource Analyses (URA), Management Framework Plans (MFP) and other documents that may require cultural resource information.

The data in this report are presented in terms of previous archaeological research; a culture sequence concerned with man's prehistoric activities; ethnographic data on the aboriginal inhabitants of the study area; ethnohistorical information; a narrative history and a needs and recommendations section for future management. This compilation and presentation of cultural resources information will, hopefully, educate and encourage long term planning that will result in the conservation and protection of a non-renewable portion of America's heritage.

The Coleville/Bodie and Benton/Owens Valley Planning Units, as defined by the BLM, cover approximately 1.2 million acres (750,000 acres public land, 450,000 acres private land) of variable terrain in Inyo and Mono Counties, California. The planning units are bounded in part by the State of Nevada on the north and east with the foothills of the Sierra Nevada mountains, more particularly the Inyo National Forest, on the west. The eastern boundary is the Inyo National Forest and the slopes of the Inyo and White Mountains. California State Highway 190 forms the southern boundary.

The area has a varied geological and geomorphological history marked by past glacial activity, faulting, erosion and vulcanism. Active hot spring areas exist within the boundaries of several of the units. Mono Lake, an approximately elliptic body of water, about 9 x 13 miles in extent and 170 feet deep without an outlet, is a particularly outstanding natural feature located in the Benton Planning Unit. The study area, situated in the rainshadow of the Sierra Nevada, is marked by a semi-arid climate transitional in character between the winter maximum of the Pacific coast and the summer maximum typical of the continental interior.

Floristically the Owens Valley lies at the boundary between the Nevadan and the Sierran biotic provinces. As a consequence of its extremely varied topography and the corresponding differences in substrate, precipitation and temperature the area exhibits a tremendous diversity of plant cover. Although much dovetailing and overlap occur due to microenvironmental variation in soil, exposure, and thus moisture conditions, a zonation of plant

communities along an altitudinal gradient can be observed which corresponds more or less to the vegetational distribution patterns of analogous slopes and valleys to the east and reflects the study area's affinity to the rest of the Great Basin. A similarly wide variety of animals, reptiles, avifauna and insects are found within the planning units due to their environmental diversity.

Holocene climatic data for the area are somewhat lacking but researchers have noted a climatic sequence similar to that proposed by Antevs' for the Neothermal although with considerable climatic variation noted for the past 3000 to 4000 years. It is hoped that future research may provide additional data to allow for an explanation of the Holocene climatic record.

Historically, eastern California has provided a rich setting for the study of men as they interacted with one another and with the environment. From the first explorations by whites in the Age of Jackson until the current environmental issues the history of the area has been dominated by two interwoven themes. On the one hand the Coleville, Bodie, Benton and Owens Valley planning units have been characterized by the slow, steady expansion that typifies a relatively isolated rural region. On the other hand, repeated eruptions of growth and controversy have benefited and troubled eastern California and have linked it in ambivalent ways with the world outside.

The two patterns of even development and turbulent outburst evolved from the generally unfavorable attitudes that early explorers and settlers held toward the region. These attitudes did not prevent an influx of Whites, Chinese, Basques, Mexicans, and other ethnic groups into the area in the 1850's and 1860's, but early settlement was sluggish. Miners in search of a strike aroused the first interest in the region, although most refused to remain there for any period of time, and they were followed by farmers and ranchers who wanted to settle permanently. With these pioneers came the first American governments.

The arrival of outsiders destroyed the Native American ways of life in the area and provoked the Owens Valley Indian War in the early 1860's. After decimating a portion of the Paiutes native to the area, the newcomers absorbed them into their agricultural and mining economy. With peace came a stepped-up pace of settlement. Towns began to appear throughout the planning units, giving a sense of community to both miners and farmers. For the last third of the nineteenth century development was split between the two opposing tendencies of rapid controversial expansion and stable incremental growth. On the one side, with the mining at Cerro Gordo and Bodie, development of the lands of the planning units was carried on by outsiders, those who wanted not to live in eastern California, but were willing to withstand much expense and discomfort in order to exploit the region's wealth. In sharp contrast were the stabler agrarian settlements peopled by permanent residents. Of course, relations between the two groups were not always hostile, for outsiders spurred the local economies and helped modernize the region. Moreover, neither group was really unified within as indicated by continual ethnic tensions and sporadic conflicts between farmers and ranchers over water and land resources.

The division between outsiders and residents really came into sharp focus in the aqueduct controversy of 1905-1927. The violence, litigation, and legacy of mistrust tarnished the reputations of both valley residents and Los Angeles officials. The confrontation recalled earlier disagreements over the values

and usage of natural resources in eastern California. Los Angeles emerged from the controversy as the dominant force in the Owens Valley, and in the 1930's the city extended its sovereignty to the Mono Basin. Once again, the consequences were mixed. Los Angeles got the water that it needed and residents of eastern California ultimately benefited from tourism, land management and the city's money. But the whole affair left a bad taste in everyone's mouth. So did the Japanese Relocation Center at Manzanar, from 1942 to 1945, which in many ways resembled the intrusion of outsiders in the aqueduct controversy. In this instance, however, as with the destruction of the Native American lifeway, nobody should judge Manzanar as a mixed blessing. The insensitive handling by the whites and the suffering endured by the Japanese cannot be justified.

After 1935 eastern California enjoyed relative prosperity largely as a result of tourism. However, it generated an ambivalent response from local residents. The overrriding fact was that tourists provided the most important source of income for the area. Moreover, the region's devotion to tourism seemed to be preserving the environment. Tourism, however, dictated that outsiders, particularly in the form of federal, state and city governments, would continue to dominate life in the four planning units. The growth in the number of visitors to the area, moreover, made environmental benefits less certain. Ultimately it was Los Angeles' use of the land, and not the tourists, that really rekindled serious controversies in eastern California. The city's ever growing need for water impelled it to increase its water withdrawals from Inyo and Mono Counties in the early 1970's. Worried about permanent environmental damage local interests fought back in the courts. They were joined this time by ecologically minded outsiders who supported their motions against the city. It seemed as if the interests of residents and outsiders might strike a better balance in future, but one can not be optimistic that persistent controversy will vanish from eastern California.

Three separate aboriginal groups are known to have used the land within the planning unit boundaries. Only two of these groups, the Mono Lake or Kuzedika Paiute and the Owens Valley Paiute, used the region as a major resource base. The third group, the Washo, appear to have had a territorial claim to portions of the Coleville unit, although they apparently only used the area on a peripheral basis. Two language families are present within the planning units. The Washo of the Coleville area have been placed in the Hokan language family while the Mono Lake and Owens Valley Paiute groups are part of the Uto-Aztecan family.

The Mono Lake or Kuzedika Paiute were a group of Northern Paiute who spoke a Shoshonean dialect of Uto-Aztecan. Centered around Mono Lake, they maintained close ties with the neighboring Owens Valley Paiute to the south and the Miwok of Yosemite Valley on the western side of the Sierra Nevada. Their population has been estimated at approximately 200 individuals or one person for every 4 square miles of their territory.

Mono Lake Paiute economics involved a combination of gathering, hunting and trade. Meat staples were derived from individual and group hunting of jackrabbit, deer and mountain sheep. Vegetal foods were derived from the exploitation of a wide variety of seasonally available wild plants. Insect larvae of the Coloradia pandora moth and brine fly (Ephydra hians) were important dietary staples.

The basic level of the Kuzedika Paiute sociopolitical organization was the kin clique or extended family. These constituted the basic work unit in the system and the day-to-day group for individuals. This group generally moved as a unit between the various resource areas.

The Mono Lake Paiute were adapted to a system of environmentally and culturally controlled movements through time and space. Their seasonal round followed a series of moves to resource areas based on the current availability of certain seeds, roots, greens, insects, nuts and other subsistence items.

The trade network, maintained primarily with the Owens Valley Paiute and the Yosemite Valley Miwok, provided
for raw materials and foods common within the Mono Lake Paiute's sphere of influence.

The aboriginal Washo were a group of Hokan speakers occupying and utilizing portions of eastern California and western Nevada with their "geographical center" situated at Lake Tahoe. The group had contact with the neighboring Maidu, Miwok and Northern Paiute. Relations with these groups were generally friendly,although limited hostilities occasionally occurred due to territorial disputes. Population estimates are in disagreement on the aboriginal population with pre-contact estimates ranging from 800-2000/3000 individuals; most authorities tend to agree on 1500, or one person for every 2.7 miles of Washo "territory."

Washo economics involved a combination of gathering, hunting, fishing and trade. Vegetal foods were obtained from the exploitation of a wide number of seasonally available wild plants,with pinenuts (Pinus monophylla),being an important staple. Individual and communal hunting of jackrabbit, deer, mountain sheep, antelope and the cottontail rabbit contributed to the supply of meat. A well developed fishing industry, utilizing a wide variety of techniques and centered at Lake Tahoe and the nearby rivers and streams, provided an important source of protein.

The basic level of Washo sociopolitical organization was the kin clique or nuclear family. Washo economic activities and decisions were directed by family interests without reference to any larger groupings. This group generally moved as a unit between the various resource areas.

The Washo, like the Mono Lake Paiute, were adapted to a system of environmentally and culturally controlled movements through time and space. Their seasonal round followed a series of moves to resource areas based on the current availability of certain seeds, roots, greens, pinenuts, fish, game and other economic subsistence items as well as access to the hunting and fishing areas.

Due to factors of topography, linguistic differences, and an abundance of 'native' raw materials and resources within Washo territory, trade relations with the surrounding groups were very limited. Exchanges occurred with the Northern Paiute, Miwok and Maidu for a number of items.

The Owens Valley Paiute were a group of Northern Paiute who spoke a

Shoshonean dialect of Uto-Aztecan and occupied the Owens Valley region from just south of Mono Lake to the area near the present town of Olancha south of Owens dry Lake. The group had contact with the Mono Lake Paiute to the north, the Tubatulabal to the south and the Yokuts and Miwok of the eastern Sierra. Relations both within the Owens Valley and with neighboring groups were generally friendly although limited hostilities occasionally occurred for a number of reasons. Population estimates for the Owens Valley groups are in some disagreement on the aboriginal population,with pre-contact estimates ranging from ca. 1000 to 2000 individuals. An area population density ranging from between 0.5 to 2.5 persons per square mile has been calculated.

Owens Valley Paiute economics involved a combination of gathering, hunting, fishing, "vegeculture," and trade. Vegetal foods were obtained from the exploitation of a wide variety of seasonally available wild plants with pine-nuts (Pinus monophylla) being an important staple,although there is some considerable debate as to when and why they became a favored resource. Deliberate irrigation was used by the Owens Valley Paiute to increase the natural yield of several root and seed plants through the construction and maintenance of communally owned diversion dams and ditches. Several researchers have concluded, based on extensive study, that a well developed agricultural system existed in the Owens Valley focused on the irrigation of "root crops" rather than on the traditionally grown species known for other Native American agricultural systems. This 'vegeculture' operated as an adjunct to the hunting and gathering of wild food items and was probably independently invented by the Owens Valley Paiute. Individual and communal hunting of jackrabbit, deer, mountain sheep, antelope and the cottontail rabbit contributed to the meat supply. A fishing industry, utilizing a wide variety of capture methods, exploited the Owens River and its nearby tributaries as well as Owens Lake.

The Owens Valley Paiute sociopolitical system represents a distinct and fundamental contrast to the Mono Lake and Washo groups. In contrast to the nuclear family or kin cliques described previously for the other groups, the nuclear family of the Owens Valley groups can be viewed as subordinate and circumscribed in regards to its economic and political independence from outside controlling forces. The controlling force or political unit in Owens Valley was the district, a political entity comprising a single large autonomous village or a cluster of several smaller allied villages. Villages were generally composed of related families, although unrelated families were also present, with marriage usually exogamous to the village. Village populations varied in size from 100-250 individuals each with a headman to direct the few communal activities. Each district owned and defended against trespass a core territory which included seed plots, pinyon groves, irrigated land and hunting and fishing territories. Band ownership of hunting territories was apparently strongly focused in the north with a gradual fading as one moved to the south. Within the district certain pinyon groves, seed plots, etc. were subdivided into family plots which, depending on the district, could be passed on through either matrilineal or patrilineal inheritance.

The Owens Valley Paiute subsistence-settlement adaptation emphasized a more-or-less permanent year round village occupation with short-term utilization of temporary camps for hunting and the gathering of seasonally available plant resources (e.g. pinyon nuts) by members of the village. This system reflects a distinct adaptation to the unique environmental setting of Owens Valley in contrast to the 'transhumant' pattern of their Mono Lake neighbors

to the north.

A moderate amount of trade was carried on between the various Owens Valley districts. External trade was primarily with the Western Mono, Mono Lake Paiute and the Miwok of the eastern Sierra. A number of items were traded, among them salt, pinenuts, baskets, obsidian and rabbitskin blankets. Shell money, glass trade beads, acorns and other assorted goods were received in return. Trading expeditions were usually restricted to the summer and fall when the trans-Sierran trade routes were open.

A substantial number of Native Americans belonging to the Paiute/Shoshone or Washo tribes are resident within the Owens Valley/Mono Lake/Coleville region today. Five reservations and one Indian Colony are present within the study area with an approximate population of 1450 Native Americans listed as resident or as members of these entities. A variety of governmental structures are used to help administer these units.

The contemporary Native American residents of the region have to one degree or another adapted to the social and economic conditions imposed by the white settlement and occupation of the area. Permanent or seasonal wage labor in a number of professions and occupations, by both males and females, occasionally coupled with various government benefits, provide the main form of subsistence of the majority of the Native Americans. The traditional round of hunting, gathering and collecting has almost been totally abandoned due to the pressures and necessities of white contact. Hunting, gathering and collecting of personal quantities of plant and animal foods still continues but usually only as a supplement to the now largely Anglo diet. This personal gathering and hunting helps maintain a close tie with the practices of their past lifeways as well as maintaining their bond with Nature on a personal level.

Traditional areas of culture, behavior and language appear to be undergoing a revival as the Native Americans develop an interest in preserving their ethnic heritage. This resurgence can be attributed in part to the growing awareness of both young and old that their heritage represents an asset and tie to the past as well as a foundation for future growth and enrichment of their lives within the "mainstream" of 'white' America.

The Native Americans have a number of concerns that deal with the land use policy of the Bureau of Land Management. They are concerned about restricted access and use of government (i.e. public) lands. From their viewpoint there is very little differentiation between the various government agencies - BLM, U.S. Forest Service, Los Angeles Water and Power - viewing government as a monolithic whole rather than as a conglomeration of state, federal and municipal agencies often with conflicting goals and aims. They feel that they have a right to land use: "It was all ours before the Whites took it away" - but realize that the white governmental power structure is firmly entrenched. The Native Americans are increasingly concerned with the free, open, non-restricted access to public lands for their personal gathering, hunting, and spiritual purposes. Specific concerns are directed at the gathering of pinyon nuts, medicinal and ritual herbs, materials for native crafts, and so on. They are especially indignant at having to compete with commercial pinyon nut pickers and other commerical and private 'multiple resource' uses of the land. They would like to see non-restricted, open use of the public lands (and all lands for that matter) for Native Americans with special concern paid to their

needs in any future policy decisions. The Native Americans have a deep feeling for the land which cannot be adequately expressed in this report. They feel that as the former occupants and users of the region prior to White "confiscation" they should have a prominent voice in the 'multiple use' planning of the various government agencies.

A number of other items are of concern to the Native Americans. Foremost among these is the use of 'traditional' hot springs and places of spiritual or social importance. In the case of the latter, they feel that the determination of any 'sacred locality' must be made on a case by case basis with the appropriate government officials conferring with the Native American community prior to any planning decisions. They feel that an all inclusive listing of sacred places would be both detrimental to themselves and the planning policy as numerous individuals must be consulted to determine the location/existence of all 'sacred' places and that many of their people would be reluctant to give this information to the government due in part to previous information abuse by various authorities.

In terms of archaeological materials, all archaeological remains are of signficance to the Native American community in that they represent the material remnants of their past history. Of special concern to the Native Americans are the operations of archaeologists and cultural resource contractors who fail to consult with or confer with the community on their research projects in the region. They feel that both groups, the archaeologists and the Native Americans, can learn much from each other and further good working relations in an area of concern to both parties - the explanation and preservation of a portion of America's aboriginal cultural heritage. Rock art sites and burial localities are areas of specific concern to the Native Americans interested in archaeological preservation.

The study area has enormous archaeological research potential but has been the subject of only relatively few research investigations. Early exploration journals and military reports for the initial contact period contain both anthropological and archaeological observations of limited utility. The first serious scholarly archaeological investigation of record is the report and analysis written by Dr. O. Loew of the Wheeler Survey on the "hieroglyphical writing upon rocks" in Mono County near Benton. The petroglyphs or rock art of the area apparently attracted the major interest and scholarly effects of various researchers for the next 60 years to the apparent exclusion of other 'archaeological research.'

The 1930-1950's saw a realization of the research potential in the area by a number of individuals and institutions. Julian Steward's well known and widely read ethnographic studies among the Owens Valley Paiute in the late 1920's and 1930's as well as his attempt at synthesizing the Great Basin culture pattern undoubtedly did much to make this 'unknown region' attractive to the scholarly world for further research.

Elizabeth and William Campbells' work at Owens Lake in the 1930's marks the beginning of systematic, although sporadic and seldom reported, archaeological research in the planning units. The research at the Cottonwood Site (Iny 2) by H.S. Riddell in 1951 defined the historic Paiute occupation of Owens Valley. Further field survey and excavation in the Owens Valley area were subsequently undertaken by H.S. and F.A. Riddell and indicated an early

occupation of the area. The Rose Spring Site (Iny 372) to the south of the various planning units, excavated by F.A. Riddell and published by E.P. Lanning in 1963, helped determine the temporal span of several projectile point series thus making them useful as 'time markers' in Great Basin prehistory.

To the north of Owens Valley, a field reconnaissance was undertaken by C. Meighan under the sponsorship of the University of California. Meighan was not able to define the cultural position of the sites he noted in any detail and no clear evidence of 'early man' was found during the survey. However, he did note that the cultural affinities of Mono County did lie with the Great Basin.

The 1960's saw the continuation and expansion of academic research within the planning unit boundaries. Numerous articles and monographs concerned with Mono Lake and Owens Valley ethnography and archaeology attest to the continuation of the research begun in the 1950's. The research of E.L. Davis must be singled out for the establishment of a valuable data base for any future study in the Mono Basin area.

To the south of the Mono Basin, Jay von Werlhof's study on the rock art of the Owens Valley stands as a significant contribution to the prehistory of the region. Von Werlhof assembled a large corpus of detailed data, described and mapped many of the rock art sites and attempted an analysis and locational study of the rock art's distribution and meaning.

A number of other researchers conducted excavations at several rockshelters, described various artifacts, reported on archaeological materials and generally made contributions to the data base during the 1960's. Of some note were the projectile point workshops sponsored by the Eastern California Museum under the supervision of Ruth Simpson to aid local collectors in point identification as well as to give the professional archaeological community an inventory of material culture in the area.

Academic research or pure 'non-directed' research faded from interest in the 1970's with a few notable exceptions. Applied research or 'other directed studies' primarily concerned with environmental impact assessments and/or cultural resource management dominate the bulk of archaeological research within the planning unit boundaries. Contract work has been carried out by CALTRANS, University of California, Riverside, University of Nevada, Reno and Las Vegas Campuses and the U.S. Forest Service among many others.

While research primarily concerned with fulfilling environmental mandates and directives has dominated the archaeology of the 1970's, there have been several notable exceptions to the general sterility of the cultural resource oriented research. Ms. Karen Nissen, University of California, Berkeley, is currently completing a computer aided analysis of rock art elements at several petroglyph sites in the western Great Basin. One of the sites,Mno-8, located on the Bishop Petroglyph Tour, has been partially subjected to a careful recordation for inclusion in the computer analysis. Members of the University of California, Riverside have made several substantive contributions, both theoretical and empirical to the planning unit's prehistory. Initially concerned with the academic research potential in the area, Robert Bettinger and others from the university undertook a series of contract operations in the region starting in 1972 as an alternate means of obtaining funding for

archeological research. This directed research formed a base for Bettinger's doctoral dissertation that represents the beginning of renewed academic interest in the prehistory and ethnography of both Owens Valley and the surrounding region.

Bettinger's doctoral research was primarily directed at testing the utility of ethnographic settlement-subsistence models in explaining the distribution of a set of archaeological assemblages collected in Owens Valley. His analysis was directed towards assemblage modeling and site taxonomy. His reconstruction of the prehistoric man-land relationships through time in the Owens River drainage suggests a highly variable, somewhat specialized, prehistoric subsistence-settlement system sensitive to the action of both natural (e.g.,climatic change) and cultural (e.g.,population pressure due to immigration and/or natural increase) factors. Furthermore, his research appears to indicate that the area acted as a unified whole with conditions in one locality having a reciprocal effect on the others. Some of his research has provoked some comment and debate and further research is planned, both directed and pure by Bettinger to resolve some of the questions and refine the models.

Other researchers have also shown an interest in the area. C. Singer and J. Ericson have presented a detailed analysis of a Bodie Hills obsidian quarry near Mono Lake in regards to manufacturing and trade patterns with a stress on the relationship to California west of the Sierra Nevada.

The existing data base of archaeological information available for the planning units covers a wide variety of topics with varying degrees of "quality." While each individual study has some information value to offer, systematic research utilizing a clearly defined research design, and built upon the previous research efforts, will ultimately prove to be of the most value in further analytic studies of the area's prehistory.

From the various archaeological accounts available and from data in the surrounding regions, an occupational history of man in the various planning units has been developed. It is unlikely, after a review of the extant data base, that man was in the region prior to 10,000 B.C. ("Pre-Projectile Point Horizon"), although evidence from areas further to the southeast may indicate the presence of 'early man' in western North America. Man probably initially occupied the planning units ca. 10,000-9000 B.C.,although the archaeological evidence for this early occupation (Fluted Point Tradition) is scant and subject to some interpretation. From ca. 9000-6000 B.C. cultural activites were probably confined to lakeshore adaptations with a generalized subsistence pattern emphasizing either lacustrine or megafaunal food resources (Western Pluvial Lakes Tradition). It is probable that neither resource was emphasized and that both were opportunistically exploited.

Between 6000 B.C. to 4000 B.C. a period of marginal exploitation has been postulated due to the effects of the Altithermal. This period of climatic change and hence environmental change is thought by some researchers to have been responsible for the partial abandonment of some lower elevation ecological zones. The exploitation of higher elevations is thought to have occurred at this time by the aboriginal inhabitants in search of available food resources. Evidence for this "hiatus" is sparse, and additional data must be gathered before a definitive statement can be made.

By 4000 B.C. the basic hunting-gathering lifeway known from the ethnographic literature seems to have been established (Great Basin Archaic). Ground stone food processing implements (e.g., manos, metates) apparently became common inferring increased use of plant resources. Humboldt, Pinto, Silver Lake, Lake Mohave, Elko and Gypsum projectile points are characteristic of this period.

The introduction of the bow and arrow is indicated by the transition from the larger heavier projectile points of the preceeding periods to the appearance of the smaller and lighter Rose Spring and Eastgate points ca. A.D. 500 - A.D. 1000/1200 (Rose Spring-Eastgate Complex). Cottonwood and Desert Side Notched projectile points appearing ca. A.D. 1000 to Historic times along with pottery in some areas of the region mark the Late Prehistoric Phase. Irrigation in the Owens Valley apparently became common during this late period.

The Recommendations and Research Directions section contains a number of generalized and specific observations pertaining to further research and management plans. Cooperation and consideration are emphasized in dealing with other agencies and the regional Native Americans. Historical recommendations and research directions emphasize preservation and interpretive actions with perhaps some future research directed at the excavation of suitable historic sites. Anthropological research recommendations are directed at suitable oral histories of the contemporary Native Americans and the study of various behaviour mechanisms utilized to cope with the dominant white society.

Archaeological research has an excellent potential in the various planning units. Special emphasis should be directed toward the development of man-land relationships through time and the formulation of a reliable regional chronological sequence especially in regards to early man's occupance of the region. Recent problems of interest to archaeological science deal with the introduction of the bow and arrow, ceramics, and the definition and delineation of the postulated Numic 'invasion' from the southwestern Great Basin around A.D. 1000. The utility of testing an ethnographic settlement-subsistence model in explaining the distribution of a set of archaeological assemblages is discussed with reference to a recent investigator's research and further research avenues are suggested to clarify his interpretations.

Further research is recommended for the highly noticeable rock art of the region with special attention to be given to the recordation, protection and interpretation of this reminder of the prehistoric past. The aboriginal network of trade relations also promises to be of value in comprehending the prehistory of the region especially in terms of its regularity, intensity, specialization and efficiency through time as well as its effect on the social patterns of the area. Two other areas of possible future research are a detailed review of the structure and character of the prehistoric irrigation system and the reasonably complex social structure known for the Owens Valley Paiute. Environmental change and its effect on the human occupance of the region is another area of future interdisciplinary research.

Other areas of interest to the Bureau of Land Management are the inventory and analysis of local collections, the accumulation of a working library on the region for BLM use and the encouragement of professionals who have worked

in the area to fully report materials in their care.

In regards to contemporary Native Americans in the region, the Bureau of Land Management should make every effort to consider, coordinate, cooperate and consult these groups as their past heritage forms the majority of the known history of the planning units.

In summary, the full research potential of the four planning units has yet to be relized and appreciated although several investigators have recognized its potential and are preparing comprehensive research programs. With careful planning and appropriate Native American consultation, the Bureau of Land Management should be able to direct and utilize the anthropological and historical potential of the region to the fullest for the benefit of science and society.

ACKNOWLEDGEMENTS

The cultural resource overview of the Coleville, Bodie, Benton and Owens Valley Planning Units required the contributions and support of numerous people. To those who we have not mentioned below, please accept our apologies and thanks for your assistance.

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Mrs. Adrienne Morgan's, Department of Geography, University of California, Berkeley, cartographic representations add greatly to the report. Mr. John Liversidge, Ms. Pamela Endzweig and Ms. Marianne Stam's research assistance contributed directly to the completion of the report. James, Martin and John R. Findlay assisted in exploring the historical resources of the region and the hospitality and interest of Mrs. Marie Jackson of Big Pine made the task much easier and enjoyable. Ms. Lila Schwartz and the People's Secretary, Berkeley are thanked for their speedy typing of the report.

INTRODUCTION

This report represents a contribution to a number of regional (i.e., planning unit) studies commissioned by the Bureau of Land Management for lands under its control in the State of California.

The intent of these various studies is to provide the Bureau of Land Management (BLM) with an overview and synthesis of the existing cultural resource information, including historic, prehistoric and ethnographic data available for the study area, in this case, the Bodie/Coleville and Benton/Owens Valley planning units of the Bakersfield District Office. The BLM is mandated by the Antiquities Act of 1906, the Resevoir Salvage Act of 1960 (as amended by Public Law 93-291), The National Historic Preservation Act of 1966 (as amended), The National Environmental Policy Act of 1969 (NEPA), Executive Order 11593 and the Federal Land Policy and Management Act of 1976 (among others) to identify, evaluate and protect both prehistoric and historic cultural resources on public lands under its jurisdiction. The purpose of this report is to provide a compilation and synthesis of data on cultural resources within the various planning units that can serve as background information in BLM Environmental Analysis Records (EAR), Environmental Statements (ES), Unit Resource Analyses (URA), Management Framework Plans (MFP) and other documents that may require cultural resource information.

The data is presented in terms of previous archaeological research, a culture history (or sequence), ethnography, ethnohistory, a narrative history and needs and recommendations for future management (including directed archaeological research) and protection of cultural resources. This compilation and presentation of cultural resource information will, hopefully, encourage long term planning resulting in the conservation and protection of a non-renewable portion of America's heritage.

As defined by the BLM, the Bodie/Coleville and Benton/Owens Valley planning units cover approximately 1.2 million acres (750,000 acres public land, 450,000 acres private land) of variable terrain in Inyo and Mono Counties, California. The planning units are bounded in part by the State of Nevada on the north and east with the foothills of the Sierra Nevada mountains, more particularly the Inyo National Forest, on the west. The eastern boundary is the Inyo National Forest and the slopes of the Inyo and White Mountains. California State Highway 190 forms the southern boundary (Fig. 1).

Our report format is divided into 5 general sections. The first section deals with the Natural Setting of the region in broad detail while the second introduces the reader to a narrative/interpretive history concerned with both the planning units and the surrounding area. Section three details the ethnographic record of the Native American peoples present at the time of white contact as well as providing background material on the contemporary Native American population. Section four deals with the prehistory of the region as reconstructed by archaeology and offers a broad overview of the culture history and chronological span of human occupance. The last section offers a series of brief suggestions and recommendations for effective

management of the cultural resources present within the four planning units. A series of specialized appendices and a select annotated bibliography conclude the data presentation and synthesis.

NATURAL SETTING

Introduction

The Owens Valley is the westernmost of the more than 150 desert basins which, together with the more than 160 discontinuous subparallel mountain ranges that separate them, form the Great Basin section of the Basin and Range Province of the western United States. The Owens Valley is commonly defined as the narrow northwest/southeast trending trough bounded by the Sierra Nevada on the west, the White-Inyo Mountains on the east and extending northward from the Coso Range south of Owens Lake for over 100 miles to the great bend in the Owens River just northwest of Laws, California. For the purposes of this report, the study area is expanded northward to include most of Mono County to the vicinity of Topaz Lake on the California-Nevada border (Figs.1 to 11).

Geologic History

The geologic history of this region has been treated in some detail by Knopf and Kirk (1918), Pakiser et al. (1964) and Bateman (1978). These works have served as the major sources for the following summary.

Throughout the Paleozoic the area of the present western United States was submerged beneath the ocean. It was exposed only at the shores of ancient Cascadia somewhere in the eastern part of the Pacific Basin. Erosion from the bordering lands, subsequent sediment deposition on the ocean floor, combined with the additional weight of volcanics from eruptions triggered by the growing stress of the deposits, led to the depression of a geosyncline at the western margin of the submerged region sometime in the early Mesozoic, probably during the Triassic. In the late Jurassic or early Cretaceous, this trough finally yielded to the tension. High temperatures and pressure caused the melting of the sedimentary rocks and volcanics and, resulted in the recrystallization and granitization and emplacement of the Sierran batholith one mile or two beneath the surface (Nevadan orogeny) with aureoles of contact metamorphic rocks. These processes were followed by a rising of the trough. Erosion of the uplifted rocks exposed the granites with erosion continuing through and after the cessation of vertical movement into the early Tertiary. This period of relative quiescence was succeeded in the Eocene by a gradual up-arching of the eroded plain, probably along an axis through the area of the present Sierra-Cascade system. Pakiser et al. (1964) tentatively place the movement along Owens Valley faults into this period. In the late Miocene and/or early Pliocene, the arch fractured into a number of segments. The Sierran block, remaining intact, continued to rise, tilting to the west. The eastern flank broke into a series of eastward tilted basin and range blocks, the westernmost of which was downdropped as the wedge-shaped graben that now forms the Owens Valley. Pakiser et al. (1964:55) have suggested that the valleys to the east may merely represent "alluviated areas on the lower ends of eastward tilted blocks," implying uplift without necessarily subsidence in this region. The downfaulting of Long Valley and Mono Basin is suggested to have occurred during this period as well, resulting from volcanic eruptions causing low pressure zones in these areas of local tension which in turn are attributed to the southward movement of the Sierra Nevada relative to the western Great Basin, including the Owens Valley.

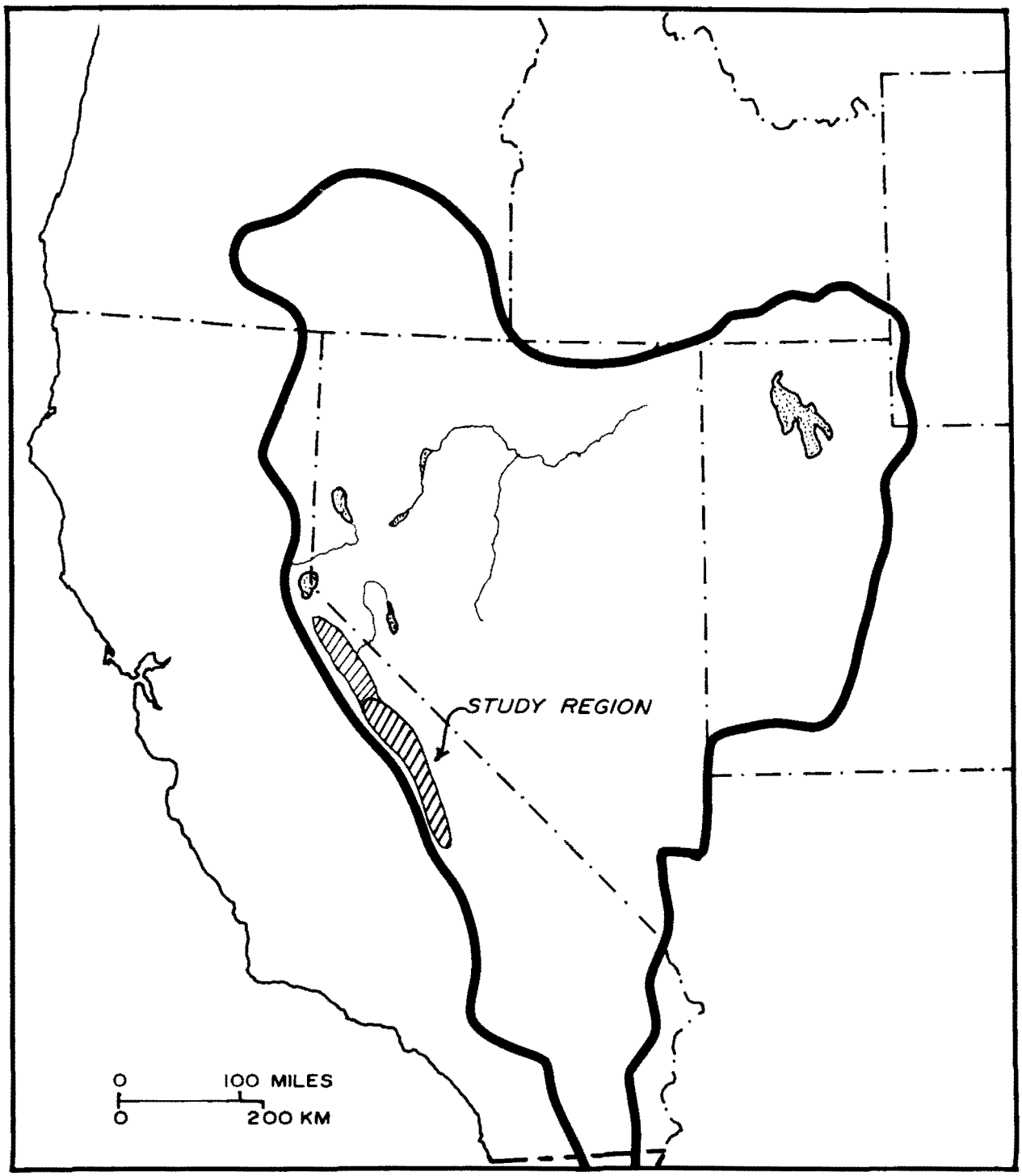


Figure 1: Study Region Within the Great Basin Proper.

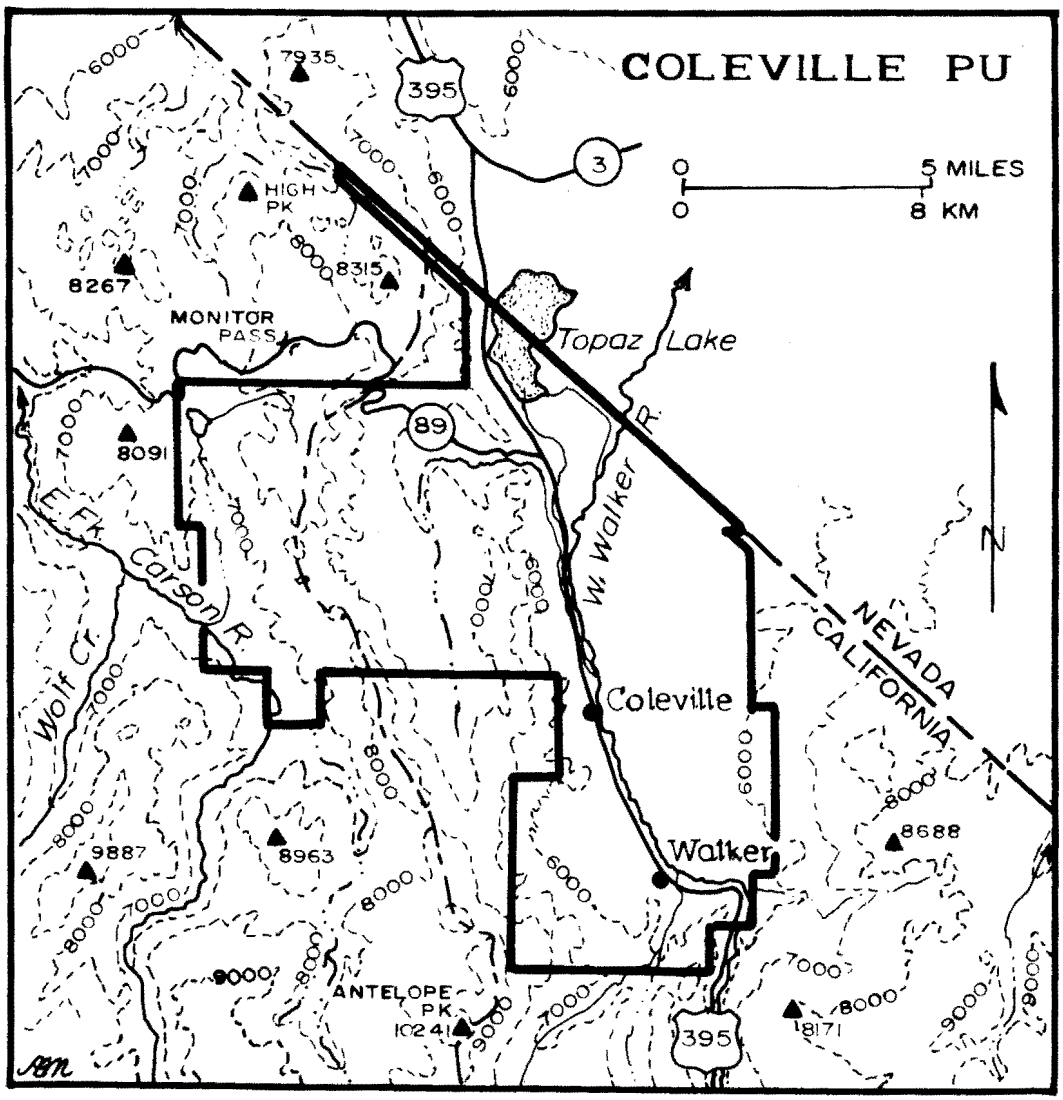

COLEVILLE PU
5 MILES
8 KM
N
Topaz Lake
W. Walker R.
Coleville
Walker
NEVADA
CALIFORNIA
MONITOR PASS
HIGH PK
ANTELOPE PK
E. Fk Carson R.
Wolf Cr.
7935
8267
8315
8091
9887
8963
10241
8688
8171
395
89
3

Figure 2

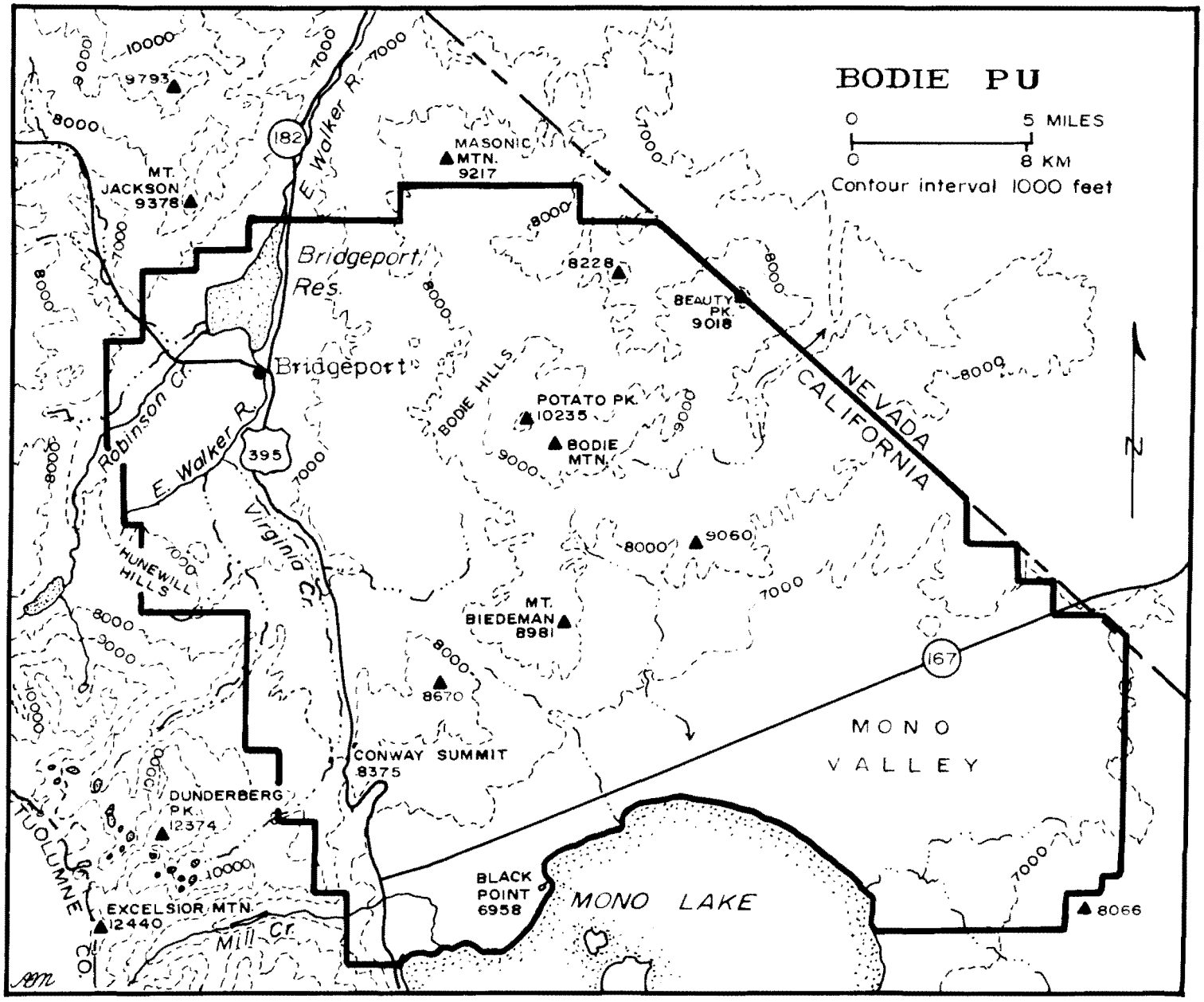

BODIE PU
0 5 MILES
0 8 KM
Contour interval 1000 feet
MASONIC MTN. 9217
MT. JACKSON 9378
9793
182
E. Walker R.
Bridgeport Res.
Bridgeport
8228
BEAUTY PK. 9018
NEVADA
CALIFORNIA
Robinson Cr.
E. Walker R.
395
BODIE HILLS
POTATO PK. 10235
BODIE MTN.
Virginia Cr.
HUNEWILL HILLS
9060
MT. BIEDEMAN 8981
8670
167
MONO VALLEY
CONWAY SUMMIT 8375
DUNDERBERG PK. 12374
TUOLUMNE CO.
EXCELSIOR MTN. 12440
Mill Cr.
BLACK POINT 6958
MONO LAKE
8066
N

Figure 3

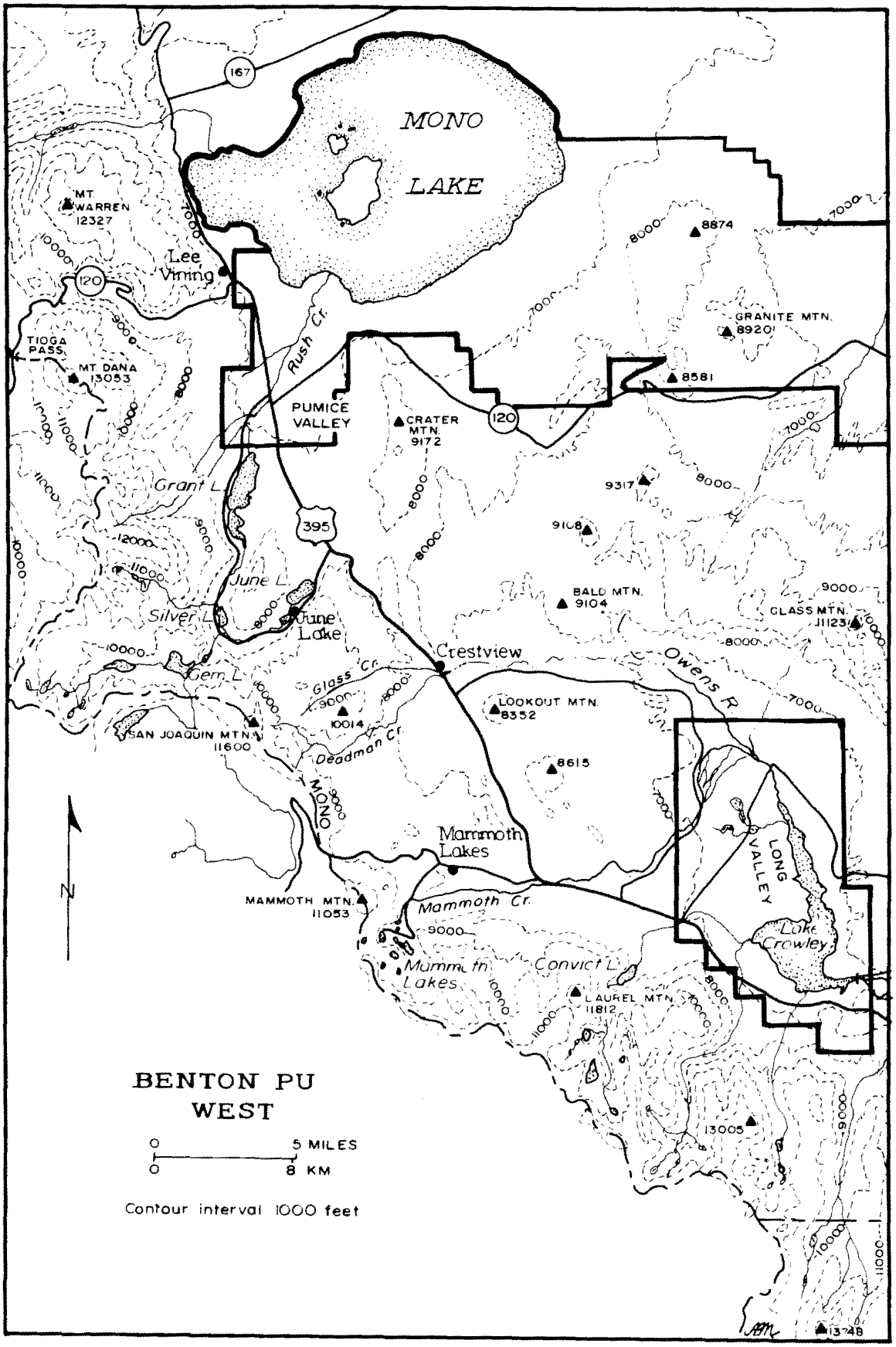

MONO
LAKE
MT. WARREN 12327
Lee Vining
TIOGA PASS
MT. DANA 13053
Rush Cr.
PUMICE VALLEY
CRATER MTN. 9172
8874
GRANITE MTN. 8920
8581
9317
9108
BALD MTN. 9104
GLASS MTN. 11123
Grant L.
June L.
Silver L.
June Lake
Gem L.
Glass Cr.
10014
SAN JOAQUIN MTN. 11600
Deadman Cr.
Crestview
Owens R.
LOOKOUT MTN. 8352
8615
Mammoth Lakes
MAMMOTH MTN. 11053
Mammoth Cr.
LONG VALLEY
Lake Crowley
Convict L.
LAUREL MTN. 11812
13005
13748
167
120
395
N
BENTON PU
WEST
0 5 MILES
0 8 KM
Contour interval 1000 feet

Figure 4

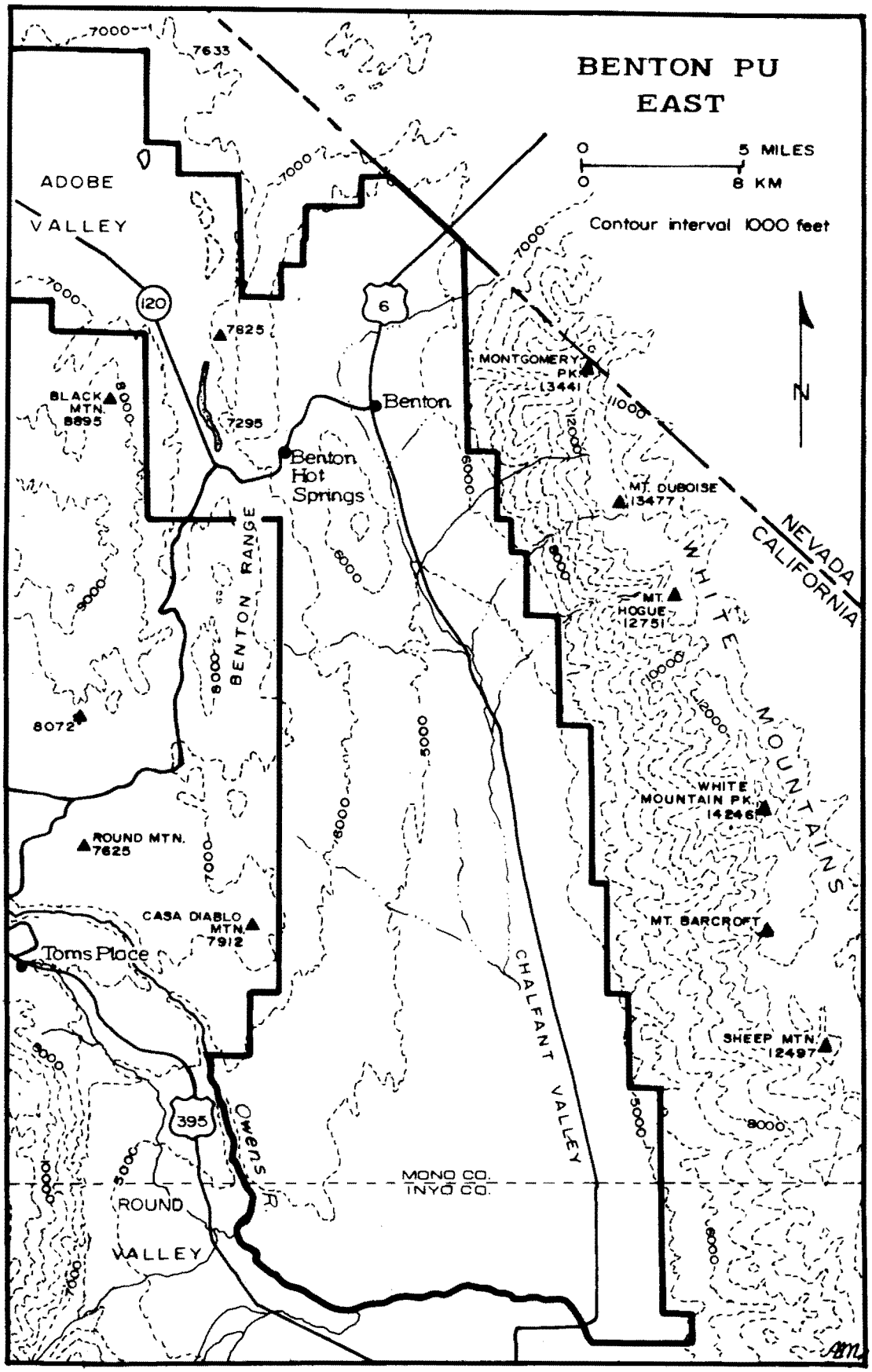

BENTON PU
EAST
0 5 MILES
0 8 KM
Contour interval 1000 feet
N
ADOBE
VALLEY
120
6
7633
7825
7295
BLACK MTN. 8895
Benton
Benton Hot Springs
MONTGOMERY PK. 13441
MT. DUBOISE 13477
MT. HOGUE 12751
NEVADA
CALIFORNIA
WHITE MOUNTAINS
WHITE MOUNTAIN PK. 14246
MT. BARCROFT
SHEEP MTN. 12497
BENTON RANGE
8072
ROUND MTN. 7625
CASA DIABLO MTN. 7912
Toms Place
CHALFANT VALLEY
395
Owens R.
MONO CO.
INYO CO.
ROUND VALLEY

Figure 5

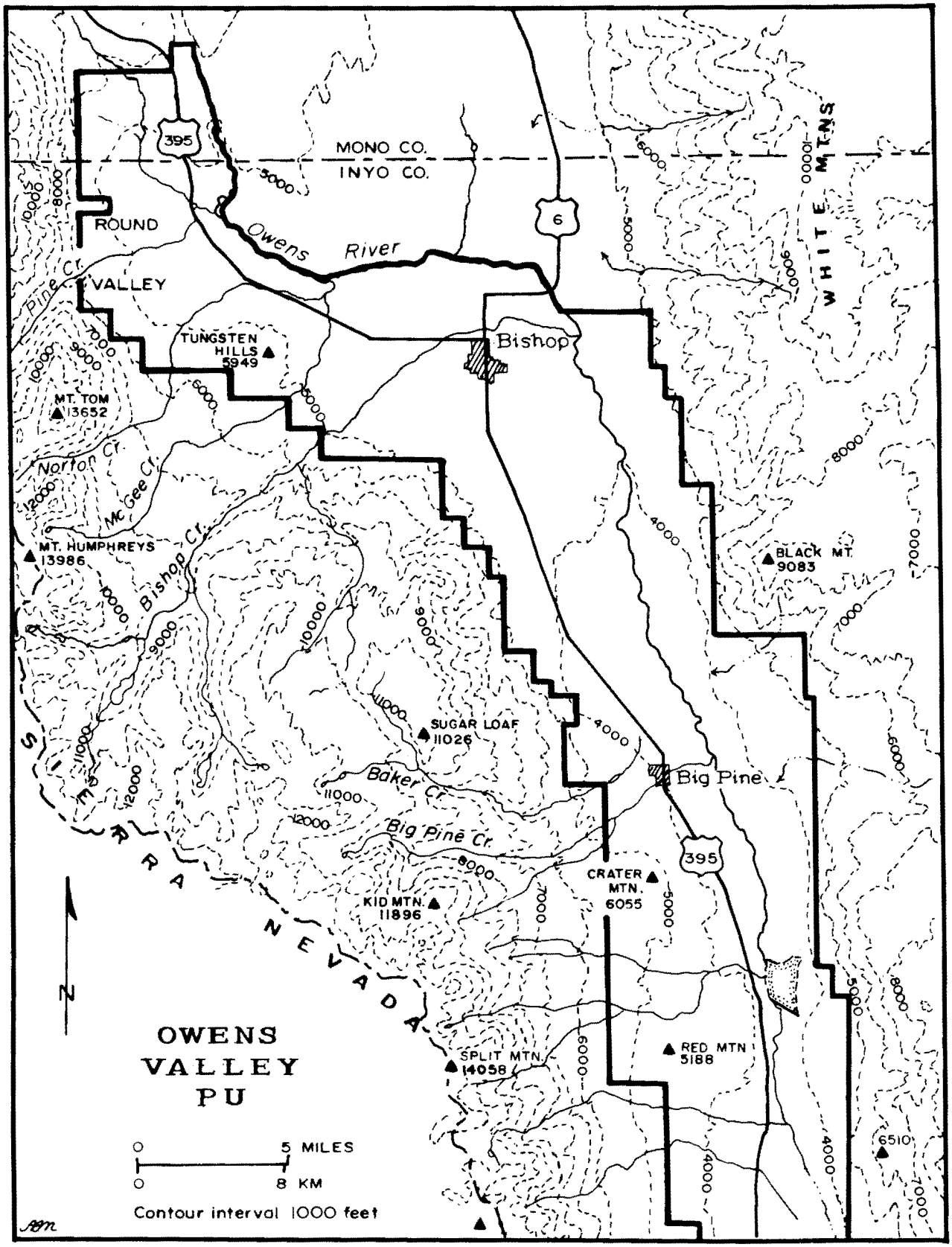

MONO CO.
INYO CO.
395
6
ROUND VALLEY
Owens River
Pine Cr.
TUNGSTEN HILLS 5949
Bishop
WHITE MTNS
MT. TOM 13652
Norton Cr.
McGee Cr.
Bishop Cr.
MT. HUMPHREYS 13986
BLACK MT. 9083
SUGAR LOAF 11026
Baker Cr.
Big Pine
Big Pine Cr.
SIERRA NEVADA
CRATER MTN. 6055
KID MTN. 11896
N
OWENS VALLEY PU
SPLIT MTN. 14058
RED MTN 5188
6510
0 5 MILES
0 8 KM
Contour interval 1000 feet

Figure 6

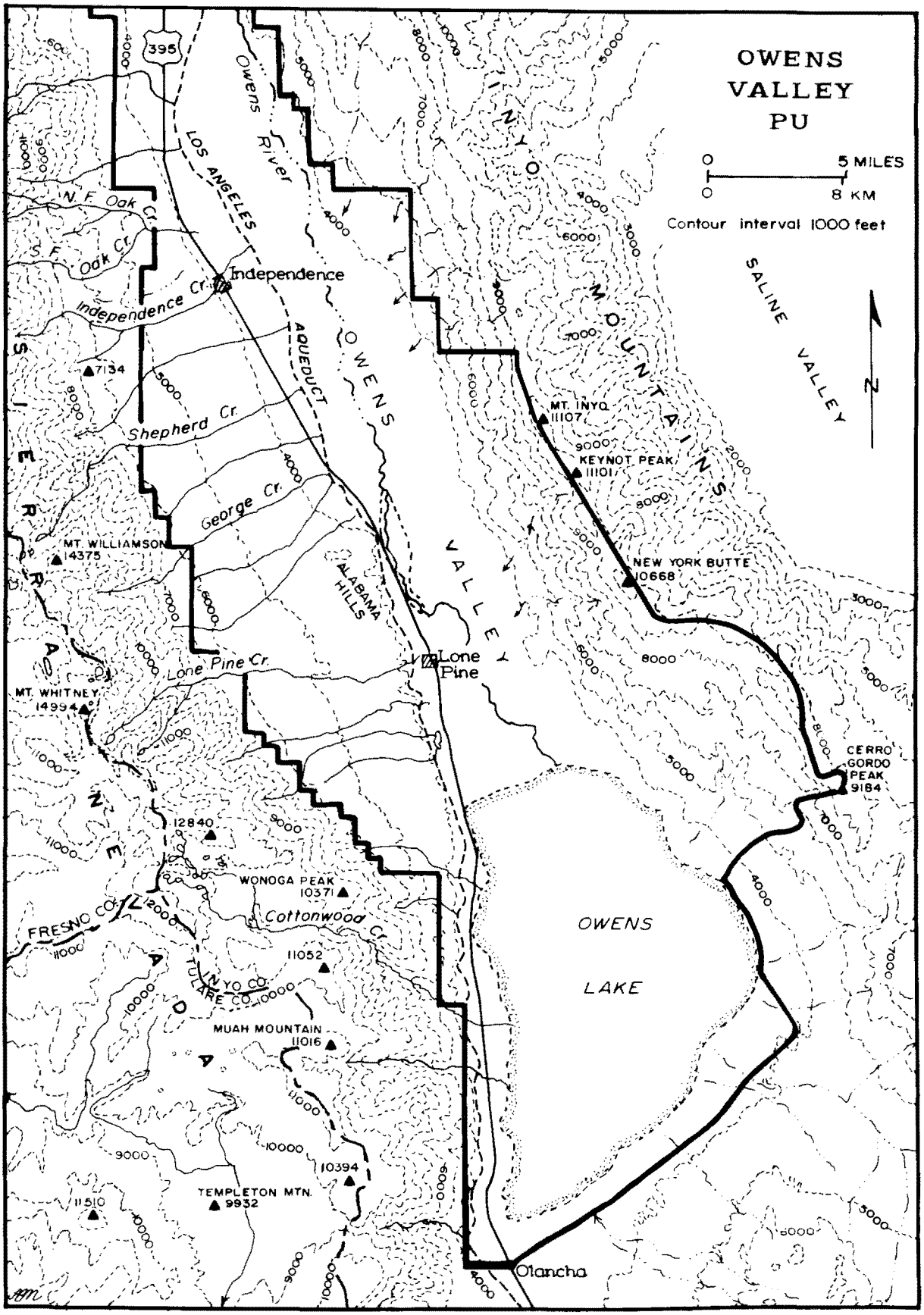

OWENS VALLEY PU
0 5 MILES
0 8 KM
Contour interval 1000 feet
395
Owens River
LOS ANGELES AQUEDUCT
OWENS VALLEY
SALINE VALLEY
INYO MOUNTAINS
SIERRA NEVADA
N. F. Oak Cr.
S. F. Oak Cr.
Independence Cr.
Independence
Shepherd Cr.
George Cr.
Lone Pine Cr.
Lone Pine
ALABAMA HILLS
MT. WILLIAMSON 14375
MT. WHITNEY 14994
MT. INYO 11107
KEYNOT PEAK 11101
NEW YORK BUTTE 10668
CERRO GORDO PEAK 9184
WONOGA PEAK 10371
Cottonwood Cr.
MUAH MOUNTAIN 11016
TEMPLETON MTN. 9932
10394
11052
12840
11510
7134
FRESNO CO.
INYO CO.
TULARE CO.
OWENS LAKE
Olancha

Figure 7

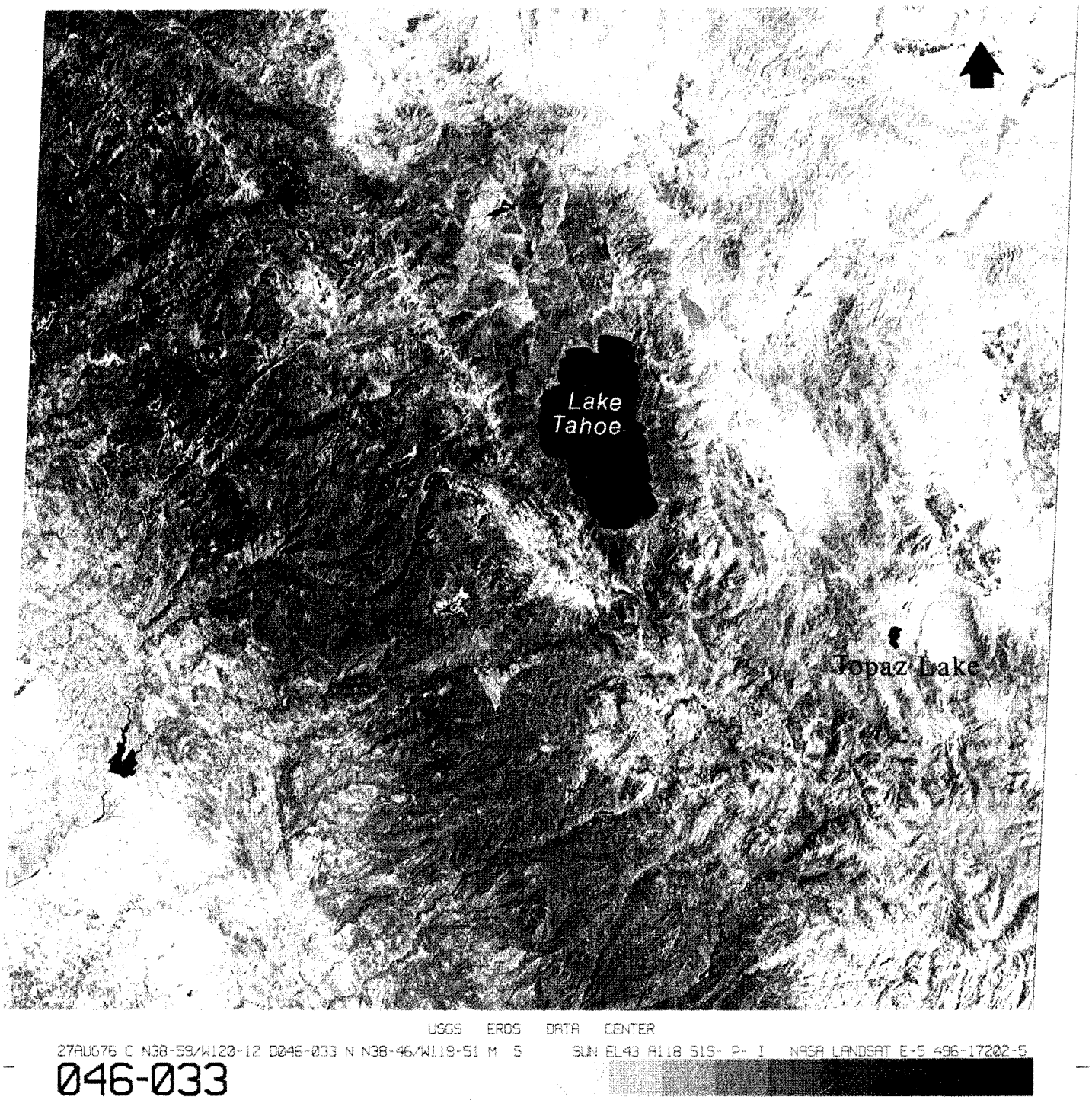


Figure 8: Landsat Imagery of Lake Tahoe and Topaz Lake (Coleville Planning Unit).



Figure 9: Landsat Imagery of northern Owens Valley, Lake Crowley and Mono Lake (Owens Valley, Benton and Bodie Planning Units).

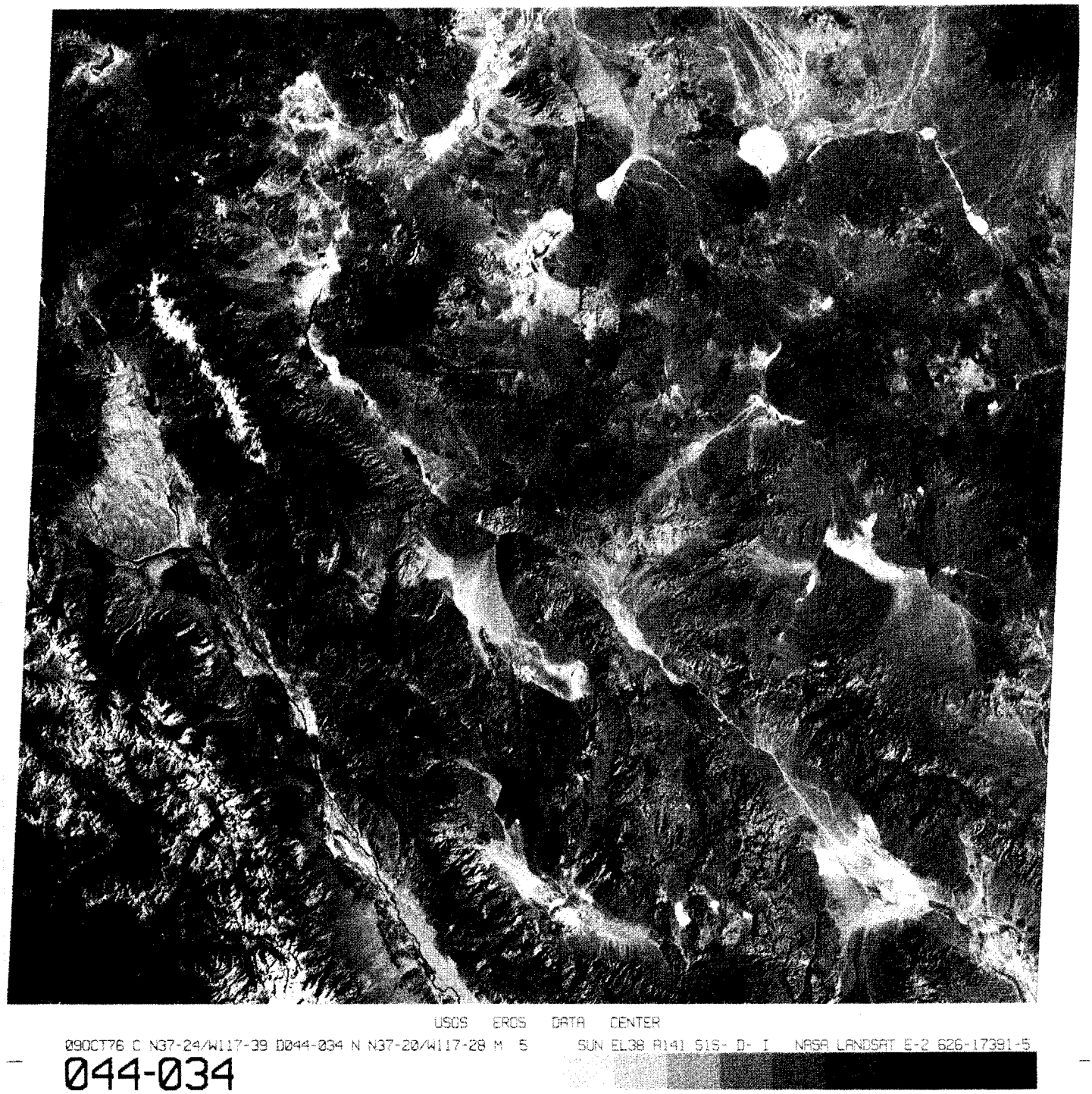


Figure 10: Landsat Imagery of central Owens Valley. Arrow indicates Owens Valley. Bishop is slightly north of the arrow.

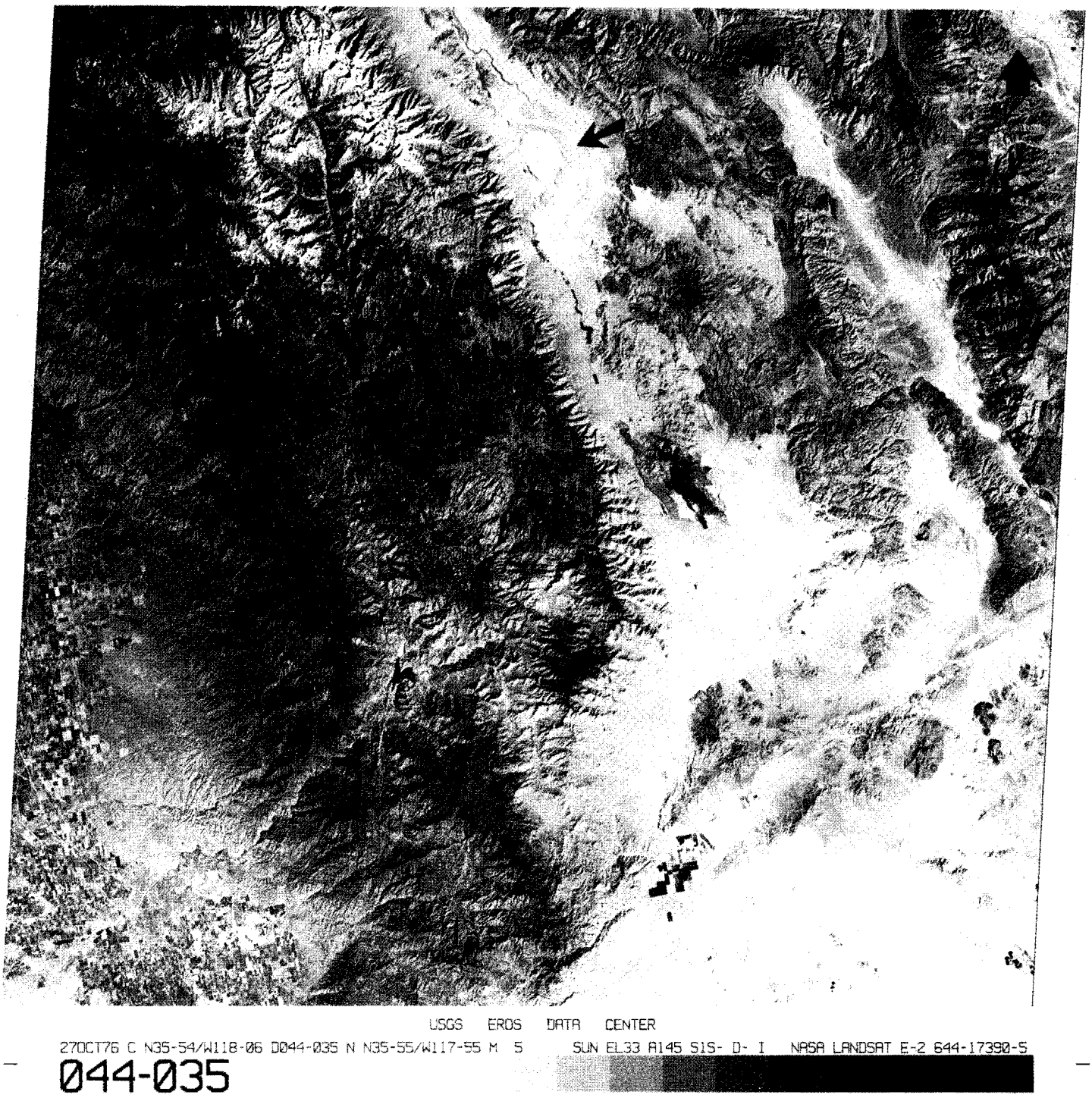


Figure 11: Landsat Imagery of southern Owens Valley. Arrow indicates Owens Dry Lake and southern boundary of Owens Valley Planning Unit.

After a time of relative calm, a second phase of Sierra uplift commenced in the late Pliocene, lasting into the early Pleistocene, and possibly simultaneous with an uplift of Owens Valley to ca. 9000 feet above sea level. Continued volcanic activity, the mark of Pleistocene glaciations and the erosional and depositional agency of water from runoff and streamflow have combined in modifying the region to give it its present character.

Geology

Eastern Slope of the Sierra Nevada

Rising as a seemingly vertical wall from an alluvial apron that slopes gently to the floor of Owens Valley at an average inclination of 6°-7° (Knopf and Kirk 1918:53), the eastern escarpment of the Sierra Nevada bears ample evidence of its tectonic origin. Along the valley trend, a simple fault line alternates with distributary parallel faults (Bateman 1978:104) that create terrace-like forms such as those opposite the Poverty Hills or east of Mount Tom. Prominent triangular facets mark the spurs between the deep canyons that dissect the slope, cutting into the alluvium to depths of 75-150 feet (Knopf and Kirk 1918:54) and in some localities even into the underlying bedrock. Whether these are due to post-glacial increase in stream discharge and erosional capacity or to orogenic uplift is still uncertain. In the region northwest of Owens Lake no less than 7 of the 11 Sierra peaks of over 14,000 feet - including Mount Whitney (California's highest peak) at 14,494 feet - together with several mountains of only slightly less elevation, form Muir Crest, trending northwestward for approximately 17 miles. Mt. Williamson, the second highest peak in California (14,375 feet) exhibits triangular facets textbook-like in their perfection. The peak appears to stand out more prominently when viewed from Owens Valley, an illusion caused by Mt. Whitney's location set back from the eastern scarp.

The Alabama Hills form a low range 11 miles long and 4 miles wide west of the town of Lone Pine almost due east of Mt. Whitney. Composed primarily of Triassic or Jurassic andesitic lavas and breccias intruded by batholithic granites (granite and aplite), they preserve a segment of the undulating landscape that formed the ancient Sierra Upland, although faulting has separated them from the main block (Knopf and Kirk 1918:59). In composition, the Alabama Hills resemble many of the isolated rock pendants that can be observed throughout the Sierra, remnants of the roof that once extended over the batholith. Long and narrow, their undisturbed appearance seems to indicate a batholithic intrusion without major tectonic disturbance. Differences in color (either rusty brown due to oxidized iron or grey to black) clearly distinguish them from the underlying rock.

The Alabama Hills are also notable for the faults that dissect the range and for the straight scarp that forms its eastern side. Observed left-lateral offsets along three of the east-trending faults have been suggested to indicate "a north-trending, right lateral force couple applied across the hills" (Richardson 1972:62-63), thus contributing to the controversy over the direction of faulting in the region (cf. Pakiser et al. 1964:16-17).

Cinder cones and lava flows mark the southern edge of the volcanic field that extends northward almost up to the town of Big Pine. Composed of basalt with "prominent phenocrysts of olivine and numerous less conspicuous crystals of augite" (Knopf and Kirk 1918:75), it is late Quaternary in origin, except for a "small group of rhyolitic hills from the Tertiary projecting through the alluvial apron of the Sierra 8 miles south of Big Pine" west of the Poverty Hills (Knopf and Kirk 1918:73). The cones seem to align with a scarp extending from Red Mountain to Crater Mountain. Recent faulting is indicated by the dislocation and 50 foot displacement of a cinder-cone west of Fish Springs School (Hinds 1952:69). Red Mountian, a reddish, extremely symmetrical lava cone with an unbroken rim indicating explosive activity at the final stage of its eruption (Knopf and Kirk 1918:76), rises 600 feet above the Sierran alluvial apron. This is in effect not much lower than Crater Mountain, although the latter appears much higher due to its extrusion through an upfaulted block of granite together with which it attains an elevation of about 2000 feet above the valley floor (Hinds 1952:68).

The Poverty Hills were not formed by volcanic activity; like the Alabama Hills, they project as a "knob of bedrock" (quartzmonzonite in association with marble and other metamorphics) through the alluvial deposits. Their western flank is bounded by the same fault scarp that caused the dislocation west of Fish Springs School noted previously. Certain inconsistencies in their position relative to major fault trends in the valley lead Pakiser et al. (1964:51) to postulate an origin due to gravity slide from the Sierra Nevada's higher slopes.

To the north of Crater Mountain the faulting of the Sierran front gives way to warping (Bateman 1978:104-106). This summit surface remnant extends northward to the Tungsten Hills. Thereafter, the front is offset to the west by about 8 miles and forms the steep escarpment bordering Round Valley (Bateman 1978:104-106). It then continues northward, forming the 6000 foot scarp of Wheeler Crest west of Rock Creek Gorge, subsequently making an abrupt turn to the northwest. Dissected as it is farther south by numerous eastward flowing creeks, many of which sport cirque-basin lakes in their headwaters, the Sierran front continues more or less in this direction to the Mammoth area. This region has been marked by considerable volcanic activity, associated both with the Long Valley Caldera to the east and the Mono and Inyo Craters to the north. Numerous hot springs and fumaroles (e.g., Casa Diablo Hot Springs, Hot Creek) are associated with deposits of kaoline, travertine, and opal (Sheridan 1971:39). Mammoth Mountain itself is a greatly eroded, volcanic dome, more than a million years old (Hinds 1952:57). The Devil's Postpile, now a National Monument, is situated 3 miles to the west, in the headwaters of the Middle Fork of the San Joaquin River. Dated at 0.63 ± 0.35 million years B.P. (Huber and Rinehart 1967), it is a remnant of basaltic lava which was extruded through a fissure in Mammoth Pass, "spreading out as a tongue from the head of Pumice Flat beyond Rainbow Falls" (Hinds 1952:57). Upon cooling, the lava contracted, forming columnar joints. These made the rock vulnerable to the quarrying activity of the glacier which overrode it later, re-excavated most of the canyon and left only the "Devil's Postpile," a "hump in the middle...about 300 yards long and 200 feet high" (Hinds 1952).

Approximately at the level of Mammoth and Mammoth Mountain, the Sierran front bends northward, continuing roughly in this direction to beyond the Mono Basin. Major eminences within this stretch are The Minarets, Mt. Ritter (13,157 feet), Banner Peak (12,945 feet), Mt. Lyell (13,114 feet) and Mt. Dana (13,053 feet).

Mono Basin

The Mono Basin lies north of Long Valley, forming a roughly triangular depression, bordered by Glass Mountain and Bald Mountain ridges along its southeastern edge; by the steep eastern escarpment of the Sierra in the southwest; and the Bodie Hills to the north. Mono Lake is its most outstanding feature. An approximately elliptic body of water, about 9 x 13 miles in extent and 170 feet deep, the lake has no outlet, a circumstance which accounts for its highly concentrated mineral content (6% dissolved solids) and high pH (9.6-9.7) (Sheridan1971:51-52). Both of these are increasing as the lake recedes due to natural evaporation and accelerated by the diversion of almost all inflowing streams by Los Angeles Water and Power. Putnam (1949:1282) distinguishes 4 topographic subprovinces in the vicinity of Mono Lake:

1. The Sierra Nevada
2. Morainal Belt
3. Lake Plains
4. Mono Inyo Craters

The Sierran escarpment, rising 6000 feet over the desert floor at Mono Lake, has already been discussed. The Morainal Belt consists of a series of "crescentic ridges" (Putnam 1949:1283) extending along and beyond each of the major Sierran canyons, primarily composed of bulky lateral moraines from the Tahoe glaciation and the less extensive terminal, lateral and recessional Tenaya and Tioga tills nested within them.

The Tahoe and Tioga glaciations have been suggested as dating from 50,000-30,000 B.P. and 20,000-10,000 B.P. respectively by Powell (D. Powell, personal communication, 1979), although Curry (1971) suggests ages of 60,000-75,000 B.P. for the Tahoe; ca. 45,000 B.P. for the Tenaya; and ca. 20,000 B.P. for the Tioga.

The remains of Mono Basin moraines, although for the most part buried beneath Tahoe deposits, can be recognized in some areas where they have been preserved by post-glacial changes in stream course (cf. Sharp cited in Sheridan 1971:144-48). Most Tahoe moraines enclose lakes, while those of Tioga Age are usually breached by active streams (Putnam 1949). Cut into the moraines are a number of old shorelines, marking high stands of Lake Russell, the Pleistocene predecessor of Mono Lake. By means of this relationship, Putnam (1949) was able to establish two past lake maxima of Tahoe and Tioga Age, represented by beachlines at 7170-7180 feet and 7070 feet respectively. It is during Tahoe times that Lake Russell, then over 900 feet deep, is believed to have overflowed, spilling through a narrow channel into Adobe Basin to the southeast (Putnam 1949:1296), and from there on by way of a series of interconnected canyons and basins into the Owens River. Putnam (1949) also suggests the possibility of a connection between Lake Russell and Long Valley which was

once the headwaters of Owens River. His Lake Plains subprovince offers additional evidence of former high lake stands. Exposed by the receding waters, the deposits of lacustrine silt, sand and gravel exhibit numerous streamcut terraces, one of which the town of Lee Vining is situated on 380 feet above the lake. The tufa "towers," which rise as pinnacles from the lake bottom and the shores surrounding it, indicate the underwater deposition of calcium carbonate, combined with the precipitous activity of calcareous algae (Scholl and Taft 1964).

The Mono Craters form a crescentic chain of rhyolitic obsidian plug domes, coulees, explosion pits and pumice cones, extending southward for about 10 miles from the southern shore of Mono Lake to Highway 395, reaching their greatest elevation at Crater Mountain (9172 feet) about 2700 feet above Mono Lake (Sheridan 1971:49). Except for an anomalous dome of hornblende andesites of pre-Tioga Age near their northern end (Putnam 1949), Mono Craters and the even more recent Inyo craters to the immediate south, are young features, formed during late Pleistocene, Holocene and Recent times. Their youth is testified by the absence of shorelines adjacent to Mono Lake, and by the layer of pumice blanketing late recessional Tioga moraines. Putnam (1949:1294) notes the presence of this pumice as far away as the Nevada border, 30 miles to the east.

In the middle of Mono Lake, two islands appear to mark a northern extension of the Mono Craters. Paoha, the "white" island and the larger of the two, consists of older lacustrine sediments and younger lava flows (Schumacher-Smith and Willard 1976:30), the former of which have been exposed by an uparching of the lake floor that may have accompanied the eruption of Mono Craters to the south (BLM geological reviewer, personal communication, 1979). In addition Paoha exhibits hot springs and cindercones, one of which contains jade-green Heart Lake. Negit, the second island, is completely volcanic. The absence of shore features and tufa deposits indicates a recent origin of both Paoha and Negit (Sharp in Wahrhaftig et al. 1965), while their rough alignment with the Mono Craters may suggest a possible "controlling fault or fault zone at depth" (BLM geological reviewer, personal communication, 1979).

Owens River Drainage

After leaving the Mono Craters Tunnel of the Los Angeles Department of Water and Power at East Portal in Long Valley, water from the Mono Basin joins with water from a number of lower order tributaries to form the Owens River. Marked by numerous active fumaroles and hot springs, Long Valley is a 9 x 9 mile east-west depression that forms a large embayment in the Sierra front (Sheridan 1971:53), extending from the Mammoth Lakes/Inyo Craters area in the west to approximately Crowley Lake Reservoir and Glass Mountain Ridge in the southeast and northeast, respectively.

About 700,000 years ago, the eruption of the Long Valley Caldera caused the extrusion of the Bishop Tuff of Gilbert (1938). This was deposited in a series of ash layers of up to 800 feet thickness over approximately 400-450 square miles underlying Mono Craters in the north and forming the Volcanic Tableland to the south. Pakiser et al. (1964:13) describe the Bishop Tuff

as "composed of rhyolitic materal; it is welded and poorly bedded and sorted. Its density increased with depth because of the compaction of the viscous gassy 'pumice' of the hot ash flow from which it formed." The extrusion of the tuff and the newly formed subsidence caldera affected the local drainage system and caused the impounding of Pleistocene Lake Crowley in the eastern part of the caldera. Its overflowing water gradually cut down Owens Valley Gorge. The local sequence of geologic events is well documented in the zonation of the Gorge walls, where Bishop Tuff ash fall and ash flow units underlie outwash gravels of Tahoe and Tioga Age, and overlie Sherwin till (dated at ca. 700,000 B.P.), late Pliocene basalt flows, and a base of Mesozoic quartzmonzonite (Sheridan 1971:24-25).

Upon leaving the second Los Angeles Tunnel, Owens River water supplies the Pleasant Valley Resevoir east of Round Valley, then continues eastward along the southern edge of the Volcanic Tableland. It takes this course due to the three episodes of tilting of the area between Round Valley and the White Mountains that account for the river's progressive eastward shift. The downfaulting of Round Valley has caused Pine and Horton Creeks to change course and join Rock Creek (Bateman 1976). Northwest of Laws the Owens River finally bends to the south entering Owens Valley proper.

The Owens Valley extends southward for about 100 miles from the Owens River bend to the now dry Owens Lake. Its width ranges from 40 miles from crest to crest in the north to 25 miles at the southern end, with a minimum of 15 miles between Bishop and Big Pine. The total drainage basin covers an area of approximately 3300 square miles (Pakiser et al. 1964:5). Knopf and Kirk (1918:54) note "The bedrock floor of Owens Valley is essentially a mosaic of tilted fault blocks, the larger of which protrude through the alluvium so that the thickness of the alluvium at any point is purely problematic." According to Bateman (1976:105) the valley floor at the base of the White Mountains is covered with more than 7000 feet of alluvial fill. The eastward tilt of the Owens Valley bedrock and the thicker accumulation of sediments along its eastern edge obscure the true elevation of the White Mountains which, from bedrock to summit, approach the Sierra Nevada in height.

South of Tinemaha Reservoir the water of the Owens River is diverted into the Los Angeles Aqueduct so that it bypasses Owens Lake, now almost always dry. Corresponding with the Tahoe and Tioga maxima of Lake Russell, Lake Owens is believed to have exhibited two extremely high levels. At its greatest extent, the lake probably had an elevation of 3790 feet (Blanc and Cleveland 1961:5) before it overflowed into Haiwee Meadows to the south with the water subsequently making its way into China and Searles Basin and southeastward across Panamint Valley into Death Valley. Biological evidence points toward an integration of the watersheds of Owens, Amargosa, and Mohave Rivers with the Colorado River to the south (Hubbs and Miller 1948). Several alternatives have been suggested for a further linkage with Lake Lahontan via Walker Lake by way of either Mono Lake or Columbus Basin/Fish Lake Valley (Blanc and Cleveland 1961). The term "Death Valley System" has been coined for this system of integrated drainage basins (Miller 1946). Based on its comparatively low salt concentration, Owens Lake is believed to have disappeared for a period of 2000 years between 6000 and 4000 B.P.

White-Inyo Mountains -- Western Slope

To the east, the Owens Valley is bounded by the northwest-trending western slope of the White-Inyo Mountains. The two ranges meet east of Big Pine, forming a noticeably straight, 110-mile long front between Mount Montgomery (13,441 feet) in the north and the depression that separates it from the Coso Range to the south. Together, they constitute the highest of the Great Basin ranges with an abrupt scarp and peaks like White Mountain Peak (14,242 feet) almost rivalling the Sierra Nevada. A fault-block of the horst-type (Knopf and Kirk 1918:13), the range exhibits many characteristics of its tectonic origin, such as the prominent triangular facets marking its northern section. Additional evidence is presented in the exposure of actual dislocations of the "superposed succession of basalt lavas" (Knopf and Kirk 1918:88) that cover the southern part of the Inyo range southeast of Keeler. The front itself displays a simple major fault scarp southward to Indian Creek, whereafter it is characterized by a number of transverse faults trending from the northwest to the southeast "at angles of 15° to 20° with the principal alignment of the front" (Powell 1963: 116). Kirk recognizes at least two episodes of faulting, one accompanying folding activity during the Jurassic or Cretaceous, and the second accompanying the Cenozoic elevation of the range (Knopf and Kirk 1918:22).

With the exception of White Mountain Peak, the slope facing Owens Valley shows no evidence of glaciation (Knopf and Kirk 1918:92). It does preserve strand-lines marking former high lake levels of Owens Lake (cf. section on Owens River drainage). The highest of these, east of Keeler, "is also the most conspicuous because of its prominent shore cliffs" (Knopf and Kirk 1918: 91) located at 3800 feet, 220 feet above the present "shoreline." Alluvial cones are prominent along the western White-Inyo flank. The younger, more prominent of them, are derived from an earlier set, dissected as a result of climatic change and a renewal or orogenic uplift (cf. Knopf and Kirk 1918: 53-57).

Figure 12 and Figure 13 (Knopf and Kirk 1918:22 and 58) have been included to illustrate the stratigraphy of the White-Inyo region.

Mineral Resources

The principal mineral resources of the region, according to Knopf and Kirk (1918) are silver, lead, zinc, tungsten, gold, copper, marble, and sodium carbonate. Powell (1963) adds mercury, scheelite, pyrophyllite, diatomite, andalusite, and additional salines from the dry lake beds.

Modern Climate

Situated in the rainshadow of the Sierra Nevada, the study area is marked by a semi-arid climate transitional in character between the winter maximum of the Pacific coast and the summer maximum typical of the continental interior

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(Climatic data, unless otherwise indicated, are taken from : U.S. Weather Bureau, Climatic Summary of the United States -- Supplement for 1931 through 1952. "California." 156 pp.)

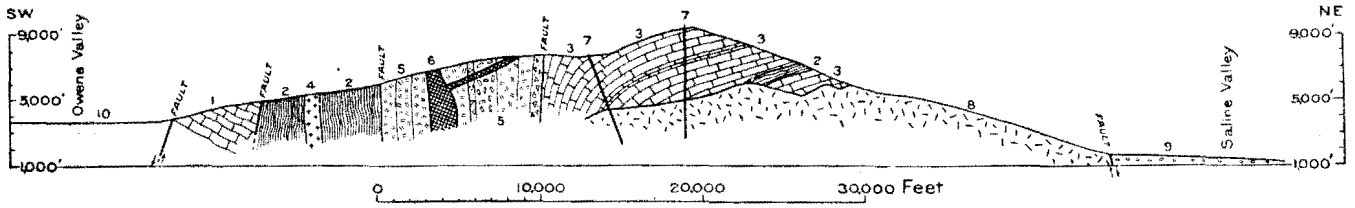


FIGURE 2.—Diagrammatic section across the Inyo Range at Swansea, Cal. 1, Undifferentiated Paleozoic limestone and dolomite; 2, Carboniferous shales; 3, Carboniferous limestones; 4, felsite; 5, Triassic andesite lavas, breccias, and tuffs; 6, aplite; 7, diorite porphyry; 8, quartz monzonite, diorite, and hornblendite; 9, alluvium; 10, lake beds.

Figure 12

Generalized section in the Inyo Range, Cal.

	Feet.
Triassic:	
Upper Triassic (and Jurassic?) shales interbedded with volcanic rocks consisting chiefly of waterlaid tuffs and breccias	5,000
Lower and Middle Triassic calcareous shales and thin-bedded arenaceous limestones, with calcareous sandstone at base	1,500
Permian: Owenyo limestone	125+
Pennsylvanian:	
Reward conglomerate	250
Later Pennsylvanian limestone and shale	3,000±
Diamond Peak quartzite	3,500+
Basal Pennsylvanian limestones	1,000
Mississippian: White Pine shale	1,000
Devonian: Middle Devonian limestone	1,400
Ordovician:	
Arenaceous shale, probably of Normanskill age	750
Limestone containing Chazy fossils	500
Limestone, probably of Beekmantown age	3,500
Sandstone	300
Upper Cambrian: Arenaceous limestone and shale	1,000±
Middle Cambrian: Calcareous sandstone and limestone	900+
Lower Cambrian:	
Silver Peak group	7,000±
Campito sandstone	3,200
Pre-Cambrian:	
Deep Spring formation	1,600
Reed dolomite	2,000
Oldest sandstones and dolomites	(?)

Figure 13

(Trewartha 1966). The contrast is illustrated by Sierran rainfall figures for an altitude of 5500 feet which record 75 inches for the western slope as compared to the 20 inches in the east. Cool season precipitation associated with the eastward movement of cyclones around a trough over the Pacific Northwest reaches its peak December through March with averages ranging from 1.57 inches at Bridgeport Dam in the north of the study area, to 1.08 inches at Haiwee in the south, falling both as rain (75-80%) and as snow (20-25%) in the valley (Powell 1963) and as snow above 8200 feet. Spring snowstorms caused by the northward expansion of the Northern Pacific High have little effect on the valley bottom (Powell 1963). Summer thunderstorms are common in late July, due to a further northward movement of the Northern Pacific High, a westward shift of the Atlantic High in shape of the Texas Anticyclone (Holmes et al. 1975) and the influx of tropical maritime air from the Gulf of Mexico or the Gulf of California. Warm-season precipitation is mainly restricted to upper elevations (Powell 1963). Annual precipitation averages from north to south range from 10.47 inches at Bridgeport Dam (ca. 6430 feet) to 6.46 inches at Haiwee (3800 feet). Bishop averages 6.00 inches (Bettinger 1979a), although extremes (July through June) have been known to range from 1.69 inches in 1898 to 13.52 inches in 1952 (Powell 1963). For the White Mountains, a rise in elevation of 1000 feet corresponds with an increase in precipitation of approximately 1.5 inches (Powell 1963). Annual temperatures average 44.3°F at Haiwee, with average annual highs of 96°F for Bridgeport Dam and 107°F for Haiwee, and average annual lows of -37°F for Bridgeport Dam and 4°F for Haiwee. Estimates of altitudinal temperature decrease in the White Mountains range from 3.5°F (Powell 1963) to 5.2°F (LaMarche 1973).

Vegetation (Figure 14)

Floristically the Owens Valley lies at the boundary between the Nevadan and the Sierran biotic provinces as described by Munz and Keck (1959). As a consequence of its extremely varied topography and the corresponding differences in substrate, precipitation and temperature, the area exhibits a tremendous diversity of plant cover. Although much dovetailing and overlap occur due to microenvironmental variation in soil, exposure, and thus moisture conditions, a zonation of plant communities along an altitudinal gradient can be observed, which corresponds more or less to the vegetational distribution patterns of analogous slopes and valleys to the east, and reflects the study areas' affinity to the rest of the Great Basin (cf. Hall 1946; Billings 1951; Munz and Keck 1959; Storer and Usinger 1964; Cronquist et al. 1972). The following overview of the major plant communities of the study area, including a number of their most representative species, is based primarily upon the general works listed above as well as on local observations by Bettinger (1979a), Powell (1963), and Schumacher-Smith (1978).

Table 1
Zones Present in the Study Area
(from west to east)

Sierran Alpine Fell-Fields	above 11,000 feet
Sierran Subalpine Forest	9500 to 11,000
Sierran Mixed Coniferous Forest	7500 to 9500

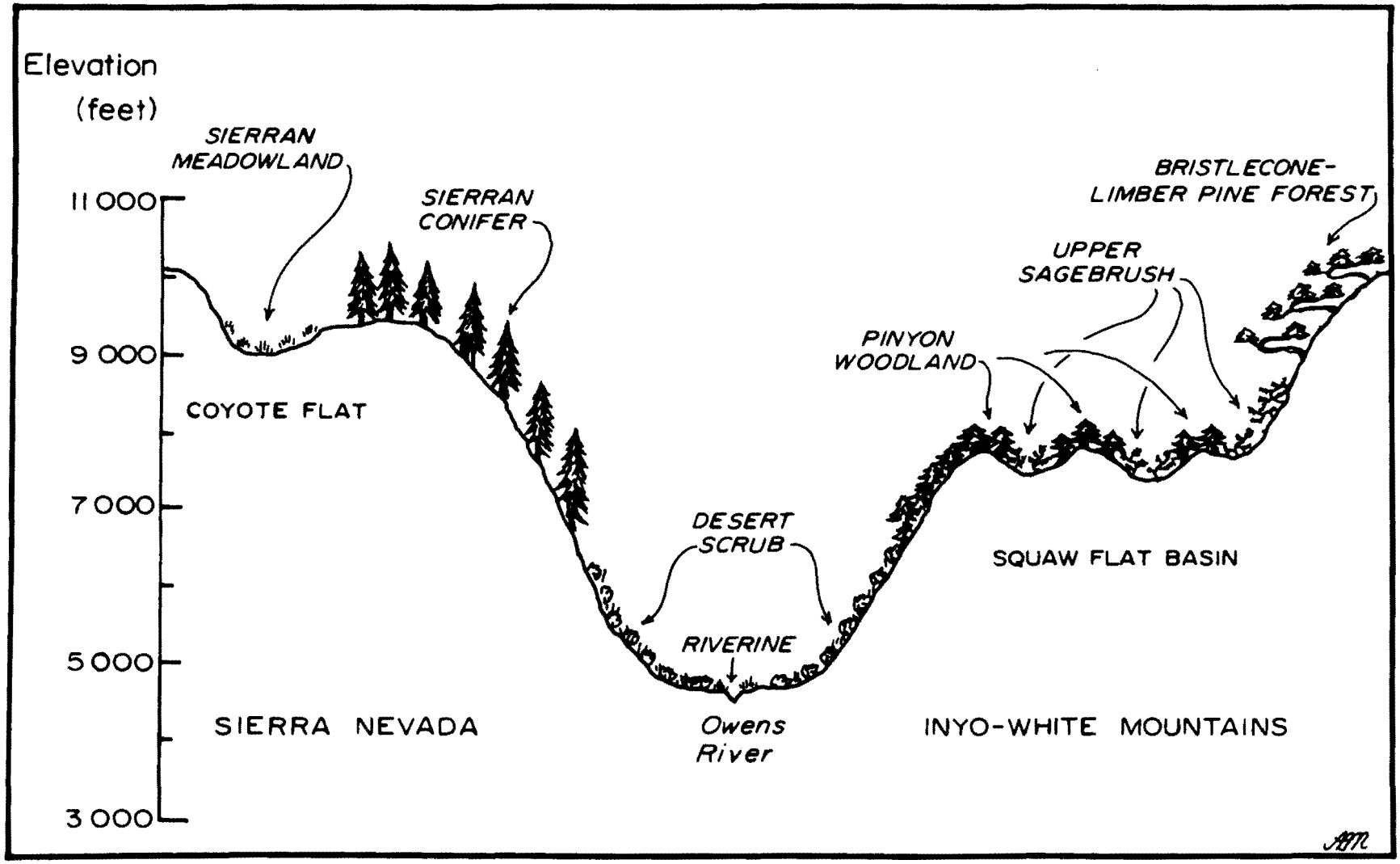


Figure 14: Generalized Vegetation Transect of the Owens Valley Region (Redrawn from Bettinger 1977c).

Desert Scrub	7500 to 3000 to 6500
Great Basin Pinyon-Juniper	6500 to 9000
Great Basin Bristlecone-Limber Pine	9000 to 11,500
Great Basin Alpine Fell-Fields	above 11,500

Sierran Alpine Fell-Fields

Past the krummholz of timberline an association of low perennials with some grasses and sedges forms the tundra-like plant cover of the Alpine Fell-Fields. Subjected to intense insolation, gusting winds, and killing frosts at any time of the year, this rock-garden-like community, clinging in scattered patches and cushions to thin rocky soils or forming a dense turf, has been termed an "alpine desert "(Ornduff 1974). This applies especially in the High Sierra, where, above the limit of maximum rainfall of the mountain slopes, the Fell-Fields receive most of their water from winter snows. In the White Mountains, snow melt and summer rainfall have been observed to provide moisture to much of the summit uplands throughout the summer (Powell 1963). A large number of endemics have developed in the isolation of these high altitudes. Thus, the Sierran timberline and Fell-Fields share only 56% of their plant species with the once contiguous tundra flora of the Rocky Mountains, 10% of which are boreal in distribution. The remaining 44% consist of California endemics and species shared with Great Basin and Pacific Northwest (Bakker 1971).

Several shrubs of the Alpine zone are genetically related to shrubs characteristic of the desert flora, e.g. low sagebrush (Artemisia arbuscula nova) sticky rabbitbrush (Chrysothamnus viscidiflorus), whitestem goldenbush (Haplopappus Macronema). Principal forbes include various species of cushioncress (Draba spp., e.g. D. oligosperms, D. Breweri), mountain sorrel (Oxyria digyna), Shockley ivesia (Ivesia Shockleyi), skypilot (Polemonium chartaceum, and other P. spp.). Penstemon (Penstemon spp.), cushion phlox (Phlox Covillei), clover (Trifolium monoense), alpine gold (Hulsea algida), Sierra primrose (Primula Suffrutescens), wild buckwheat (Eriogonum spp.) and wild daisies (Erigeron spp.). Some of the more common grasses, rushes, and sedges are wheatgrass (Agropyron Scribneri), darkies (Carex Helleri and other C. spp.), timberline bluegrass (Poa rupicola), alpine bluegrass (Poa Suksdorfii), rush (Juncus Parryi), spike trisetum (Trisetum spicatum), mountain Timothy (Phleum alpinum), and fescue (Festuca brachyphylla).

Sierran Subalpine Forest

The Subalpine Forest is found between 9500 and 11,000 feet, representing the "most boreal forest in California" (Munz & Keck 1959:12). This thinly forested zone is composed chiefly of whitebark pine (Pinus albicaulis), foxtail pine (Pinus Balfouriana), limber pine (Pinus flexilis), and lodgepole pine (Pinus Murrayana), trees ranging from 40 feet and over in height at its lower limits to the characteristic krummholz of the timberline. DeDecker describes this environment as a "country of broad glacial basins, high mountain lakes and rocky ledges" (DeDecker in Schumacher-Smith 1978:140). Precipitation can amount to as little as 15 inches per year, as compared to 30 to 50 inches at the same altitude on the Sierra's western slope. Understory and subalpine meadow vegetation consist of cinquefoil (Potentilla Breweri, P. fruiticosa), western roseroot (Sedum rosea), Sierra buckwheat (Eriogonum mari-

folium), red heather (Phyllodoce Breweri), Labrador tea (Ledum glandulosum), meadow mimulus (Mimulus primuloides), alpine gentian (Gentiana Newberryi), shooting star (Dodecatheon redolens), golden aster (Haplopappus aparigioides), mountain hemlock (Tsuga mertensiana), penstemon (Penstemon Newberryi, P. heterodoxus, P. speciosus Kennedyi, etc.), squaw currant (Ribes cereum), and mountain gooseberry (R. montigenum).

Sierran Mixed Coniferous Forest

Between 7500 and 9500 feet, upslope of desert scrub and a narrow, weakly defined belt of pinyon-juniper woodland similar in composition, though not in density and extent, to its counterpart to the east, the eastern Sierra front exhibits a zone of mixed conifers. This association corresponds more or less to Munz and Keck's (1959) Yellow Pine, Red Fir, and Lodgepole Forest zones, contracted and elevated due to their rainshadow location. Jeffrey pine (Pinus Jeffreyi) appears at dry, low elevations, in many areas joined by white fir (Abies concolor). Red fir (A. magnifica) is found at somewhat higher altitudes, while Sierra juniper, also known as California or western juniper (Juniperus occidentalis) is frequent, especially on granite ridges, and lodgepole pine, also known as tamarack pine (Pinus Murrayana) extends throughout and above the zone. Understory and clearings are occupied by shrubs, such as snowbush (Ceanothus cordulatus), bush chinquapin (Castanopsis sempervirens), green-leaf manzanita (Arctostaphylos patula), mountain-mahogany (Cercocarpus ledifolius), and squaw currant (Ribes cereum). Forbs include western monkshood (Aconitum columbianum), Sierra gentian (Gentiana holopetala), shooting star (Dodecatheon redolens), tall angelica (Angelica lineariloba), bluebells (Nama Rothrockii), squirreltail (Sitanion spp.), Brewer cinquefoil (Potentilla Breweri), and columbine (Aquilegia formosa). Meadows and stream canyons provide moisture conditions suitable for quaking aspen (Populus tremuloides), willows (Salix spp.), water birch (Betula occidentalis), black cottonwood (Populus trichocarpa), and various grasses, sedges (Carex spp.), and rushes (Scirpus spp.).

Desert Scrub Zone

The Desert Scrub Zone extends from the valley floor up to the lower, or dry, timberline (Powell 1963). Marked by their ability to withstand drought and high temperatures, the species of this community exhibit such adaptive mechanisms as succulence, waxy cuticle, light coloring and/or vertical orientation of leaves, hairy surfaces and delayed seed germination (Ornduff 1974). Within this zone, a number of subdivisions "replace each other more or less latitudinally from south to north, and altitudinally from low to high elevations" (Cronquist et al. 1972:110).

Dominated by the evergreen creosote bush (Larrea divaricata), the Creosote Bush Scrub community extends southward from the well-drained soil of alluvial fans and flats in southernmost Owens Valley, usually below 3500 feet. Interestingly, the wide spacing of these two to ten feet tall shrubs has been correlated with rainfall, and its role in leaching toxic substances secreted by the bush from the soil (Went 1955). Shrub species associated with the creosote bush include burrobush (Franseria dumosa), Fremont and California daleas (Dalea Fremontii, D. Californica), cheese-bush (Hymenoclea Salsola), brittlebush (Encelia farinosa), hop sage (Grayia spinosa), Anderson thornbush (Lycium Andersonii) and spiny menodora (Menodora spinescens). Also frequent are beavertail cactus (Opuntia basilaris), cholla (O. echinocarpa) and winter annuals such as various species

of gilia (Gilia spp.), and yellow-throat (Phacelia Fremontii).

The Creosote Bush Scrub is replaced approximately along the 37th parallel by the Shadscale Scrub (Cronquist et al. 1972) which occupies the heavy, often hardpan-underlain soils of mesas and flats from about 3000 to 6000 feet. Although frequently cited for its tolerance to high salinity, Billings (1949) has suggested that the occurrence of shadscale (Atriplex confertifolia) in saline valley bottoms may be just as much a function of its drought resistance. The community as a whole is characterized by low (1.0 to 1.5 feet), grayish green, small-leaved and often spiny shrubs that are shallowly and extensively rooted and widely spaced, rarely covering more than 10% of the ground surface (Cronquist et al. 1972). Species associated with the dominant shadscale are bud sage (Artemisia spinescens), another species of the saltbush genus (Atriplex canescens), squaw tea (Ephedra nevadensis) and horse-brush (Tetradymia glabrata). As preferred browse species, hop-sage (Grayia spinosa) and winter fat (Eurotia lanata) are frequently subject to overgrazing.

Halophytic associations sometimes known as the Alkali Sink Scrub dominate along poorly drained alkaline flats and playas and consist mainly of low, fleshy chenopods. Most extensive is the greasewood (Sarcobatus vermiculatus) association, with several species of Atriplex, seep weed (Suaeda Torreyana ramosissima), and galleta grass (Hilaria Jamesii). Where the salts are too highly concentrated, iodinebush (Allenrolfea occidentalis), saltgrass (Distichlis spicata stricta) and sacaton (Sporobolus airoides) take over.

The Sagebrush Scrub community, dominated by Basin sagebrush (Artemisia tridentata), replaces the Shadscale Scrub on the deep and pervious salt-free soils of mountain slopes and alluvial fans at about 4500 or 5000 feet. This community consists of an association of somewhat larger, silvery-gray, non-spiny shrubs, usually about two to seven feet tall, and a variety of perennial and annual grasses and forbs. Shrub species include rabbitbrush (Chrysothamnus nauseosus, C. teretifolius, and, at somewhat higher elevations, C. viscidiflorus), hop-sage, bitterbrush (Purshia spp.), cotton-thorn (Tetradymia axillaria), and desert peach (Prunus Andersonii). Several species of native perennial bunchgrasses, such as needle grass (Stipa spp.), ricegrass (Oryzopsis hymenoides), and several bluegrasses (Poa spp.) have managed to survive overgrazing and the introduction of annuals, such as brome grass (Bromus spp.) and coexist in varying ratios with the sagebrush, possibly determined by prevailing moisture conditions (Christensen 1959). Common forbs include desert paintbrush (Castilleja chromosa), lupine (Lupinus spp.), pensteman, giant four-o'clock (Mirabilis Forebelii), phlox (Phlox spp.), and blazing star (Mentzelia spp.). Several grasses producing edible and aboriginally utilized seeds occur throughout the Desert Scrub Zone. These include several species of wild rye (Elymus spp.), wheatgrass (Agropyron trachycaulum) and squirreltail (Sitanion hystrix). Numerous wild buckwheat species (Eriogonum spp.) are found throughout the study area.

Altitudinally within the Desert Scrub Zone, a narrow band of Riparian Woodland (cf. Storer and Usinger 1963; Ornduff 1974; Bettinger 1979a) borders the slow-moving Owens River, extending up the gentler lower courses of its tributaries and also occurring in spots along the edges of Owens and Mono Lakes (Bettinger

1979a). This community is dominated by bulrush (Scirpus spp., e.g., S. robustus), rushes (Juncus spp.), sedges (Carex spp.), and cattail (Typha latifolia).

Great Basin Pinyon-Juniper Woodland

At approximately 6500 feet and lower, especially along washes and streams, scattered Utah junipers (Juniperus osteosperma) begin to appear within the Sagebrush Scrub. Higher up, the pinyon pine (Pinus monophylla) occurs. The two species form an open woodland association of low evergreen trees, about twenty feet high, over an "understory of varying admixture of shrubs and herbaceous plants, often with nearly bare ground" (Cronquist et al. 1972:127). While climate surely plays a role in the elevational ranges of the two species, Powell (1963) has pointed out their relationship to substrate as an additional factor affecting distribution. Thus, the juniper favors deep alluvial slopes and especially granite, in contrast to the pinyon pine, which seems to prefer shallow alluvium or bedrock, especially of sedimentary or metamorphic nature (Powell 1963). The sagebrush community of this zone is very similar to that encountered at lower elevations. Although sometimes treated as a separate entity (cf. Cronquist et al. 1972; Bettinger 1979a), it is considered here as an extension of the Sagebrush Scrub Zone previously discussed, differing slightly. Along with sagebrush, some of the common understory shrub species include, various kinds of rabbitbrush (Chrysothamnus spp.), Mormon tea (Ephedra viridis), cream bush (Holodiscus spp.), bitterbrush, gooseberry, elderberry (Sambucus racemosa), and snowberry (Symphoricarpos longiflorus). Some common forbs are yarrow milfoil (Achillea millefolium lanulosa), various species of locoweed, such as Inyo locoweed (Astragalus inyoensis), wild daisy (Erigeron spp.), wild buckwheats, lupines, penstemon, and phlox. Grasses include wheatgrass (Agropyron Smithii), junegrass (Koelaria cristata), ricegrass, Kentucky bluegrass (Poa pratensis), and squirreltail. Black cottonwood (Populus trichocarpa), water birch (Betula occidentalis, B. fontinalis), willows (Salix spp.), and quaking aspen (Populus tremuloides) are frequently found lining stream courses, as are sedges, rushes, buffaloberry (Shepherdia argentea), and wildrose (Rosa Woodsii ultramontana). Mountain mahogany (Cercocarpus ledifolius) occupies dry rock slopes from 4000 to 10,500 feet, often filling the gap between the upper limit of pinyon growth and the lower limit of the Bristlecone-Limber Pine Zone.

Great Basin Bristlecone-Limber Pine Zone

From approximately 9000 feet to timberline at about 11,500 feet, the landscape exhibits broad expanses of low sagebrush-type shrub vegetation interspersed with patches of limber pine (Pinus flexilis) and bristlecone pine (Pinus aristata) forest. This open subalpine forest, particularly well-developed in the White Mountains, is restricted to north- and east-facing slopes, the limber pine dominating on substrates of granite and lava, while the bristlecone pine competes more successfully on the highly alkaline and mineral-poor dolomite (Powell 1963). The greatest concentration of the latter species extends south of White Mountain Peak for 16 miles from the head of Cottonwood Creek to Reed Flat (Powell 1963) and includes the still-living specimens of the Schulman Grove that by tree-ring count have been dated to over 4000 B.P..

The understory consists of a number of already familiar shrub genera -- several species of sagebrush (Artemisia arbuscula nova, A. Rothrockii, A. tridentata), squaw currant, rabbitbrush (Chrysothamnus Parryi vulcanicus), bitterbrush (Purshia tridentata), and various species of Haplopappus. Forbs include several species of locoweed, wild daisies, wild buckwheat, phlox, and lupines, as well as bluebells (Mertensia ciliata stomatechoides), meadow mimulus (Mimulus primuloides), shooting star, Inyo mountain parsley (Lomatium inyoense), again only to list the more representative. Once more, several bunchgrasses are found, e.g. ricegrass, junegrass, squirreltail, and slender bluegrass (Poa sp.). The streamside vegetation resembles that of the lower latitudes. Lodgepole pines, according to Powell (1963), are present at several sites especially north of White Mountain Peak.

Great Basin Alpine Fell-Fields

This zone greatly resembles its analog of the Sierra Nevada described earlier. The reader is therefore referred to this section.

Wildlife

As a result of its environmental diversity, the study area provides a habitat for a similarly wide variety of animals. Various attempts have been made to classify the wildlife according to distribution especially along an altitudinal gradient. Of these classifications, C. Hart Merriam's (1898) "life zones" figure most prominently. Internally, this system forms a useful framework, but complications arise when an attempt is made to correlate faunal zones with plant belts, and these in turn with elevation, precipitation, and temperature, especially in a transitional area like the Owens Valley. For the purposes of this report a separation into four zones is made based on a modified version of D. Powell's classificatory system for the White Mountains (1963), extended to include the western slope of the Sierra. It must be emphasized that very few species are restricted in their distribution to one zone. The lines of demarcation presented below represent very general and somewhat arbitrary boundaries.

Table 2

Faunal Zones Present in the Study Area

Zone I.	Desert Scrub	includes Merriam's Lower and most of Upper Sonoran, exclusive of pinyon-juniper belt
Zone II	Lower Forest ..... (pinyon-juniper and mixed conifer)	includes part of Merriam's Upper Sonoran (pinyon-juniper), Transition and Canadian
Zone III	Subalpine Forest	Merriam's Hudsonian
Zone IV	Alpine	Merriam's Arctic Alpine

The ranges of mammalian distribution and general descriptions follow Hall (1946) and Ingles (1947). For information on fish, the reader is referred to La Rivers (1962). Reptiles and amphibians of the area are covered in Stebbins (1954) and Van Denburgh (1922). The avifauna is discussed in Grinnell and Miller (1944), Hoffmann (1927), Peterson (1961), and Pough (1957).

Zone I

A variety of rodents inhabit the Desert Scrub Zone. Several species of pocket-mouse are found (Perognathus spp., e.g. P. longimembris, P. parvus, P. formosus), kangaroo rats (Dipodomys sp., e.g. D. panamintinus, D. ordii, D. microps, D. merriami), dark and pallid kangaroo mice (Microdipodops megacephalus, M. pallidus), Townsend and antelope ground squirrel (Citellus townsendii, C. leucorus). Of the mice, the canyon mouse (Peromyscus eremicus) is found at low elevations primarily south of Independence. One species of woodrat (Neotoma lepida) inhabits the desert, as do the northern and southern grasshopper mouse (Onychomys leucogaster, O. torridus), the former of the latter genus ranging southward to just about the 38th parallel where it is replaced by its southern counterpart. The western harvest mouse (Reithrodontomys megalotis) occurs throughout the Desert Scrub and is also frequent in the pinyon-juniper ecotype. One subspecies each of striped skunk (Mephites mephites estor) and spotted skunk (Spilogale gracilis gracilis) are frequent in the creosote brush scrub. Additional inhabitants of Zone I include Least or sagebrush chipmunk (Eutamias minimus), badger (Taxidea taxus), and mole (Scapanus latimanus), although this animal extends throughout and is more likely to be found within the upper reaches of the Lower Forest (Zone II). Of the lagomorphs, black-tailed jackrabbit (Lepus californicus) and one subspecies of Audubon cottontail (Sylvilagus audubonii arizonae) are more likely to be encountered at lower elevations. Carnivores inhabiting this zone include coyote (Canis latrans), kit fox (Vulpes macrotes), ring-tailed cat (Bassariscus astutus) in the southern limits of the study area, bobcat (Felis rufus baileyi) in the upper reaches of the zone, and raccoon (Procyon lotor) which ranges widely all the way up to subalpine regions. A wide variety of bats are known from the study area including various species of myotis (Myotis spp.) and a number of other genera.

Of the ungulates, the Inyo mule deer (Odocoileus hemionus inyoensis) is most common. Migratory animals, they are found at low elevations throughout the winter, whereafter they "follow spring as it advances up the mountain slope" (Vestal 1976:114). Hall (1946) shows the range of the Sierra and desert bighorn sheep (Ovid canadensis californiana, O. canadensis nelsoni) as interzonal as well. According to Schumacher-Smith (1978:75), about 400 head inhabit the Sierra in five herds, scattered between Convict Creek and Cottonwood Creek, with the largest found near Mount Baxter and Mount Williamson. Prong-horned antelope (Antilocapra americana) formerly occupied the Desert Scrub Zone year-round (Bettinger 1977c). The dwarf or Tule elk (Cervus nannodes), native to the Central Valley, were introduced to the Owens Valley in 1933 and 1934 (Powell 1963). Apart from the Owens Valley herd, other Tule elk herds exist in Colusa County (Hock 1978:40, 151), San Luis Island in Merced County and at Point Reyes (D. Powell, personal communication, 1979). In the study area, the Tule elk "range the Valley from Lone Pine to Bishop, and up to about 8000 feet in the mountains on both sides," often found especially along the Owens

River and in the Poverty Hills/Red Mountain area (Hock 1978). The species is the focus of present considerable debate with cattle ranchers favoring drastic reduction or complete elimination; hunters desiring the animals as game; and others demanding that the herds be officially protected from human interference.

Mono Lake's unique brine ecosystem merits special mention. Negit, the smaller of the lake's two major islands, provides a rookery for thousands of California gulls (Larus californicus), while the two organisms found in the lake's highly alkaline water, brine shrimp (Artemia) and brine fly (Ephydra) pupae, support enormous populations of birds that stop to feed here twice a year along their migratory routes. Numerous other bird species nest on the islands, beaches, and in the marshes around the lake. Considerable controversy hinges on the lowering of the lake's water-level by the diversion of its inflow, which causes an increase in alkalinity and the formation of a landbridge connecting the islands to the mainland and opening them up to land predators.

Most fish found in the study area's streams and lakes have been introduced within the last century. Natives are dace (Rhynichthys spp.), Tui chub (Siphateles bicolor) and the rare pupfish (Cyprinodon radiosus). Introduced species include perch (Perca sp.) and trout (Salmo spp., Salvelinus spp.), among other species. The references given above should be consulted for information on the avifauna, fish, amphibians, and reptiles.

Zone II

This zone is inhabited by a considerable rodent population, with many of its genera and species found at lower elevations as well. One species of chipmunk (E. panamintinus), however, is actually restricted to the pinyon-juniper zone. Somewhat higher up, it is replaced by Townsend, long eared, and lodgepole chipmunk (E. townsendii, E. quadrimaculatus, E. speciosus). Several of the kangaroo rats listed above extend into the pinyon-juniper forest, together with northern pocket gopher (Thomomys talpoides), Beechey or California and golden-mantled ground squirrels (C. beecheyi, C. lateralis), and sagebrush vole (Lagurus curtatus). Canyon mice (P. crinitus) are found in the lower part of the zone. The pinyon mouse (P. truei) is restricted to the pinyon-juniper forest. Also likely to be encountered within Zone II are bushy-tailed woodrat (N. cinerea), western harvest mouse (R. megalotis), big jumping mouse (Zapus princeps), porcupine (Erethizon epixanthum) and the muskrat (Ondrata zibethica). Other species known for this zone are northern flying squirrel (Glaucomys sabrinus lascivus), squirrel (Tamiasciurus douglasii) and yellow-bellied marmot (Marmota flaviventer). As in Zone I the striped and spotted skunk are encountered, the former favoring the riparian environment, while the latter is generally found in rocky, brushy places (Ingles 1947:95). A different subspecies of badger replaces that found at lower altitudes (T. taxus taxus). Of the shrews, five species can occur within this zone (Sorex trowbridgii, S. vagrans, S. palustris), S. tenellus, S. obscurus) of which the latter two, dwarf and dusky shrew, prevail within the lower and upper limits of this zone, respectively, while the other three, Trowbridge, vagrant, and water shrew, are encountered throughout. The mole is still common. Above the pinyon-juniper woodland upper ecological boundary for the black-tailed jackrabbit, two other species of

hare are found. The white-tailed hare (Lepus townsendi townsendi) occupies the foothills and mountains, feeding on creambush, sagebrush, and various grasses (Ingles 1947:266) while the snowshoe hare (L. americanus tahoensis) seems to favor the red fir forest, browsing "bark and twigs of aspen, alder, and willow, and also the shoots of young evergreen trees" (Ingles 1947:266). The lower half of Zone II is inhabited by Nuttall's cottontail (S. nuttallii) and Audubon cottontail as well. Black bears (Ursus americanus californensis) are known from the Sierra in the upper ranges in this zone; Ingles (1947) places them in the Transition and Canadian Life Zones. Other carnivores include raccoon, western marten (Martes cauriana sierrae), short-tailed and long-tailed weasels (Mustela cicognanii lepta, M. frenata nevadensis, respectively), mink (M. vison), river otter (Lutra canadensis), and red fox (Vulpes fulva necator). As in all other life zones, the coyote is found, together with bobcats. Mountain lions (Felis concolor californica) range into this zone and the wolverine (Gulo luscus) frequents its upper reaches.

As indicated earlier, mule deer and bighorn sheep migrate interzonally throughout the year.

Zone III

As one moves into this subalpine environment, the number of species gradually decreases due to temperature constraints. Few new names can be added to the list.

Townsend chipmunk is still found, together with Say chipmunk (E. quadrivittatus) and alpine chipmunk (C. alpinus); both species of pocket gopher; golden-mantled and Belding ground squirrels; porcupine; squirrel; badger; deermouse; marmot; mole; and shrews -- vagrant, dusky and water. Of the previously noted rabbits, only the white-tailed hare is encountered at this altitude. The pika (Ochotona princeps), another lagomorph, inhabits rock-slides near the timberline and is noted for its habit of harvesting and storing summer plant matter to support it through the cold winter months.

Predators that may be encountered in this habitat are the raccoon, black bear, western marten, short-tailed and long-tailed weasel, river otter, red fox, coyote, and wolverine. Again, mule deer and bighorn sheep are seasonally present.

Zone IV

Mammals frequenting this alpine environment include the golden-mantled ground squirrel, white-tailed hare, marmot, deermouse, pika, coyote, mule deer, and bighorn sheep.

Holocene and Recent Climatic Change

As a result of the development of sophisticated dating techniques and the refinement of old methodology, Antevs' proposed tripartite model of Holocene climatic change in the Great Basin (Antevs 1948, 1953, 1955) has increasingly become the subject of some considerable debate (cf. Mehringer 1977). To a large degree this is due to the interest of anthropologists and archaeologists

concerned with the interaction of culture and environment (cf. Baumhoff and Heizer 1965, Bryan and Gruhn 1964) and the growing emphasis on interdisciplinary research and communication (cf. Moratto et al. 1978). A good deal of the debate is concerned as to the nature and significance of postglacial climatic change on man in the Great Basin (Antevs 1952; Aschmann 1958; Baumhoff and Heizer 1965; Bryan and Gruhn 1964; Jennings 1957, 1964; Martin 1963; Swanson 1966; Fowler 1972, 1977; Elston 1976 among many others). As yet there are no signs of a consensus and Mehringer (1977) has cautioned against the acceptance of paleoclimatic models which claim relevance for the Great Basin as a whole.

Antevs' theory (1948) postulated pluvial periods in the Great Basin which corresponded with the continental glaciations of the higher latitudes. He attributed this correspondence to a general southward displacement of the stormtrack bringing summer rainfall to an area which otherwise derives much of its precipitation from winter storms. With the Aleutian Low persisting throughout the summer and possibly a Subtropical High at or below North latitude 30°, moving cyclones would be effective year-round until the stormtracks were pushed off their normal courses thus causing heavy precipitation over northern Nevada and Utah. This, Antevs suggests, would undernourish the northern ice-sheets and initiate their retreat while a temporary rise in pluvial lake-levels would occur from the runoff of melt water. The Postglacial or Neothermal would ensue with the transition to the "time when the temperature in the southern parts of the previously glaciated areas has risen to equal that at present" (Antevs 1948:174). Utilizing deposition rates of fibrous limnic peat in southern Oregon and estimates for the eruption of Mt. Mazama and the formation of Crater Lake, as well as palynological evidence, in conjunction with data from other continents, Antevs suggested a date of 9000 B.P. for the end of the Wisconsin glaciation and the beginning of the Neothermal. Correlating similar data from North America and the other continents Antevs proposed a 3 part division of the Neothermal as represented in Figure 15.

For the study region, an ambitious project combining historical research, tree-ring studies, lichenometry, palynology, radiometric dating and studies of vegetational age-classes has been attempted by Curry (1969) in an effort to arrive at a chronology of post-Wisconsin climatic change in the central Sierra Nevada. The historical evidence included precipitation and runoff data from mining camp newspapers, assorted journal entries, Los Angeles mission diaries, as well as early photographic materials. Cores from 49 High Sierra specimens of five arboreal tree species, growing under a variety of environmental conditions, provided information concerning the "relations between ring width, climatic variable, tree species and site" (Curry 1969:14). This, in combination with dendroclimatological data from the White Mountain bristlecone pines (Fritts 1965), suggests a generally dry period from A.D. 800 to A.D. 1300 with little fluctuation except for two moist maxima at ca. A.D. 900 and A.D. 1100. From ca. A.D. 1300 to the present, the climate oscillates considerably and is marked by numerous periods of higher than average precipitation. Lichenometric analysis was used by Curry (1969) to date glacial deposits.. Curry identified three major periods of Neoglacial activity during the last 5000 to 6000 years. At least two glacial advances are known for the period between 2000 B.P. and 2700 B.P. corresponding to

Figure 15

Subdivisions of Postglacial Time
(Antevs, 1948, 1952, 1955)

Time	Temperature Age	Moisture Conditions
Present	Medithermal	Moderately warm; arid and semi-arid. Rebirth of Great Basin Lakes.
2500 B.C.		
	Altithermal	Arid; disappearance of Great Basin Lakes. Distinctly warmer than present.
5000 B.C.		
	Anathermal	Climate at first like today but growing warmer. Probably subhumid and humid. Great Basin Lakes higher than in Medithermal.
7000 B.C.		

Birman's Recess Peak glaciation (Birman (1964). As Holmes et al. (1975) have noted, these deposits are also dated by a blanket of pumice from Mammoth Mountain and the Yosemite area overlying the moraines and wood radiocarbon dated at 1440 $\pm$ 150 B.P. (Porter and Denton 1967, cited in Holmes et al. 1975). The second maximum is dated at A.D. 850 to A.D. 1050 followed by a third period of glacial advance starting at A.D. 1250 and marked by talus and lateral moraines indicating three advances between A.D. 1550 and A.D. 1700, and terminal moraines from three or more advances between A.D. 1750 and A.D. 1898. This third period, of considerably lesser extent than the other two, coincides with Birman's Matthes glaciation (Birman 1964).

Curry further suggests two additional periods of activity. An advance or series of advances between 6500 B.P. and 8000 B.P. is represented by till from the Coldwater Creek drainage near Mammoth Lakes. Birman's (1964) Hilgard advance, originally dated at less than 4000 B.P. is thought by Curry (1969) to have occurred either between 12,000 B.P. and 13,000 B.P. or at 9000 B.P., "on the basis of Sierran pollen stratigraphy, weathering characteristics of the till and analogy to its radiometrically dated morphological counterparts in the European sequence" (Curry 1969:27).

The investigation of bristlecone pine tree-line fluctuation at Sheep Mountain and Campito Mountain, two sites in the White Mountains (LaMarche and Mooney 1967; LaMarche 1973) is of major importance in the reconstruction of the past climate of the region. Bristlecone snags and remnants from as early as 7400 B.P., extending up to over 490 feet above the present upper tree-line, have been radiocarbon and tree-ring dated as well as mapped. The resultant analyses indicate a period of warm dry weather with high summer temperatures lasting until 4200 B.P., or possibly 3500 B.P.. This is followed by a shift towards a cool and wet climate that lasted until ca. 2500 B.P. when conditions became cool and dry. A major tree-line decline in A.D. 1100 marked the onset of cold and dry conditions with the tree-line dropping to its present elevation. Both sites show evidence of increased reproduction throughout approximately the past 100 years indicating a warming trend, reversed only within recent decades. The investigations agree with other paleclimatological evidence from North America (cf. LaMarche 1973:656-657) with the climatic tendencies indicated by the study correlating with periods of low warm seasonal temperatures as defined by the tree-line decline with Curry's (1969) proposed glacial events excepting the Recess Peak Advance. As well, the studies strongly support Antevs' (1948, 1953, 1955) concept of a warm and dry Altithermal. While no work has been published on tree-line variation in the High Sierra, Curry (1969) notes the existence of similar fossil tree-lines in the area as well. He infers,from "the degree of preservation of the remnants and the general similarity of the sites where such remnants are preserved", a downward shift in timberline contemporaneous to that described for the White Mountains (Curry 1969:25).

Curry (1969) makes reference to Adam's work on pollen variation in the Sierra Nevada (Adam 1967). Adam's research provides valuable information on climatically determined shifts in plant communities from the end of the Wisconsin. These investigations are based on data from surface transects of modern samples across the Carson and Tioga Passes; four stratigraphic sections from sites at varying elevations along the Tioga Pass route; and "Osgood Swamp," a small moraine-dam lake near the south end of Lake Tahoe. The

pollen record is divided into four major zones. Adam (1967) sees post-glacial climatic fluctuations in terms of temperature fluctuations, since, as he suggests, the Sierra's location would continually provide the range with considerable precipitation making warm periods more likely than really dry periods.

The sequence from Osgood Swamp is particularly interesting for its time depth. Zone 4 covers at least the latter part of the late Wisconsin glaciation and indicates alpine tundra conditions marked by large quantities of sagebrush and scattered juniper, the latter of which Adam suggests might have resembled the stunted trees found near the timberline in the area today. Zone 3 illustrates the transition to a mixed conifer forest of post-glacial conditions. Pine pollen is heavily represented (over 70% of the sample) together with fir, while the sagebrush and juniper of cooler climates decrease in favor of an oak-Ericaceae chapparal similar to the present. Zone 2 is taken to represent the Climatic Optimum or Altithermal with sagebrush and fir at a minimum, and an increase in oak, aquatic and riparian elements. This period is marked by two distinct temperature maxima separated by an interval of somewhat cooler conditions. Zone 1 follows during which a rise in fir and Ericaceae and a reduction in warmth loving plants support the concept of a "Little Ice Age." The lithology of the core does not conflict with the described zonation based on palynological analysis. A 32 inch layer of laminated gray silt, settled from glacial melt water overlain by organic mud is in turn followed by 39 inches of peat containing coarse organic detritus, radiocarbon dated at 6990 $\pm$ 300 B.P.. A layer of volcanic ash at 67 inches depth, possibly from the eruption of Mount Mazama, could provide an additional time marker of ca. 6600 B.P.. Other dates available are 2920 $\pm$ 200 B.P. for the base of Zone 1 and 9990 $\pm$ 800 B.P. for mid-zone 3.

Pollen studies have been undertaken at several localities in the general area. Roosma's sequence from Searles Lake (Roosma 1958) somewhat to the south of the study area in the Mohave Desert, indicates a predominance of woodland species in an organic layer until 10,500 $\pm$ 560 B.P. giving way to shrubs and herbs in a layer of saline material with a temperature maximum occurring at ca. 6500 B.P. (Broecker and Orr 1958). Somewhat below the maximum, conditions shift towards intensified aridity as evidenced by a decrease in sagebrush and a corresponding increase in the percentage of chenopods. Roosma (1958) points out that communities of pine and juniper today are found some 30 miles away from the lake, almost 3400 feet higher in elevation indicating a considerable shift in vegetation zones in response to climatic change.

Paleoenvironmental studies from Black Lake in Adobe Valley have been done by Batchelder (1970). At the writing of this summary these results were not available. References to the study (cf. Mehringer 1977; Bettinger 1979a) were somewhat incomplete and contradictory and did not allow for any accurate conclusions to be drawn without reference to the original study. A pollen sequence from Owens Lake listed in Martin and Mehringer (1965:435, Table 1) is as yet unpublished. This data could provide valuable information if it is ever made available.

Although the above data fail to provide a completely integrated and unequivocal sequence of climatic conditions throughout the past 10,000 years, they do, nevertheless, allow for certain general conclusions to be drawn. Beginning at ca. 10,000 or 9000 B.P. a warming trend seems to have succeeded the cold glacial climate of Wisconsin times. At first, the moist conditions appear to have become dry and warm somewhere around 7000 B.P. indicating the onset of a period much resembling the Altithermal as postulated by Antevs (1948, 1953, 1955). This seems to have lasted until ca. 3000 or 4000 B.P. after which the available data suggests a return to both lower temperatures and variable moisture conditions which lasted until the late 19th century. As this period is marked by considerable climatic oscillation, the usage of Antevs "Medithermal Age" does not seem appropriate although future research may change this. An apparently especially cold climate, beginning in the 12th or 13th century and lasting through the mid-1800's, gave way to the warmer weather of the first half of the 20th century. Only in the last 10 to 20 years have temperatures once more been noted to have declined.

Several suggestions have been offered by researchers concerning the magnitude of these climatic shifts. Curry (1969:35) concludes that:

> "Two additional snow storms per season of average magnitude are sufficient to cause a neoglacial advance equal to those of the 14th through 19th centuries and that one additional storm per season is sufficient to maintain mass budgets of the Sierran glaciers at the positions of their maximum late neoglacial advance."

Based on Sands' (1966) compilation of atmospheric circulation features common for the period 1958 through 1963, Holmes et al. (1975) have determined five basic upper air circulation patterns which could account for the climatic trends of the past 5000 years. Weide (1976) emphasizes that a precipitation-evaporation ratio of only 0.3 would be needed to replace the vanished pluvial lakes while LaMarche (1973) suggests that the total observed shift in the White Mountains' treeline, amounting to about 656 feet, could correspond to a difference in July temperatures of about 3.5^{o} F based on a maximum July surface temperature gradient of roughly 5.3^{o}F per 1000 feet.

In summary, the neoglacial climatic variations noted for the study area, "can be explained by a climatic model in which the extremes of mean precipitaion for the 96 years of historical record are greater than the range of long-term means for that climatic parameter" (Curry 1969:1).

An excellent review and synthesis by Mehringer (1977) is recommended for reference to related paleoenvironmental studies throughout the Great Basin. It is hoped that future research will be directed at explaining the climatic changes and phases noted so far in the paleoenvironmental record.

HISTORICAL OVERVIEW

Chapter 1

Discovery, Exploration, and Initial Impressions: The First Whites Arrive in Eastern California, 1827-1864.

As far as historians can tell, the first non-aboriginal people to enter the study area were American and English fur trappers and mountain men. Spaniards may have explored the area, but this seems unlikely, and no records of any such journey have been uncovered. Rather, most evidence points to Jedediah Strong Smith as the first non-Indian in the eastern Sierra of California.

Jedediah Smith stands out as the epitome of the American combination of mountain man and explorer. Like many of his fellow countrymen, Smith felt the impulse of private enterprise in the Age of Jackson. This impulse drove a number of men into the fur trade in the West. As American and Indian trappers depleted the streams and rivers of their beaver populations, mountain men moved toward the Pacific after the earliest years of the nineteenth century. This impelled them, in part, to become explorers as well as trappers. Men like Smith were also encouraged by a sense of "manifest destiny," a feeling that the United States should one day stretch from one seaboard to the other. Because he was moved by this spirit, when Smith came into contact with Mexican authorities after his trip through the Great Basin to southern California in the mid-1820s, he disobeyed their deportation orders and travelled up the San Joaquin Valley. That brought him to the Sierra in the late spring of 1827. Faced with the need to return to a trappers' rendezvous at the Great Salt Lake, Smith made the first crossing of the Sierra Nevada by a white man.

The record of Smith's exact route remains unclear. Unreliable sources suggest that he passed near Mono Lake and go so far as to say that his party discovered gold there (Chalfant 1922:42-43; Yongue and Harris 1975:12). It seems more likely that Smith passed a good deal to the north of Mono Lake, but no exact record of his route exists. Maxine Chappell (1947:234-236) speculates that he entered into the eastern Sierra via Sonora Pass and followed the East Fork of the Walker River by the present site of Bridgeport, continuing then past the shore of Walker Lake. However, most historians now believe that Smith crossed Ebbets Pass and either traversed the Antelope Valley, or followed the Carson River northward, bypassing the study area altogether (Cain 1961:1-2; Maule 1938:16,53: Phillips 1977:25). In any case, Smith provided the first crossing of the Sierra, and it was his exploits that encouraged later mountain men and explorers to journey into both the eastern and western Sierra.

The next white man to explore early Mono and Inyo, according to Gloria Cline (1963:126-127) and Fred M. Phillips (1977:33), was the British trapper Peter Skene Ogden. Ogden, an agent of the Hudson's Bay Company based in the Pacific Northwest, has generally been remembered for his expeditions in the Great Basin from 1824 to 1830. Although some controversy used to surround the location of Ogden's route on his last journey in 1829-1830, Phillips and Cline agree that Ogden's route from the Columbia River to the Colorado River went through the Owens Valley. Ogden himself indicated that he reached the "'Great Sandy desert of Great Salt Lake,'" but his sketchy geographical descriptions, according to Cline and Phillips, place him more probably in eastern Mono and the Owens Valley during his epic journey.

Joseph Reddeford Walker led the next white expeditions into the study area. One of the most persistent explorers of the Sierra Nevada and Owens Valley, Walker made three trips through eastern California. His first lasted from 1833 - 1834. Beginning in the Great Basin around the Great Salt Lake, Walker and his party travelled into the eastern Sierra in the first successful white effort to cross from east to west. Again, his exact route is not definite, but most students of his travels suggest that he followed the east fork of the Walker River, perhaps travelled up Virginia Canyon, and then crossed the Sierra somewhere in the vicinity of the present Tioga Pass. This route would have traversed the Bridgeport Valley, and probably made Walker the first white man to view Yosemite (Farquhar 1925:6-7; 1965:33-36).

After wintering on the California coast, Walker began his return in 1834. Looking for an easier route back across Sierra Nevada he was urged to travel south to where he might cross the range more easily. His Spanish advisers were probably referring to the Tehachapi Range. On his trip through the central valley, however, Walker met some Indians who guided him over the pass that today bears his name. He then moved north through the Owens Valley, hugging the foothills of the Sierra, according to the account of Zenas Leonard, a member of Walker's party (Ewers 1959:122-25; Farquhar 1965:37). Once through the valley, Walker's party camped at Benton Hot Springs before turning eastward into Nevada (Cline 1963:176).

The group's reaction to the eastern Sierra exemplifies an important attitude toward the land and the environment that heavily influenced later developments in the area. The expedition entered the valley in late April, 1834, and found the country not very much to their liking. Zenas Leonard wrote of the region (Ewers 1959:122-25):

> The country on this side is much inferior to that on the opposite side--the soil being thin and rather sandy, producing but little grass, which was very discouraging to our stock....On the opposite side vegetation had been growing for several weeks--on this side it has not started yet....The country we found to be very poor, and almost destitute of grass.

The lack of pasturage made the journey through the Owens Valley slow for men anxious to get home, and probably darkened their outlook on the valley. Significantly for its later history, numerous other exploratory and immigrant parties echoed Leonard's unfavorable reaction to the Owen Valley. Virtually all whites who first passed through the valley complained about the climate there. Their negative comments may have reflected, in part, an implicit comparison with western California and a lack of interest in lands that seemed to be a barrier to their final destinations. More importantly, most of the explorers up to 1865 traversed arid Owens Valley during the harsher seasons of the year. Only one of the men who left early writings about the area, Captain John Davidson in 1859, went to the valley at a time when its fertility and pleasantness could be appreciated. As a result, Owens Valley earned a bad reputation for its climate.

Speaking of a similar situation in Mono County, Maxine Chappell (1947: 233) pointed out that for men accustomed to or expecting the green, gentle, well-watered slopes of the western Sierra, the steep, treeless hills of the

eastern side seemed disappointing. The barren mountainside merely merged with the arid, sage-covered landscape of the Great Basin, whereas the western Sierra rolled into the greener, grassier lands of the coastal and valley regions. On the eastern slopes, "the cheeriest note on the whole landscape is sounded by creeks," but even those drain into bitter, salty lakes. For those interested in settling in California, or perhaps for those intent upon acquiring water, the eastern Sierra seemed a hostile, expendable environment compared to the more temperate and verdant lands west of the mountains. This unfavorable comparison, like the emerging attitude toward the Owens Valley, played a large role in the later devleopments of the Owens Valley, Benton, Bodie, and Coleville planning units.

Although westering Americans did not initially wish to settle on the forlorn lands east of the Sierra, they had to pass through them on their way to the mines and farmlands of western California. As a result the region came under further exploration by trains of settlers. In 1841 the first emigrant party to cross the Great Basin made its way into California. Sixty-four members of the Bidwell-Bartleson party left Missouri for California in the spring of that year. Internal dissensions divided the party, and half turned off on to a better known trail to Oregon in August. The others struggled onward toward the Humboldt River, still rife with conflict among themselves. They entered California and passed through the Antelope Valley, near present-day Coleville, in October. Following the West Walker River, they made their way into the mountains as winter neared. They finally passed the crest in late autumn somewhere in the vicinity of Sonora Pass, becoming the first emigrant party to cross the Sierra (Farquhar 1965:8; Phillips 1977:51).

Joseph Chiles, a member of this successful crossing, returned to Missouri the next year and organized another group of settlers. Hoping to avoid the tribulations of the earlier group, he hired Joseph Walker to guide his party to California. Although Chiles later split off to find a northerly path, Walker led the bulk of the party through a portion of the Mono Basin, down the eastern shore of the Owens River, and over Walker Pass in 1843. The emigrants hauled wagons and machinery with them all the way to the valley, but to save their hard-pressed livestock they were compelled to abandon much of their equipment near Owens Lake (Phillips 1977:51-52; Farquhar 1965:43-44). With the completion of this journey Owens Valley became an occasionally used emigrant trail, providing a route into California that avoided crossing the High Sierra.

John C. Fremont led the next two forays into the area under study. On his "second expedition" in late 1843 and early 1844, an effort to cross the Sierra during winter, the Fremont party blundered through the Bridgeport Valley toward the mountains. He followed Swager Creek up into the hills, but discouraged by the forces of winter he retreated, abandoning a tiny cannon along the way. The party then followed the West Walker River northward, probably through the Antelope Valley, and likely camped at Topaz Lake on January 30, 1844. The party later made its way over the Sierra via Carson Pass, north of what is now Mono County (Maule 1938:16,50,54; Chappell 1947:235). Both daring and foolhardy, this expedition stimulated controversy over the abilities of Fremont.

Later in the same year, Fremont led another party into the Sierra during late fall on his "third expedition." While Fremont himself took a small band over the Sierra near Truckee, a larger party headed south under the more able

leadership of Joseph Walker, Edward M. Kern, and Theodore Talbot. Walker's group passed east of Mono Lake through the Adobe Hills, reportedly camping in the Adobe Valley on December 13, 1845 (Reveal; Farquhar 1965:58-61). Three days later, Kern, Walker, and Talbot struck the Owens River. Short on rations, the party hastened down the valley, leaving Owens Lake behind on December 21. The men then crossed Walker Pass around Christmas, and moved into the San Joaquin Valley to rendezvous with Fremont's group (Kern 1876:482).

Like the members of Walker's earlier party, his third group also held unfavorable opinions of the area. After all, the men passed through the valley just as winter was setting in. Edward Kern wrote in his journal (1876:482, 484) that, on the whole, the area was "a sandy waste," lacked sufficient water, and provided poor grass for livestock. Kern did note a good deal of "wild-fowl," and seemed impressed by the "fine, bold stream" that was the Owens River, but the "strong, disagreeable, salty, nauseous taste"of the Owens Lake disappointed him. Kern also spotted "numerous," "badly disposed," hidden Indians, which created a good deal of apprehension. Comments like Kern's and like Leonard's previously cited remarks did little to enhance the reputation of Owens Valley and Mono Basin. In fact, they seemed to contribute to an official disregard for the possibilities of the lands that later worked to the disadvantage of the valley and its residents.

It was during this trip down the valley, Walker's third and last, that the deep trough between the Sierra and the Inyo-White ranges received its name. Most sources, including Erwin G. Gudde's California Place Names (1969:232; Guinn 1917:41-42),argue that Fremont named the river, lake, and valley after reuniting with Kern, Walker, and Talbot. The namesake was Richard Owens, who like Fremont had never seen the valley. One of Fremont's captains on the third expedition, Owens was rewarded with this praise. However, Philip J. Wilke and Harry W. Lawton (1976:36) dispute this standard interpretation. Noting that Kern's daily journal mentioned "Owen's River" during his trek down the valley, and assuming that this was written during the travel and not afterward, Wilke and Lawton have attributed the naming of the valley to Kern. Later, Fremont claimed credit for it in his Memoirs, published in 1887, during his only mention of the incident. In any case, the valley first appeared on a map under its present name in 1848 (Gudde 1969:232).

From the time of Walker's last journey to the late 1850s, many more travelers made their way through Owens Valley, Mono Basin, and the Bridgeport and Antelope Valleys. Yet, virtually none of these parties stopped in the area. Most were intent upon making their way to western California, and probably viewed lands east of the Sierra as obstacles in their paths. Different sources note the occasional presence of travelers in the area. In 1849 several groups of Midwesterners journeyed near Owens Lake in their crossing of California, many having suffered greatly in traveling through Death Valley. Other trains of emigrants, using different passes through the Sierra to reach coastal and central California, also had to travel through the study area (Chalfant 1922: 57,79; Maule 1938:7-8). The Mormons, who had settled near the Great Salt Lake in the late 1840s, significantly did not send a party of explorers or settlers to Mono and Inyo. Even through the Latter-Day Saints claimed the lands of the four planning units as part of their Kingdom of Deseret, they did not make any effort to colonize or investigate the region.

During the 1850s the study area was explored more thoroughly by different government parties. In 1852 Lieutenant Tredwell Moore led a band of soldiers from central California into the Mono Basin in pursuit of renegade Indians, ended up exploring much of the region, and even found gold. In the next two years, a member of Moore's group led LeRoy Vining over the same route, and Vining became the first settler in the area (Yongue and Harris 1975:12).

The state of California became interested in the areas east of the Sierra in the mid-fifties. In 1855 the state Surveyor of Public Lands commissioned A. W. Von Schmidt to survey lands east of the Sierra and south of Mono Lake. During that year and the next, Von Schmidt's team worked the area from Mono Lake to Owens Lake. The comments of Von Schmidt (Chalfant 1922:71-74; Northern California Historical Records Survey Project (hereafter NCHRSP) 1940:12), like those of Kern and Leonard, probably served to discourage interest in settling in the area, for like his predecessors Von Schmidt found the region an unpleasant place. Save for Round Valley and Long Valley, he declared the "land entirely worthless....On a general average the country forming Owens Valley is worthless to the white man, both in soil and climate." The scarce game also displeased him. Von Schmidt had little trouble with the Indians, save for one brief skirmish. The Indians of eastern California had not amounted to much difficulty for explorers up to this point, despite white suspiscions of them.

Though they had done nothing to whites settling in California, the natives of the eastern Sierra were under the constant surveillance of the army and the Office of Indian Affairs. In 1859, both agencies made excursions into the Owens Valley, trips that helped to give whites a better knowledge of the area. Sometime in that year, though it is not certain when, Indian agent Frederick Dodge travelled through the valley and made a map as he went. The map and a brief mention of the journey (Dodge 1859; United States Office of Indian Affairs (hereafter USOIA) 1859:373-377) are the only evidence of this trip.

In the same year an expedition led by Captain John W. Davidson explored the same region. Following heavy civilian livestock losses in the Fort Tejon and Los Angeles areas, the commander of Fort Tejon, Lt. Col. Benjamin L. Beall, ordered Davidson to lead a party of soldiers into the valley to search for stolen horses. Davidson himself had suspected the Paiute of eastern California, but upon viewing the natives of the region he realized his error. Seeing few horses at all in the valley, he concentrated instead on observing the tribes and the area itself. His observations were in part motivated by the notion of establishing an Indian reservation in the valley. Beall had specified that Davidson "examine the country well with reference to its fitness for the purposes of establishing an Indian Reservation" (Wilke and Lawton 1976:6-7,14).

Davidson's route took him up the west side of Owens Valley to a point just north of Round Valley. Unlike most of his predecessors and most of his followers, Davidson was pleased with the climate of the valley in July, and with much of the land that he saw (Wilke and Lawton 1976:18-20,24-27). Though it must have been quite warm in that mid-summer month, he found the climate "delightful." He was equally pleased with the land itself, noting an abundance of water, timber, and grass. Davidson was probably the first white to notice the Paiutes' irrigation projects, and he suggested that much of the land could be irrigated from the many streams in the valley. In particular Davidson found Round Valley an especially pleasing basin of land, "some of the finest country" he had ever seen. To the farmer, the rancher, and the Indian, Davidson recommended the valley highly. Unlike his predecessors, Davidson found the valley more than tolerable.

The final exploration of the study area in this period was made by the Whitney survey team in 1863-64. Commissioned by state geologist Josiah Dwight Whitney, William H. Brewer led a survey team over uncharted parts of California in the early and mid-1860s. A man with a keen eye for observation and a dry sense of humor, Brewer provided a useful glimpse of the study area on the verge of earnest settlement. In July, 1863, Brewer's party approached the Mono Lake area. From Tuolumne County it crossed Mono Pass and headed for the Mono Craters. Then it went to Mono Lake, taking time out to visit Negit and Paoha Islands. After a side trip to Aurora, Nevada, the party finally followed the West Walker River over Sonora Pass.

Brewer found some aspects of the Mono Basin remarkable. He seemed genuinely interested in Mono Lake, likening it to the Dead Sea. He analyzed the water and described its wildlife. But generally, Brewer's stay in the basin was unpleasant, probably contibuting to an unfavorable impression of the region and its potential. His first camp just south of Mono Lake was visited by coyotes. Though Mono Craters held some interest for him, they still presented quite a desolate scene -- "barren volcanic mountains standing in a desert." And though they were there in July, Brewer and his party had to suffer through a freezing rainstorm. All in all, he found that the scenery and the climate did not compare with the lands on the other side of the Sierra crest (Farquhar 1930:415-422).

Brewer's trip to the Owens Valley, during late July and early August of the next year, was equally unpleasant. The party travelled from Visalia over Kearsarge Pass, down Independence Creek to Owens River and Owens Lake, back upstream past Camp Independence, an outpost that had been established by that time, past the head-waters of the Owens River, and back over the Sierra. Throughout the trip, which took place during widespread drought in California, Brewer and his party were uncomfortable. Friday, July 29, was especially unpleasant (Farquhar 1930:534-539):

> It was a terrible day. The thermometer ranged from 102° to 106° F, often the latter....It almost made us sick. There was some wind, but with that temperature it felt as if it came from a furnace. It came from behind us and blew the fine alkaline dust into out nostrils, making it still worse.

Added to these miseries, Brewer failed to find any lumber or other fuel. The cattle he witnessed in the valley were "starving," perhaps because all but ten per cent of the land, according to Brewer, was desert. The strong mosquitoes, which prohibited sleep, further added to his discomfort. Brewer's party was only too happy to leave the Owens Valley, taking with it an unfavorable impression of the area that would contribute still more to the generally negative attitude toward the valley developing among both state officials and westering settlers.

By the time of Brewer's journey into the Owens Valley, other non-Indians had begun settling there. Brewer's mention of cattle and towns in the region demonstrated the extent to which whites had taken over the valley. With the start of Indian-white hostilities in 1861, the federal government made its first imprint on the area in the form of Camp Independence. Moreover, to get to the area from the other side of the mountains Brewer had relied on well-

travelled prospectors' trails through the rugged Sierra (Farquhar 1930:533-34). His reliance on those trails provided testimony that the miners were the first white Californians to journey to the lands east of the Sierra. It is to these pioneers that we now must turn.

Chapter 2

Miners, Settlers and Government: Using and Defining the Land, 1857-1870.

Until the influx of miners and prospectors, California east of the Sierra and south of Lake Tahoe had mainly been used as the pathway to and from western California. White men had thought of it as little more than an obstacle in their course westward, as their negative attitudes toward the lands reflected. When, from the mid-1850s to mid-1860s, white men began flocking to the Owens Valley and the Mono Basin, the area took on a different image. To understand this new migration, which ironically came from the same region that had attracted Americans away from the lands east of the mountains, one must look at developments on the other side of the Sierra.

For several years after the initial strike of gold at Sutter's Mill, mining proceeded with a rush in western California. But by the mid-1850s conditions had developed to the point that the nature of and prospects for mining there changed significantly. Two important consequences resulted that encouraged miners and prospectors to recross the Sierra. The first was the reorganization of the industry itself, and the second was the apparent decline of mineral resources in the western Sierra.

Most men rushed to the California goldfields as independent entrepreneurs, believing that they could pull a fortune out of the ground with their own initiative and under their own supervision. Miners soon realized, however, that successful extraction required the reorganization of mining along the lines of large-scale industry. The business required all the discipline, money, and organization that capitalist methods could bring to the mother lode. As a result the means of production became increasingly concentrated in the hands of a few, and many miners had to face working for somebody else. While this reorganization probably provided more security and success than the previous, more individualistic and haphazard methods, some men sought to retain the independence they had envisioned in the West. Being effectively excluded from significant strikes in the western Sierra, these hardy independents turned to one of the few alternatives open to them, "that hardest and most ill-paid of occupations: 'prospecting' for new mineral grounds" (Paul 1947:173,ch.11). Prospecting still held out to these men the hope of independently striking it rich.

By the late 1850s another change provoked even more men to leave the western mines of California. Parts of both the southern and the northern mines of the occidental Sierra experienced decline, leaving many unemployed and searching for new beds of ore. Being "psychologically unprepared" to return to their homes in the East, they cast about for other possible mining opportunities. The lands east of the Sierra represented one such opportunity (Paul 1947:ch.11; Nadeau 1965:173).

The Mono-Inyo region seemed forbidding at first. Transportation and communication there was very difficult, the ores first extracted did not appear to be very high grade, and a lack of capital limited early development. Yet, miners made their way to the region, sometimes going so far as to abandon claims that still had potential on the western side of the Sierra. To some the area offered a chance to continue to mine as they had before. To others a new mode

of prospecting appeared that required the use of mules and burros to pack gear through the sagebrush. Still others migrated to eastern California to "mine" the miners through trade. These different types of unsettled men made up the earliest population of Americans in Mono and Inyo counties (Paul 1947:263-266; Nadeau 1965:173).

During this period a series of gold and silver strikes drew attention to the semi-arid lands of the western Great Basin. The discovery of the Comstock Lode in Nevada in 1859 stimulated great interest in the region. Yet Mono and Inyo attracted their own settlers, some of them being among the first to mine on the eastern side of the Sierra. Mono in particular was first populated by the overflow from the California gold rush in the late 1850s. Argonauts spilled over on newly carved paths through Mono and Sonora Passes, inaugurating mining activity in the four planning units of Coleville, Bodie, Benton, and Owens Valley (Chappell 1947:236). Some even travelled to the strikes from Los Angeles by way of the Owens Valley (Los Angeles Star, August 21, 1858).

Though its origins remain unclear, Dogtown was the first consequential mining town on the eastern slope of the Sierra. It was started in 1857, perhaps by Mormons, as a panning site along Dog Creek. Using placers to search for gold, the first inhabitants of Dogtown developed a small village of stone-walled cabins. By 1859, the little settlement had seventy or more people, and a general store had been started. Yet, the town must never have been very prosperous, for in that peak year it collapsed in the face of another strike a few miles to the east (Cain 1961:4-5; DeDecker 1966:15-16; NCHRSP 1940:13).

The strike at Monoville, or Mono Diggings, was made in summer, 1859, and quickly attracted widespread attention and many more miners than had ever heard of Dogtown. Seven hundred people arrived at the diggings in the first year, and in 1860 nine hundred were reported to be living there. Most of its settlers came from Tuolome County west of the Sierra. The interest in the diggings seemed to run quite high. The miners employed Chinese labor to build a nine-to-ten mile ditch costing $75,000 to Monoville from nearby Virginia Creek, providing water on the mountainside for placering. They also dug so deeply into the earth for ore that the scar remains visible and known today as the "Sinnamon Cut." These efforts reflected a mixture of independent entrepreneurship and big business that suggests that not even this newly tapped region was free from the new discipline in California mining (Chalfant 1947:30-33; Maule 1938:26).

The diggings at Monoville seemed to be a testimony to the endurance of men. In 1860 Henry DeGroot (1860:7-8) described the difficulties that challenged those who came to the Mono Diggings. The area lacked flood and supplies, water for placers, and adequate transportation. The short growing season jeopardized any farming in the area, forcing the men to import their food from outside at expensive prices. The region was generally cold, and the land was largely "destitute of timber." Yet much of the ground in the proximity had been claimed by miners, suggesting that many braved the elements to try their luck at Monoville.

Like Dogtown, Monoville survived for just a few years. The strike at Aurora in 1860 soon attracted many of Monoville's residents, proving to be a much richer opportunity. Aurora, which is in Nevada, was believed at the time to be in California. As thousands of people flocked to this new site, Monoville disappeared. Even the buildings surrounding the diggings were hauled off to Aurora to provide lumber in this largely timberless region. Like Dogtown, Monoville soon came to be deserted, ending up as just one more jumping off

point to the larger opportunities in the Washoe country (Maule 1938:26; Hoover 1966:212-213).

Other strikes soon afterwards in the Mono County area also attracted miners and merchants to the lands of eastern California. In 1859, gold was discovered in a spot that would later be famous as Bodie, but little transpired there for more than fifteen years, as the finding was dwarfed by larger strikes at Aurora on the Esmeralda Lode in Nevada (Chappell 1947:237). In the early 1860s silver strikes were made in Montgomery Canyon, just east of the present site of Benton, and on Blind Spring Hill, just to the south. Benton became the supply camp for these mines, though the ores never panned out very successfully. Although Benton (or Benton Hot Springs) endured as a silver camp for more than twenty years, and still remains in a much tamer version today, mining activity in that area always remained in the shadow of larger, more fruitful strikes (DeDecker 1966:26-27; Cain 1961:15; Nadeau 1965:216).

To the south, mining in the Owens Valley area began slightly after the establishment of Dogtown and Monoville, and resulted in more temporary towns. The greatest stimulation to mining activity in the Owens Valley resulted from nearby strikes, including not only those around Mono Lake but also those east of Owens Valley. Prospectors from the pueblo of Los Angeles, to the south, and from Visalia to the west, crossed the state to get to the valley. In 1860 Dr. Darwin French and his party of prospectors discovered the rich Coso Ledges just southeast of Owens Lake. In the same year prospectors located the first claims in the valley in Mazourka Canyon, but did not develop them, and the New World Mining and Exploration Company, a San Francisco firm, explored the valley and staked claims just southeast of the present site of Independence. By July, the Visalia Delta reported that up to one hundred men were prospecting in the valley (Chalfant 1922:80-87; Smith 1978:177; DeDecker 1966:41-51). All along its eastern slope claims were made.

Enthusiasm soared in different parts of the state. In San Francisco in late 1861, the Mining and Scientific Press (1861:1) announced the success of mining east of the Sierra. It declared that the gold and especially the silver hidden there would eventually provide "riches beyond computation." Though their enthusiasm would eventually have some merit, the development of mining in the area proceeded very slowly in the first few years as a result of strife between whites and Indians. Once the army was called in to quell the difficulties in 1862 and 1863, however, mining picked up again. Some of the cavalrymen themselves found gold in the foothills of the White Mountains. Also in 1862, the San Carlos Mining and Exploration Company, another San Francisco-based enterprise, established a camp between the Owens River and the mountains to the east (Smith 1978:177, DeDecker 1966:41-51).

Virtually all of the first mining camps were founded on the eastern bank of the Owens River. In the northern part of the valley the town of Owensville sprang up in 1862 or 1863. The chief settlement in that half of the valley, up to fifty homesteader claims were filed on land around there. At one time in the short-lived town corner lots were selling for $1,000 to $1,500. In 1864, however, decline set in, and by 1871 the last resident had departed. The buildings of Owensville were dismantled and the lumber floated downstream to Independence, Lone Pine, and Big Pine (Chalfant 1922:165; Hoover 1966:117).

Further south on the river, three other towns were begun in the 1860s, all of them very shortlived. San Carlos, begun near the mouth of Oak Creek at the site of a soldier's discovery of gold, lasted barely more than a few years, and Chrysopolis died out so quickly that it is doubtful that it could be relocated today (Cragen 1975:48; Hoover 1966:117). The town of Bend City, on the present road to Mazourka Canyon, just 4.3 miles outside of Independence, was better preserved in the historical records, and can be discussed at greater length as perhaps exemplary of the kind of community that sprang up in the valley. At its height Bend City contained sixty houses, most of them adobe, two hotels, five stores, several saloons, a library, a "stock exchange," and a vigilante committee. It peaked during the early part of the decade when valley residents initiated the unsuccessful effort to establish Coso County with Bend City as its seat (DeDecker 1966:46; Chalfant 1922:171). Like most western mining towns, Bend City seemed to thrive on speculation and hope. William Brewer (Farquhar 1930:537) left his impressions of the town in 1864 upon his journey up the Owens Valley:

> It is a miserable hole, of perhaps twenty or twenty-five adobe houses, built on the sand in the midst of the sagebrush, but there is a large city laid out -- on paper. It was intensely hot, there appeared to be nothing done, times dull, and everybody talking about the probable uprising or the Indians --

One of the most long-lived of these ephemeral villages, Bend City died out in the mid-1870s during the depression that hit the valley. By 1888 all that the State Mineralogist could report there and at San Carlos were crumbling adobe houses, idle mines, and abandoned equipment (DeDecker 1966:45).

Like the early strikes in Mono County, the first mining in Owens Valley amounted to very little. Activity in the area always remained slower than that taking place elsewhere. Yet mining brought the first rudiments of Western civilization to the region. Related industries, roads, ranches and farms, and forms of local government arose to provide for the miners.

Evidence of the earliest lumber mills in the area is either sketchy or non-existent. The importance of lumber for mines was very high, and in a relatively treeless region, usable wood was at a premium. As a result virtually all abandoned lumber, whether in deserted mines or ghost towns, was recycled. Lumber was used not only for mines, but also for town buildings, fuel, and for flumes along stream beds to gather more lumber. The first sawmills appeared in the Big Meadows area, near the present site of Bridgeport, in the 1860s. These mills worked timber that had been felled in the East Walker River valleys, and provided lumber for most of the mines nearby (Maule 1938:37,43-44; Cain 1961:15-17). Data on other early mills is largely nonexistent, save that these early activities began a long process of deforestation on some of the hills of the eastern Sierra.

To haul lumber and other supplies, and to provide for transportation and coummunication, roads were also developed in the region under study. In the largely treeless Owens Valley, where the river was used for much transportation, records on the earliest roads have not surfaced. Much has been collected, however, on roads in the Mono County area in the early 1860s. To get to Mono in the early 1860s from west of the Sierra, men had to use pack trails over

the Sierra. One crossed over Sonora Pass and wound all the way to Aurora, Nevada. This route became a toll road in 1868. Another began in Big Oak Flat in Tuolumne County, traversed the Sierra over Mono Pass, and descended to the Aurora vicinity as well (Hoover 1966:212-213; Maule 1938:23; Chappell 1947:243-244).

Toll roads appeared very early on. These represented a way for state governments to initiate routes through undeveloped areas by authorizing private individuals to build and maintain roads. The franchise given to an individual stipulated toll rates, and the authorized individual then built toll houses and stations (Maule 1938:17,54). These provided him with an income to maintain the road and support himself. These roads were laid out where people had already travelled in great numbers - there were no unnecessary roads in the early west.

Probably the first franchise toll road was granted by the state of Nevada to John Hawkins in 1862 for a route from Aurora to Big Meadows. For a wagon and span, Hawkins charged $1.50. An empty team cost 75¢, a man on horse 50¢, and loose animals 10¢ each. The same state granted a franchise to E. Dexter and J. M. Baldwin two years later for a road from Aurora to Adobe Meadows, a route that was later extended to Owens Valley. Dexter and Baldwin charged a dollar for a wagon and span, 50¢ for an empty team, $1.00 for a buggy and two horses, 25¢ for a man on horse, and 15¢ for a pack horse (Maule 1938:17,21, 24,52,54,56). Toll roads like these provided the first transporation routes of any permanence for whites in the Owens Valley-Mono Basin region.

As miners, lumbermen, and travelers came to the valleys and basins of the eastern Sierra, the land was opened up to more permanent types of settlers. Visitors to the region noticed that the area could be used for agriculture and ranching, and the influx of miners and mine-related workers seemed certain to provide a market for dairy and beef products, farm produce, and the services of craftsmen. As a result, the first waves of miners into the four planning units were accompanied and followed by other, more permanent settlers.

The first recorded occurrence of white settlement in the study area took place in the Antelope Valley in Mono County in 1859, when Hod Raymond drove a herd to feed in the valley during autumn (Maule 1938:10). The next year, George W. Parker began a homestead in the Adobe Valley at an unspecified spot on the commonly traveled path between southern California and the strike at Aurora (Reveal). In the summer of the following year, 1861, the first white settlers came to the Owens Valley. A cattle-driving party, including A. Van Fleet and Henry Vansickle, moved into the valley from the north in August, scouted the land as far south as the present site of Lone Pine, and returned to the northern edge of the valley to build the first white dwelling, of sod and stone, near the site of Laws. Around the same time, Charles Putnam noticed the stepped-up traffic through the valley due to prospectors, and built a stone cabin on Independence Creek as a trading post, beginning the present town of Independence. Virtually simultaneously, Samuel A. Bishop drove a herd of cattle from Fort Tejon, near Los Angeles, into the Owens Valley, and built a ranch just southwest of the town that today bears his name. In late November, 1861, Barton and Alney McGee herded some cattle into the Lone Pine area from the Central Valley, and built a residence in that vicinity (Inyo County Board of Supervisors [hereafter ICBS] 1966:5,9).

By the first year of white settlement in the Owens Valley, then, three of the valley's four major town sites had already been selected. In the next years, the communities sprouted roots and took hold in the arid valley. Independence, which was for a short while known as "Putnam's" and "Little Pine," grew gradually, helped by the addition nearby of Camp Independence in 1862. Thomas Edwards and his family, travelling with a large herd, moved into the valley in 1863, purchased Putnam's trading post and stone cabin, and laid out the first official town at Independence. The townsite, six-blocks long and six-blocks wide, featured the names of great Americans on its streets, and Edwards' own surname was given to the main street (ICBS 1966:25; Smith 1978:41; Krater 1975:7-8). Lone Pine prospered with the influx of miners, quickly attracting a multi-ethnic population (Smith 1978:28-29). In 1862 a group of cattlemen settled together on George Creek to form a community that would in later years become the orchard town of Manzanar (Krater 1975:61). To make these early settlements official, the pioneers in the area filed their first claims on the land in 1863, and it looked like the valley would develop permanently (Chalfant 1922:193).

These nascent towns were important because they formed the loci for later settlement in the valley. Yet the influx of settlers, and expecially of farmers and ranchers, was not yet substantial. When the army moved a fort into the valley in 1862, there were very few sources of food for the soldiers (Cragen 1975:8,24). Only in the next three or four years did enough people enter to support non-agrarian settlers. The driving force of permanence in the valley, and the solid bedrock on which the valley was to be developed over the next forty years, was the settlement by farmers and ranchers in the early 1860s that began populating the entire valley. The impulse for rapid increase of farmers and stockmen was the drought that afflicted western Californian grazing and growing lands from 1862 to 1864 (Smith 1978:180; Cain 1961:28). Searching for adequate pasturage for their hungry stock, sheep and cattle raisers from the Central Valley drove their herds into Owens Valley and Mono Basin. Crossing over Walker Pass, these men drove north through Owens Valley and into lower Mono County. Later, in developing a route that remains in use today, herders would push their stock over Sierra passes in Mono County into the northern part of the Central Valley, and complete their circle of travel for summer pasturage. Some of these stockmen made their permanent homes east of the Sierra, so that by 1870 the Mono County government assessed $107,150 worth of resident stock (Beck and Haase 1974:73; NCHRSP 1940:23-25). Others were so pleased with the pasturage east of the Sierra that they continued making the summer journey annually, providing a steady stream of traffic through the region.

In a remote area like the eastern Sierra, cattle and sheep proved to be an ideal product because, unlike minerals and farm produce, they transported themselves to market. Early farming was hindered by the lack of a reliable, nearby market for produce. Consequently, agricultural pursuits never developed very quickly in the 1860s and 1870s. Nevertheless, the residents of the eastern Sierra had to provide for themselves, and they found a temporary and unstable market in miners and prospectors. Although beef was a staple food for many, most enjoyed a mixed diet of meat and local vegetables. William Brewer (Farquhar 1930:538-539) provided evidence of farm surplus in 1864 when he bought vegetables and dairy products from local producers in Round Valley. He paid 10¢ a pound for green peas in the pod, 8¢ for a dozen

radishes, and 75¢ for a pound of butter. Brewer remarked not only at the relatively high prices east of the Sierra, but also noted that greenbacks were worth but a third of their face value in gold in the valley, an indication perhaps of the primitive state of the region's economy. Early county records mentioned other agricultural developments in tax records. By 1867, two thousand acres had been enclosed in Inyo County, and six thousand in Mono County. In both places the principle crop was barley, but a number of other crops were also raised for human and animal consumption (Chalfant 1922:208-210; NCHRSP 1940:23-25).

The final development ignited by mining east of the Sierra, and one of the most important, was the establishment of government in the 1860s. As most white Americans had done before them in moving to the unsettled west, the early prospectors east of the Sierra established forms of self-government. To accomplish this a number of miners came together and defined the boundaries of their "mining district." They then drew up rules and procedures for establishing claims to mines and for resolving disputes (Paul 1947:214-217). The land of the Coleville, Bodie, Benton, and Owens Valley planning units fell within the jurisdiction of a few established California counties, including Tulare, Mariposa, and Fresno, but the distance from these centers of government was so far and so hard to travel that the miners felt they needed their own governments. Without that specific form of informal organization, the mining frontier certainly would have been more chaotic than it actually was in the western United States. Even after Mono and Inyo Counties were formed, the miners continued to rely on their mining districts throughout the 1860s, suggesting that early county government was not very powerful or effective.

Perhaps the first district established east of the Sierra was the Russ District, organized initially in 1860 and reorganized two years later. The Russ District was subsumed by the newly defined Inyo District in 1864, which covered most of the Owens Valley mines. To the north, in what today is Inyo County, men organized the White Mountain district in 1861, located in the hills east of the Owens River (DeDecker 1966:41-51). In Mono County several more districts came into being in the 1860s. The Montgomery and White Peak districts, east of the town of Benton, were organized in or around 1863. In 1865 the Indian district was formed to the south and the west of Benton. On land that is now under the jurisdiction of the National Forest Service, the Lake, Homer, Tioga, and Clover Patch districts came into being throughout the later 1860s and 1870s (DeDecker 1966:26-27; Wasson 1879:iii,vii; NCHRSP 1940:19). These forms of self-regulation brought the first sense of order to previously ungoverned land. Though none of them was organized around mines that ever proved remarkably successful, they endured for a number of years as the only effective form of government in a terrain that was hard to travel and hard to endure.

On April 24, 1861, by act of the California legislature, Mono became the first mining county east of the Sierra. Formed from parts of Fresno and Mariposa counties primarily, the county at first represented an unsuccessful attempt to bring governmental order to an area rapidly filling up with mines. Since at that time the exact boundary between Nevada and California was vague, Mono selected the booming town of Aurora as its county seat. When it was formed, Mono County included much of what is today Inyo County, its southern border extending south beyond Big Pine Creek (Cain 1961:10; NCHRSP 1940:3-6).

As soon as the county was formed it experienced an election scandal. In 1861, during Mono's first involvement in the state election, men in the White Mountain Mining District in the southern extremities of the county cast far more votes than there were people in the area. When the suspicious losers of the election investigated, they found that the names of the non-existent voters came from the passenger list of a Panama-to-San Francisco steamer (Chappell 1947:239; Chalfant 1922:92-95). Mono County had made its inglorious debut in state politics.

Virtually as soon as it was formed, the huge county of Mono began to lose residents. In 1863 the Houghton boundary survey between Nevada and California discovered that Aurora, the boom town and county seat, lay three miles within Nevada, and it soon became the seat of Esmeralda County in that state. When Mono lost Aurora, much of its initial population disappeared as well. The county needed to find a new seat, and in 1863 the three main competitors for this honor were Monoville, Owensville, and Bridgeport. The residents of the county established their seat at Bridgeport, the agricultural center in Big Meadows, making their county seat at a town that promised, unlike Aurora and Owensville, to be more permanent (Cain 1961:11-13; NCHRSP 1940:8-11). In the next year, 1864, Mono survived another crisis when the whites in the northernmost valley sought to secede from the county. Coleville had been founded by an obscure man named Hartshorne in the early 1860s. Voters in the town petitioned to be annexed to Alpine County in 1864, perhaps as a result of being so distant from the center of government. Although three-quarters of the town's voters favored the move, the petition was killed in the California legislature (Maule 1938:25).

Mono lost more area in 1866 and 1870 as a result of the formation and expansion of Inyo County. Residents south of Mono had originally petitioned to form Coso County in 1864, but through lack of activity the motion defaulted. Two years later the same petitioners succeeded in establishing Inyo County out of portions of Tulare and Mono County on March 22, 1866. At that time the southern boundary of Mono was moved up to Big Pine Creek, and four years later Inyo purchased for $12,000 another chunk of Mono County, including the present town of Bishop, making the borders approximately what they are today (Cain 1961:10; Chalfant 1922:201,211-212). At the time of its formation, Kearsarge, a mining town located high on the eastern slope of the Sierra, competed with Independence for the position of county seat. Steering clear from the rugged and inaccessible location of Kearsarge, which was later partially destroyed by an avalanche, county residents selected the well-planned community of Independence, near the post of the United States Army, as its county seat. After weathering dissensions within the county that threatened to have the northern part returned to Mono in the early 1870s, Inyo went on to become the second largest county in California (ICBS 1966:35,37; Hill 1969: 13).

This completion of county government, and its concomitant involvement in the matters of the state and nation, finished the first cycle of white settlement of the lands east of the High Sierra, a cycle that had begun with the first explorers and miners interested in the area. Despite the unfavorable image of the land created by its early explorers and held in official circles, Americans proved that Inyo was a viable place to settle. Yet, it should be remembered that white agriculture, industry, and settlement had not

been the first habitation of the valleys and basins east of the mountains in California. Whites superimposed their settlements on lands long inhabited by Indians. The conflict of interests between white and aboriginal peoples was bound to create tension between the two groups. We cannot really understand the beginnings of white habitation of the valley until white interaction with Indians is discussed.

Chapter 3

The Clash Between Indians and Whites in Mono County and Owens Valley.

In general, Indians east of the Sierra did not suffer the extreme troubles of western tribes as a result of white settlement in California. Aboriginal peoples along the California coast and in the central valleys stood in the path of the missionaries, the argonauts, and those intent upon carving great farms and estates out of California lands. The unfavorable attitudes toward land east of the Sierra, and the relatively slow influx of whites into that area, spared the Indians there some of the misery suffered by the coastal and valley tribes. However, Indians east of the Sierra shared some of the plight of those in the western part of the state.

In Mono, contact between whites and Indians was among the least violent in California. A. L. Kroeber wrote that, though the Mono Indians had initially been a comparatively small tribe, by 1925 they were "the most numerous body of Indians in California" (Chappell 1947:234). The inhospitality of rugged Mono County had prevented the onrush of white civilization, giving the Indians there some protection and isolation from the destruction that white men brought to other Californian tribes. Some of this comparatively peaceful coexistence also seemed to result from the passivity of many of the Indians. Ella M.Cain relates the account of an old Indian chief who kept abandoning his homes as white men increasingly settled the lands that included running water. Although angered by the whites' encroachments, the chief passively gave way to the settlers' explanations of the law of the white nation. While not representative of every relation between whites and Indians, the encounters of this old chief symbolize the general pattern of peaceful withdrawal effected by Indians in Mono in the face of white invaders (Cain 1961:26-28,90,117-121).

To the south of Mono county, in the long narrow path of the Owens River, Native Americans had dwelled for thousands of years. These bands of hunters and gatherers, while belonging to the family of Great Basin Indians, and suffering some of the problems of survival in that dry climate, enjoyed the environment of the richer Owens Valley as their habitat. Until the late 1850s these people had lived secluded from the white man. Upon the arrival of Anglo-Americans in eastern California, the Owens Valley Paiute faced a severe and penetrating challenge to their centuries-old culture.

The whites who came to the Owens Valley, just as across the rest of the country, held contradictory attitudes toward the tribes and cultures of the area, and never really understood them. In travelling the region in the mid-1850s, state surveyor A. W. Von Schmidt thought that the Indians were in "poor condition." Later, the Indians were characterized as renegades from other areas of California, as if that explained the troubles about to arise in the Owens Valley (Chalfant 1922:74,76-77).

For the most part these unfavorable impressions were in the minority. Although Captain Davidson, on his trip to the valley in 1859, had begun with the assumption that the Indians were horse thieves and renegades, his observations changed his mind. When Davidson finally communicated with the natives, after having them flee from his troops, he realized that "these Indians are not only not horsethieves, but...their character is that of an interesting, peaceful, industrious people, deserving the protection and watchful care of the government" (Wilke and Lawton 1976:19). Davidson's attitude was later shared by Colonel James H. Carleton of the California Volunteers, who labelled the

tribe both "inoffensive" and "gentle." By supposing that these agrarian and food gathering people would not have the weapons and the hunting technology to make them dangerous to whites, Carleton and other military officials were probably surprised when war broke out in the early 1860s (Cragen 1975:4-5).

Seeing that the Owens Valley Paiute were largely peaceful, and that the area easily supported the tribe, Davidson went even further. He proposed that the area be made into a reservation. In fact he promised the Indians that their valley would be set aside, thereby forbidding whites to settle there. Provided that the Paiute allow free travel through their valley, and that they "maintained honest and peaceful habits," Davidson was willing to protect them. Apparently, this plan had been approved, or maybe even suggested, by military and governmental officials far from the valley itself (Wilke and Lawton 1976: 21,31; Cragen 1975:12).

Promises made by Davidson only reiterated those already laid out by the Office of Indian Affairs. The first Indian Affairs agent to travel through the valley was apparently Frederick Dodge of the Utah Superintendency in 1859. Though Dodge left a map of his travel, he failed to discuss it in detail with his superior that year (Dodge 1859; USOIA 1859:373-77). Later agents had different and more important contact with the natives. Warren Wasson, working out of the Nevada Superintendency in 1862, reported that the Indians had been promised security, material goods, and land by "officers of the government," presumably including both the military and the Indian agents (USOIA 1862:226-27). In the Owens Valley, as in other areas east of the Sierra, the government had spoken too freely. As Nevada's territorial governor James B. Nye reported in 1861, "the Indians have been promised too much, and led to expect more from the government than it would be possible to perform" (USOIA 1861: 110). In the case of the Owens Valley Paiute, Nye's commentary proved prophetic. Once valuable minerals and grazing lands had been discovered in the area, the inflow of whites could not be restrained in any way by government promises to the Indians, and armed conflict resulted.

Tensions between whites and Indians began to mount as miners and stockmen invaded formerly Indian lands in Owens Valley. By 1863, due to mineral discoveries all around the western rim of the Great Basin and to the drought to the west of the Sierra, the valley had become "a great thoroughfare" (USOIA 1863:106). White cattlemen and herdsmen, hoping to feed their stock or sell it to miners in Esmeralda, Mono, and Inyo Counties, drove their herds through the valley, without doubt the easiest route in the area. The sheep and cattle devoured the seed plants that the Paiutes relied upon for winter food. Moreover, the increase of lumbering in the entire eastern Sierra, as an adjunct to mining developments, tended to deplete the supply of pinyon trees, and in turn the pine nuts, upon which the natives relied for another source of winter food. Not only did the Paiute now lack an adequate food supply, but they also lost much of the surplus which they used to barter with Indians west of the Sierra for other goods (Cook 1976:483-85; Underhill 1941:56; Cragen 1975: 11-13; cf. Davis 1961).

As tensions mounted in the early 1860s, word of the inevitable conflict began to spread. North of Inyo, in the Mono Lake and Walker River areas, tribes heard of the plight of the Indians to the south and pleaded with the Indian agent to resolve the crisis (USOIA 1862:224). Even some whites were acutely aware of the forthcoming problems. Colonel Carleton, commander of the

First Infantry California Volunteers, understood the situation quite clearly. He wrote:

> the poor Indians are doubtless at a loss to know how to live, having their field turned into pastures whether they are willing or not willing. It is very possible, therefore, that the whites are to blame, and it is also probable that in strict justice they should be compelled to move away and leave the valley to its rightful owners (Cragen 1975:4-5).

Never having "strict justice" as their strong suit, the westering Americans who turned up in the Owens Valley continued to reside in the area, ignoring the original users of the lands. They also ignored Pauite demands for tribute and appeals to move off their cultivated and gathering lands (Smith 1978:179). The rift between the two peoples gradually grew larger, pushing both sides beyond reconciliation.

The breaking point was finally reached in the winter of 1861-62. By felling pinyon pines and destroying seed plants with their stock, whites had drastically reduced the natives' supply of food for the winter. Because of the particularly harsh conditions that season, Indians had virtually no other place to which they could turn for food. When they began raiding the herds of cattle that remained in the valley, ironically capturing the very animals who had destroyed the seed plants, whites retaliated by shooting the Paiutes and hostilities soon escalated (Phillips 1977:58-60; Chalfant 1922:96-98). It was never made clear how damaging the Indian attacks on white herds really were. It is possible that Indians may have been blamed for the thefts of other whites, as well as their own, because some whites probably suffered with the Indians that winter. As the party of William Brewer so amply illustrated in 1864, whites were hardly above rustling cattle themselves (Farquhar 1930: 538). In any case, the Indians who Captain Davidson had found so gentle and peaceful in 1859 became hostile and feared by whites a scant three years later.

The specific developments of the war have been treated in such detail elsewhere (Cragen 1975; Chalfant 1922; USOIA 1862 and 1863; cf. Iroquois Research Institute 1979) that the conflict need only be sketched in the broadest outlines here. It should be pointed out that for a large part of the war, whites were not unified against the Indians. Although most settlers, miners, and soldiers in the area hoped to put the Indians down forcibly, agents of the Office of Indian Affairs continued to work for peaceful resolution of the difficulties. In the first stages of the war in the spring of 1862, during early battles around Bishop Creek, Indian agent Warren Wasson met Colonel Evans, who was prosecuting the fighting against the Indians. As Evans and his troops of California Volunteers took command of the white forces, Wasson realized that his peace-making mission had been squeezed out of the foray (USOIA 1862:225-227). The complaints of Wasson were reiterated by John P. H. Wentworth, the Indian agent for the southern district of California, in the following year. Realizing that his office had largely been ignored and pushed aside by the military, Wentworth lamented his plight. After being turned down by the United States Congress when requesting a $30,000 appropriation to subsidize and pacify the Paiutes, the agent vented his disappointment:

> By heeding the reports of its agents, who are upon the

> ground and ought to know the wants of the Indians far better than those who are so remote from them, oftentimes formidable and expensive wars will be averted, and the condition of the Indians vastly improved (USOIA 1863:99).

The military had first appeared upon the scene in the early months of 1862 when it was notified of the troubles between the Indians and white stockmen. A troop of the California Volunteers arrived in the valley just as the Indians laid Putnam's to siege in the vicinity of present-day Independence. The Volunteers, led by Lieutenant Colonel Evans, first drove away the natives and then proceeded to Bishop Creek where a larger battle was under way. The white soldiers had been led to expect that the Indians were not warlike. Upon finding them fighting to preserve the ecology and property of their valley, Evans decided, in view of white traffic and settlement in the valley, that a permanent, protective military post needed to be established in the area to fend off the determined Indians (Cragen 1975:6-9).

After a trip back to the Los Angeles area to resupply his outfit, Evans returned to the valley in June of 1862 and established Camp Independence near the present-day county seat on July 4. Immediately thereafter a short-lived treaty was signed with the Indians at the Indian agent's instigation, and hostilities receded. But when both the Indians and the army began to run out of supplies, and when the Volunteers and the Indian agents could not provide the pacified Indians with the material goods they had been promised as part of the treaty, war broke out again. Once more, the whites had not kept their promises to the Indian tribes, and the natives gained even more reason to distrust and repel the invaders of their valley (Cragen 1975:10-11,21-23,28-34). Hostilities were renewed, prolonging the conflict between whites and Indians.

The methods of the white military, led by Colonel Evans, were to kill or imprison the natives, and to destroy their homes and food supply. While these methods would be ultimately effective, it took the California Volunteers some time to employ them. Evans had at his disposal young, adventurous men who had signed up intending to fight in the Civil War. Having been diverted from the gold rush, these volunteers expected to be fighting Confederates. As a result, they tended to confuse the Indians with the secessionists who had some sway in California and Nevada Territory. Rumors persisted that the Indians had been stirred up by Southern sympathizers. Since the Indians had plenty of their own motivations, these rumors were probably unfounded. Nonetheless, by confusing the Indians with the Confederacy, a good deal of added hostility was probably brought to the war. The Indians, as well as the local secessionists, had to be defeated in order to preserve the Union (Cragen 1975:25-26,28,71,passim).

Thus intensified out of due proportion, armed conflict between the Owens Valley Paiute and whites extended into 1863. As Indian attacks increased in the early part of the year, choking off white traffic through the valley, soldiers and civilians responded harshly. For the most part the Indians fought on an informal basis, though through much of early 1863 they roamed the area in a band of anywhere from 150 to 300 warriors. A group of forty-one Indians was exterminated on the shores of Owens Lake, just east of where the river flows into it, as revenge for the Indians' killing the wife and son of a civilian. Other pitched battles occurred on Owens Lake at the mouth of Cottonwood Creek,

and in the Black Rocks near Bishop (Underhill 1941:39,56; Cragen 1975:47-54, 74-75; Austin 1950:59-65).

The wave of success finally crested in spring, 1863, when a ruthless new commander, Captain Moses A. McLaughlin, replaced Colonel Evans at Camp Independence. Using the same methods employed by Evans but pushing them even farther than before, McLaughlin managed to subdue the Paiutes in relatively short order. Hungry and beaten, the Indians at first trickled and later poured into Camp Independence during the late spring and early summer until about one thousand had finally surrendered. Anxious to dispose of the beaten and troublesome Indians and to dismantle Camp Independence, Captain McLaughlin, heeding the advice of the nearby Indian agents, herded 998 Indians to Fort Tejon in the Tehachapis to confine them to the reservation there. Of the one thousand or so who began the forced march, only 850 finished it. Those who did not finish either died along the way or escaped back to the valley that was their home. The returners would be followed, over the next few years, by a large number of those who had made the journey to Fort Tejon reservation. These Indians gradually sifted back into the economy of the valley which was now controlled by whites. They became farmhands and laborers or performed other jobs. Some even showed up in Bodie during the gold strike there (Cragen 1975: 55-62; Chalfant 1922:146; Smith 1978:178,190; USOIA 1863:99; California Department of Parks and Recreation 1977:15-16; Cook 1976:463,465n).

Although many of the displaced Indians ended up back in Owens Valley, their tribal ways had been severely disrupted. For instance, the contact with whites appeared to undermine temporarily the family and sexual standards of the tribe. In 1859 Captain John Davidson had noticed both the prevalence of chastity among the Indians and the lack of venereal disease (Wilke and Lawton 1976:30,34). In the middle of the strife with the whites, however, just 3 and 4 years laters, the economy and morality of the tribe had been disrupted. White soldiers began taking advantage of the Indian women, and the Indian women in turn looked to whites for food and protection when their own tribesmen were deprived of the ability to provide for and defend them. Squaws began to stay around Camp Independence as early as 1862, angering the Indian men who had themselves been undercut by white intrusions into the valley's ecology (Cragen 1975:30). This repeated a pattern that occurred throughout California. As white men drew Indian women away from their families and provided a market for prostitution by destroying the tribal economies social and familial structures collapsed. Acts of rape and forced cohabitation, and the resulting half-breeds, further decimated the mores of tribal sexuality and family life (Cook 1976:329-346). In ways like these, the tribe suffered from the whites' invasion.

Despite the disruption of the old tribal ways, Indians persisted in the Owens Valley, restoring their family patterns and taking up jobs in farming, ranching, and mining. In 1870, a census counted 1150 Indians in the valley, and in 1877 there were 776, or about one-third of the estimated original native population (Cragen 1975:88,187). The Fort Tejon reservation had been abandoned, for the most part, by the captive Paiutes who had marched there in 1863. Efforts to establish Paiute reservations in western Nevada in 1874 failed similarly (Underhill 1941:56), as Indians chose to keep living in the valley, dependent largely upon the economy of the very white men who had originally dislodged them from their homelands.

When Captain McLaughlin had removed the Indians to Fort Tejon, whites

assumed that the valley would be safer. The development of mining and agriculture, which had been slowed considerably by the hostilities, accelerated once more. But at the same time some hostile Indians, who had not submitted to the soldiers, continued their attacks. Camp Independence, which had been dismantled when Captain McLaughlin marched back to Fort Tejon, was quickly reestablished to protect the valley, and remained there until 1877. With the reopening of camp, most of the Indian attacks ceased. Travelers in the valley still needed an escort in 1864, but the function of the military steadily shifted away from protection against Indians (Cragen 1975:67-72,78-82,ch.8; Chalfant 1922:162-165; Farquhar 1965:136).

With the destruction of Indian ways in the valley and the removal of all obstacles to white development, government officials finally stopped recommending that the region be turned into a reservation. Indian agent John H. P. Wentworth realized that the government's hopes of establishing an Indian colony there had been shattered by white inroads (USOIA 1862:327). One cannot help but think that when Indian agents first reported the hardships of Indian survival in the valley, they added to the unfavorable impression of the land and climate there. Yet, the hardships themselves were imposed not so much by the environment itself, but by white settlers, herders, and miners who found the area an attractive and hospitable region. It is these whites who determined the later character of the valley and its lands, and a discussion of them is now in order.

Chapter 4

Social Development During the Late Nineteenth Century.

With the conquest of the Owens Valley Paiute, the lands of the eastern Sierra opened up to rapid settlement by white Americans. During the next thirty-five years, the Owens Valley and much of Mono County underwent substantial development which shaped their futures heavily and determined to a large extent the present character of the region. Two prominent mining booms took place in the area -- the strikes at Cerro Gordo and Bodie -- and dominated the history of the Coleville, Bodie, Benton, and Owens Valley planning units during the last four decades of the nineteenth century. But before these events are taken up, it would be useful to establish the ongoing developments as a way of defining the setting within which the mining excitements took place.

While the mining rushes had profound and lasting effects on the developing regions, they were primarily short-lived affairs. Agriculturalists began settlements that had a much more permanent character, although in some parts of the study units, even farms were but temporary features upon the landscape. After all, farming at first relied upon the market that miners provided, as did the businesses that supplied lumber, transportation, and water. Despite this dependence, farmers and ranchers lent an air of stability to the lands east of the High Sierra. The hard times that set in after each boom reduced agricultural interests but could not eliminate them as they did mining. The slumps in the region after 1880 attested to the difficulties in the economic sector that supported miners, but the persistence of farmers and stockmen attests to the steady character of livelihoods tied to the renewable wealth of the land.

In Mono County most farming and ranching took place, and still takes place, in the valleys that dot that mountainous terrain. In the late 1860s and the 1870s, Bridgeport, Adobe, Antelope, and Long Valleys and the well-irrigated shores of Mono Lake provided the bulk of farm and pasture lands. By 1867 six thousand acres had been enclosed by farmers and ranchers, of which approximately two thousand were devoted to barley. Sixty individuals claimed a total 23,460 acres of farm and range land in the 1860s, but most of this lay unimproved and unfenced (NCHRSP 1940:23-25). Besides barley, these men tended sheep, cattle, fruit, wheat, oats, beans, potatoes, hay, and dairy products (Chappell 1947:244). Lumbering, especially in the Bridgeport Valley, also occupied the land. By 1880, sixty-four landholders shared 42,078 acres, of which 28,173 acres were improved. A relatively impartial observer suggested that the extent of Mono agriculture was "limited," but it had made a firm and lasting beginning (NCHRSP 1940:24-25; Wasson 1878:58). The orchards of Antelope Valley and the pasturage of Bridgeport and Long Valleys comprised the bulk for this early agriculture (Cain 1961:16).

Farming in the Owens Valley got off to a slower start, but ranching prospered very quickly. By 1867 farmers had cultivated two thousand acres, and had enclosed one thousand. Barley again was the primary crop. Two years later 250 tons of grain were harvested from five thousand acres of cultivated land, indicating the rate at which farming was increasing (Chalfant 1922:208-210). By 1886, a number of fruits and vegetables were produced in the valley,

bringing good prices to growers. Flour sold at $3 for a hundred pounds, hay at $8 per ton, pork at 6½¢ per pound, and potatoes at 1½¢ a pound (Anonymous 1886:27-28).

A promotional pamphlet published in 1886 reported that more than 82,000 acres were still available for cultivation, with two-thirds of Round Valley left for new settlers (Anonymous 1886:5,6,9). Yet one has to suspect that that estimate was too optimistic. Cattlemen and sheep raisers dominated most of the choice "open" land throughout the valley, and probably would have resisted any extensive incursions by newcomers. In fact, in the mid-1870s, at the height of the strike at Cerro Gordo, soldiers at Camp Independence had to dismantle feuds between cattlemen and sheepherders over rights to pasturage and water holes (Cragen 1975:167). Despite promoters' claims to the contrary, the best usable land was beginning to be so full that potential settlers were fighting over it. Though canals and irrigation ditches were being built by farmers, the demand for land seemed to be outstripping the supply.

The destinations of the Americans who flocked to Mono and Inyo counties at this time can be observed in the shifting locations of the United States government land office. Before 1873, the office had been at Aurora as a result of the mining strike in that town and its eventual conversion to the seat of Nevada's Esmeralda County. But on June 1 of that year, the office shifted to Independence, and began accepting claims on land and mines in that area. With the decline of Cerro Gordo in the next few years and the rise of Bodie, the land office had to shift soon after it had arrived in Independence. This time it was taken northward to Bodie. In general it followed the highest rates of population increase in the lands east of the Sierra (Cragen 1975: 132; Wasson 1878:22).

At first, Mono County lost population when the state boundary survey lopped off parts of Nevada, including the town of Aurora, in 1863. Concessions of land to Inyo county in 1866 and 1870 further diminished the population so that in 1870 only 430 people were counted in the county. Just over two hundred of these were voters, and more than three hundred were American citizens. A total of sixty resided in the county seat. Ten years later the population had increased dramatically as a result of the strike at Bodie. Around 7,500 lived in Mono County, with 5,462 being registered voters (NCHRSP 1940:21-22). The federal census tallied 7082 whites, 363 Chinese, 35 Indians (a doubtful figure), and 19 Blacks. Approximately 4100 were native-born, and 3400 were foreign-born, the bulk of the latter group coming from Western Europe and Canada.

Besides farming, ranching, and mining, residents of Mono were involved in lumbering along the eastern and western forks of the Walker River and in the Mono Basin. These various industries, and the business of the county itself, required lines of communication and transportation. Stage lines and roads soon connected Bridgeport, Sonora Pass, Bodie, Aurora, Adobe Meadows, Benton, Antelope Valley, and Mono Lake with each other and with points to the south, east, and west (Maule 1936:17-23; Beck and Haase 1974:51; Cain 1961:17-18; NCHRSP 1940:18-19). Telegraph lines were constructed between Coleville, Bridgeport, and Bodie, as well (Maule 1936:34-35), and the world's first remote power station was built on Green Creek to supply electricity to Bodie (Cain 1961:21-22). The increase in population and activity encouraged the

development of schools, so that 462 pupils and 11 teachers were counted in Mono in 1880 (NCHRSP 1940:26).

The population of Mono was small, but by the 1870s it had already enjoyed some illustrious visitors. In the early or mid-1860s Mark Twain had visited the Mono Basin while searching for the "Lost Cement Mines" of the eastern Sierra. In 1871 he recorded his amusing but generally unfavorable impressions of the area in chapters 37-39 of Roughing It (Clemens 1962). Clemens was followed, of course, by Brewer, who wrote as discouragingly about the area as Twain had. Despite the dislike of these two travelers, however, John Muir found a ranch near the shores of Mono Lake quite pleasant, and spent his summers there on occasion. So did the famous landscape artist William Keith (Maule 1936:31).

Muir and Clarence King visited the Owens Valley, too. It had become a base camp for climbers heading into the High Sierra by the 1870s, and the route up Mount Whitney had its beginning, as it does today, at Lone Pine (Farquahar 1965:153). But these visitors to the valley were comparatively rare, as the valley was largely isolated from the outside world. Though it generally grew faster than the settlements of Mono County, it still developed quite slowly, particularly after the decline of Cerro Gordo in the mid-1870s. Besides Muir and King, the other most famous visitors to the valley in the concluding thirty years of the nineteenth century were members of the Wheeler Expedition, an Army Corps of Engineers scientific survey team assigned to explore the Great Basin (Cragen 1975:93-102). The expedition based some of its activities at Camp Independence from 1870 until the camp's abandonment in 1877.

The selection of Owens Valley as the expedition's base camp seemed to symbolize the character of the valley in the late nineteenth century. On the one hand it was on the fringes of the Great Basin, and as a result it offered many of the hardships of that arid geography. On the other hand, the Owens Valley lay on the perimeter of California, adjacent to the rapidly developing settlements there, but separated by the wall of the High Sierra. This location as a sort of isolated backwater, lying between the turbulent prosperity of California and the dry stretches of the Great Basin, lent to the Owens Valley a motley and unstable character. The population of Lone Pine in 1873, for example, was a mixture of Mexicans, Americans, Indians, Frenchmen, Swiss, and Chileans (Cragen 1975:142). Mining strikes like Cerro Gordo, and Panamint and Darwin outside the study area, created an opening for Oriental workers as well. That ethnic groups could mix so easily suggests that no one element controlled the valley during these years. Partly due to its geographical location, and partly due to its undeveloped character, the society of the Owens Valley, like that of Mono County, remained impermanent, unstable, and not very deeply rooted for most of the late nineteenth century.

Yet some families found this backwater of civilization appealing and meant to settle there. Those involved in agriculture especially strove to create permanent civilization east of the Sierra. Rudiments of this effort showed up mostly in the towns. Bishop Creek, a town of approximately 600, brought the first "religious society" to the eastern Sierra in 1869 with the establishment of a Baptist Church (Chalfant 1922:210). By 1886, the town featured two churches, three hotels, and a public school (Anonymous 1886:5).

The same period witnessed the growth of the first newspaper, the Inyo Independent, located at Independence in 1870, the first telegraph, between the town and the camp of Independence in 1876, and the beginnings of the irrigation system crucial to the agricultural development of the region (Chalfant 1922:212,304,314).

Though it was itself temporary, Camp Independence provided an additional aura of stability to the Owens Valley. Through the 1860s it had helped to establish white settlers in the valley by fighting the Indians, protecting travelers, and providing a market for local meat and produce. In the 1870s, the soldiers stationed near Independence helped to resolve some of the problems associated with accelerated settlement. The struggle among farmers and ranchers for land and water, and the violence and lawlessness associated with the mining booms nearby, required and received the soldiers' attention (Cragen 1975:127,161-62). Local government was well enough organized by the end of the 1870s, however, that it could begin to take care of itself. As a result, when the camp was disbanded in 1877, and the buildings torn down or auctioned off, no great crime wave inundated the valley.

The earthquake of 1872 did much more damage to the permanent residents of Owens Valley than any act of lawlessness and violence in those years. At 2:30 a.m. on March 26, one of the greatest tremors recorded in California shook the valley. One source estimates that the quake would have registered 8.3 on the Richter scale. Indeed, the damage it did to Lone Pine, which was near the epicenter, indicates the size of the movement. All of Lone Pine's adobe houses collapsed in the tremor, killing 29 and injuring more than sixty of the town's population of three to four hundred (Durrenberger 1959:5; Beck and Haase 1974: 4; Smith 1978:186-88). Of the nearly thirty killed by the quake, most of whom were Mexicans, sixteen had no nearby relatives, and they were buried in a common grave that remains on the northern outskirts of Lone Pine today (Mulholland 1894:29). The adobe structures at Camp Independence also caved in, but with no fatalities and fewer injuries. Independence itself, which had been built up largely with wood, suffered almost no injuries at all to its population of 400, since the wood flexed with the quake and did not break (Mulholland 1894:29; Cragen 1975:115,122).

As a result of the earthquake the landscape of the valley took on new features. Scarps that reached twenty-three feet were formed along the eastern edge of the Alabama Hills, and in some places the ground moved horizontally by twenty feet, so that fences were torn apart (Durrenberger 1959:5). Twenty-eight miles north of Lone Pine, the bed of the Owens River sank, and as the river filled up these new fissures the flow stopped to the south for a few hours. About seven miles north of Lone Pine, the ground along the river banks sank, creating a new channel for the river (Mulholland 1894:31-2). The faults and scarps of that dramatic event remain today in the valley, and along with the grave of earthquake victims, serve to remind us of the valley's geological and social history.

Chapter 5

Cerro Gordo, Bodie, and the Carson and Colorado Railroad.

Compared to the slow and steady development of agriculture and settlement in the valley, the bright outbursts at Cerro Gordo and Bodie loom spectacularly. Like the earthquake of 1872, these two mineral rushes shook and realigned the character of the Owens Valley and Mono County planning units. In a sense, they put the lands of the eastern Sierra on the map by stimulating rapid demographic and economic growth and by linking the area, albeit tenuously, to the outside world. Although these mining booms seem anomolous beside the overall pattern of slow and awkward settlement, they typified the approach of most Americans to the region. Unwilling to settle in the lowlands of the study area, for the most part, many were willing to endure great hardship and cultural deprivation atop Bodie Bluff and Cerro Gordo for a few years to strike it rich. These miners, and some later generations of Americans who came into contact with the environment of the Coleville, Bodie, Benton, and Owens Valley planning units, hoped to tap the rich resources of the area but did not want to shoulder the commitments and responsibility of settling there. The miners preferred a temporary stay in the area, hoping as later westerners would to spend and consume its wealth elsewhere. Nonetheless, their frenzied existence in the study areas contributed substantially to the region's permanent growth.

The silver boom at Cerro Gordo, which was the richest strike ever in Inyo County, exemplified these patterns of development. Found as early as 1865, and worked constantly for twelve years, the mines at Cerro Gordo generated travel and wealth in the valley, but as was common in many western mining strikes, the profits from the venture tended to flow away from the valley to large cities and distant capitalists. Nonetheless, the mine stimulated commercial growth, created new businesses in the valley, and connected the region ominously with Los Angeles to the south.

Although a number of legends exist that purport to explain the beginnings of mining at Cerro Gordo (Chalfant 1922:248-49), the most widely accepted history posits a Mexican, Pablo Flores, as the discoverer of the silver veins in 1865 (Smith 1978:26). Flores and his companions managed to conceal their good fortune briefly, but in the next few years word of the strike spread. By fall of 1868, seven hundred souls had made their way to the peak high above Owens Lake, and Cerro Gordo became a full-fledged mining camp. Stage coach lines sprang up, connecting the mine with Owens Valley twice daily, with Nevada twice weekly, with San Francisco via Walker Pass three times weekly, and with Los Angeles once weekly (Nadeau 1948:35-36). Cerro Gordo was on its way to success.

By New Year's Day, 1870, close to one thousand claims had been filed on the area surrounding Flores' strike at Cerro Gordo, and the town itself began turning into a more civilized place. Frame houses began to replace rock-and-canvas shacks, their progress slowed only by the absence of a steady supply of building timber (Nadeau 1948:36-37; Chalfant 1922:249). The town also gained the most meager rudiments of culture--hotels, dancing halls, muddy roads, and a Chinatown (Nadeau 1948:189-190).

However, in both legend and fact, lawlessenss and disorder seemed to prevail over the advance of civilization in Cerro Gordo. The motley population, which contained an array of Americans, Indians, Mexicans, Chinese, and others, sported more than its share of prostitutes, gunmen, swindlers, and thieves. The roads around Cerro Gordo, which also served mines at Darwin and Panamint, attracted more than their share of bandits. The soldiers from Camp Independence were frequently called to quiet the disorders presented by the presence of wealth at Cerro Gordo, but even they were unable to make much of a dent in the tide of crime (Chalfant 1940: 59-61; Cragen 1975:161-62).

Despite its problems with crime and disorder, Cerro Gordo became one of California's richest strikes. Its total output was uncertain in its prime from 1865 to 1877, but estimates suggest that it produced around $17 million in silver. At its peak in 1874, the three smelters that served the mine produced 5300 tons of bullion valued at $2 million, or 400 bars of silver per day (Chalfant 1922:248; Smith 1978:26). The success of Cerro Gordo at this time was due largely to its business organization. Unlike the nearby mines of the late 1850s and early 1860s, Cerro Gordo was developed by big businessmen, and their disciplined organization turned it into a profitable venture. Through industrial organization, Cerro Gordo overcame the problems of the cold and dreary climate and the rough and lawless society.

Mortimer W. Belshaw, a mining engineer from San Francisco, was responsible for most of the success of Cerro Gordo. Belshaw arrived with the earliest of American prospectors at Cerro Gordo, but instead of rushing to the silver deposits he snatched up the primary supplies of lead in the area. Since lead was necessary for the smelting of the silver ore, Belshaw quickly became the kingpin of Cerro Gordo. In control of the refining processes, and later of the water and the roads to Cerro Gordo, Belshaw and his partners soon came to monopolize production there (Nadeau 1965:188; Nadeau 1948:31-34).

Since his control of the silver mines seemed precarious at times, Belshaw strove to extract as much silver as quickly as he could. A proven mastermind of mineral engineering, Belshaw invented a special type of smelting furnace. By September, 1868, he had begun to produce bullion at the unheard-of rate of 120 bars per day, each bar weighing 85 pounds and costing $20-35. From Cerro Gordo, the silver was hauled to Los Angeles by mule, a journey that took between three and four weeks. In another three days it had been shipped to San Francisco, where it was refined further and passed on the United States mint. If San Francisco's refineries were too busy, which occurred frequently because of Belshaw's rapid rate of production, some of the bullion was shipped as far as Wales for processing (Nadeau 1948: 34-35).

Due to its remote, barren location, Cerro Gordo required imported water and lumber, and reliable transportation to prosper, and it got all three, due in great part to the efforts of Belshaw. Straddling the crest of the Inyo Mountains at an altitude of approximately nine thousand feet, Cerro Gordo had no nearby supply of water. This important ingredient for a mining camp had to be hauled by burro or else piped over a distance of twenty miles in order to get to the town. Burros, while reliable, were too expensive for most users. One smelting furnace consumed $120 per day in water. Private

householders were charged 10¢ a gallon, and businesses had to pay 5-8½¢ per gallon. The town's main inn, the American Hotel, had a monthly water bill of $300 (Chalfant 1940:57-58). Yet, the pipelines, which cost somewhat less, were also less reliable and were another aspect of the monopoly of Mortimer Belshaw. Because they froze in the winter they were not very dependable for most purposes. Nonetheless, Belshaw managed to supply his operations with ample water by as early as 1868.

Lumber was another scarcity atop Cerro Gordo Mountain. It was needed for building mine shafts and housing, and as fuel. By 1872 Cerro Gordo began running out of wood cut from its own peak, and the leading entrepreneurs began to look to more distant sources (Likes and Day 1975:38; ICBS 1966:51). One of the town's largest suppliers was Colonel Sherman Stevens, a settler of Inyo who had important financial connections in San Francisco. Stevens developed a lumbering business on the eastern slope of the Sierra by Owens Lake. He constructed a flume along Cottonwood Canyon in order to ship wood to the lakeside. Some of the timber was converted to charcoal there in kilns that still remain along the lake's western shore. The charcoal, which was burned in Belshaw's furnaces, and the rest of the lumber were then shipped across the lake and up the road to Cerro Gordo (Cragen 1975:144, 147, 179; Nadeau 1948:114-115). Naturally, Belshaw built and maintained the toll road that connected Cerro Gordo to the shore of Owens Lake, so the suppliers of water and wood products, if not already under Belshaw's supervision, payed tribute to him in one way or another.

Getting the bullion to the coast of California was one of the developers' largest problems. Until 1873 the production of bullion outraced the abilities of mule teams to haul away the silver. A steamboat transported the bars from the base of the peak across Owens Lake, where mules picked them up and shipped them to Los Angeles. After trying several outfits and operations, Belshaw helped to form the Cerro Gordo Freighting Company, headed by Remi Nadeau in 1873. This arrangement stabilized patterns of shipment for the rest of the boom at Cerro Gordo.

The most important aspect of this shipment was not the method of travel, but the direction. The silver at Cerro Gordo gave the Owens Valley its first consistent link with the outside world. Just as importantly, it fueled the growth of the city to the south -- Los Angeles -- which in later years came to dominate the environment and economy of the area. The rise of Cerro Gordo coincided with one of the first land booms in the Los Angeles area. Just as Cerro Gordo began producing silver, farmers began to flock to the pueblo of Los Angeles. Cerro Gordo provided an ideal market for their crops, and Los Angeles provided an ideal entrepot for the bullion of Cerro Gordo. The five hundred or so mules that hauled cargo between Cerro Gordo and San Pedro harbor near Los Angeles consumed all of the city's surplus feed crop, and the men at Cerro Gordo consumed other supplies from the city's farmers and merchants. Although the silver itself went to San Francisco, its mere passage through Los Angeles sparked a boom in that young town. The two regions became closely linked in a pattern of commercial growth (Nadeau 1948:42-43,88-97). This connection almost produced an early railroad between the two sites that might have altered the valley's growth greatly. When the backing of an independent railroad promoter fell through, however, the Southern Pacific took over the idea, but they extended the rail line no farther than Mojave, re-

quiring the Owens Valley to wait another 35 years to be connected directly to the city to the south (Cragen 1975:149,154-57,166-68,181,184).

The Southern Pacific's reluctance to incorporate Cerro Gordo into their system reflected the decline of mining on that rim of the Owens Valley. In the mid-1870s the railroad sensed correctly that mineral activities had begun to peter out at Cerro Gordo. The biggest deposits started to run dry, and by 1877 all known silver had been consumed (Smith 1978:26; Nadeau 1948:242-47). The only reliable source of water simultaneously ran dry, and the furnaces had to be shut down, though other smelters on the eastern shore of Owens Lake continued briefly to refine ore. Fires plagued the mine works as well. In 1877 one engulfed the largest producer, the Union mine works, doing $40,000 damage, and virtually destroying the company (Nadeau 1948:244-47). Two years later the entire mountaintop had been abandoned. Through the ensuing decades short-lived efforts were made to rekindle activity at Cerro Gordo. In 1911 Louis D. Gordon found zinc and gold at the same site, and the mine returned to production for a few years (Chalfant 1940:58). In the mid-1940s prospectors returned once again to search for more silver, but no significant strikes were made (Nadeau 1948:247). The largely unsuccessful efforts to reopen mining at Cerro Gordo in the twentieth century merely served to punctuate the death it had died toward the end of the 1870s.

The demise of Cerro Gordo came at an inopportune time for the Owens Valley. The depression of 1873, which had long afflicted the rest of California and the nation, began to affect Inyo County in 1875. As Cerro Gordo slumped, miners, teamsters, and merchants enjoyed less business. Other mines began to decline as well. With the onset of hard times some social tensions increased. The Chinese, for instance, suffered increased discrimination at Cerro Gordo as opportunities shrunk for all men. During early 1877 soldiers at Camp Independence had been discharged in a continuous stream. Then on July 10, 1877, the entire post closed down, destroying not only a social center and a source of authority, but also a market for the produce of farmers and the goods of merchants (Cragen 1975:174,180-89). The disbanding of the fort and the closing of Cerro Gordo were signs of the end of the first period of real prosperity in Owens Valley.

To the north, the rising mining camp of Bodie was able to absorb some of those dispossessed by the economic decline in Inyo, and in so doing bolstered the sluggish development of Mono. However, regional economic dependence on Bodie led to the same sort of troublesome transient prosperity that the Owens Valley had developed around Cerro Gordo. At Bodie, just as at Cerro Gordo, everyone in 1879 "assumed at the time that the riches of the mine were inexhaustible" (Smith 1925:76), and Bodie residents came to suffer a similar fate a few years later. Also, just as Cerro Gordo had been discovered as the Mother Lode appeared to run dry in western California, Bodie became a boom town after the silver camps of Nevada and of the Owens Valley began to decline (Nadeau 1965:203). It would become, like Cerro Gordo, one more brief step into the desolate lands east of the Sierra for an impermanent band of men who had no intention of settling in the area and utilizing its resources there.

Even the geography of Bodie resembled that of Cerro Gordo. The town grew up in a barren landscape at the altitude of 8,374 feet, and the mines were closer to nine thousand feet. Like Cerro Gordo, Bodie suffered from cold harsh winters, and the summers were short and very dusty, reflecting the

absence of water. The lack of vegetation allowed the residents no shelter from the winds that swept continually through the eastern Sierra, making life miserably cold in winter and miserably dusty in summer (Smith 1925:67-68).

The forbidding climate may possibly have discouraged some early mining there, but is more likely that Bodie was dwarfed at first by other developments. Gold was found at Bodie in 1859 by some of the hangers-on at the Mono Diggings, and by spring of the next year about a dozen claims had been filed. Yet. the real attraction of the eastern Sierra lay at Aurora to the northeast (California Department of Parks and Recreation [hereafter CDPR] 1977:11). For the next fifteen years or so, as the claims there passed through a number of hands, Bodie earned a reputation for disappointment (Smith 1925:67). A small real estate speculation boomed in 1863, and more than twenty buildings stood on the valley floor the next year. But by 1869 only twenty or so miners remained, poking around the unproductive diggings (CDPR 1977:12).

As the result of a cave-in one of the shafts during 1874, a rich vein of gold was found, which later became the basis for the Standard Mining Company, and serious mining began. Four years later another strike was made, resulting in the Bodie Mining Company, and the real rush to Bodie was on (Smith 1925:68). As miners flocked to Mono from declining camps along the Comstock Lode, the town's population multiplied. In late 1877 between 500 and one thousand people lived at Bodie at the beginning of the big influx of men. Early 1878 witnessed an influx of too many miners for the small, undeveloped town, and some of those who could find no work or food perished in one of the harshest winters on record. But building continued and 350 edifices were up by the end of the year, including fifty bars, fifty brothels and dance halls, twenty restaurants, and several hotels. These facilities served a population of over five thousand. A year later six hundred buildings could be counted, many along a Main Street that ran for one mile. One of the buildings was a new school, which housed forty students in its first year. By 1880 six thousand people of mixed ethnicity had arrived, and the boom at Bodie was in full swing. The town had been hastily thrown together in the matter of a few years, but it was no longer the source of disappointment that it had once been (CDPR 1977:13; Smith 1925:66,70).

The activity in Bodie crested from 1878 to 1881, with a peak population during that period of 15-16,000 people. After that the prosperity ebbed, slowly at first but with quickening pace by 1900 (Hoover 1966:213; Nadeau 1965: 204). At its height the town of Bodie rested on a pattern of rapid and turbulent growth. It featured many of the amenities of civilization during this time. Residents enjoyed, besides the bars, dancing halls, and hotels mentioned earlier, the more exotic luxuries of a racetrack, three breweries, a well-organized red-light district, four daily newspapers, and a volunteer fire brigade. Stage coaches linked the boom town with outsiders. Two banks, the first ones and for a long time the only ones in Mono county, also served Bodie (Nadeau 1965:211-15). Social life in the isolated town revolved for some around such fraternal orders as the Masons and the Odd Fellows, and women participated in churches and fraternal auxiliaries (CDPR 1977:16).

These rudiments of culture, however, were not evidence of a deeply rooted and concerned population. Rather, they reflected the best efforts of a growth that was much too rapid and of a town that was much too transient. The draw-

backs of the instant camp of Bodie were reflected in problems that resulted from a general lack of planning and permanent commitment. Congestion, violence, and crime permeated the life of Bodie throughout its period of prosperity. The town had little local government in its early years, with just two or three deputies. As a result an array of private body guards emerged for those who could afford them and needed them. Those who could not afford private guards formed into vigilante groups, meting out justice as best as they thought possible (CDPR 1977:13). In essence, Bodie was little more than an overgrown mining camp, inhabited by the unsettled types of men who peopled most mining towns of the West. The men were neither good nor bad, but they were generally uncommitted to living in such a desolate place for very long (Smith 1925:65-66). One of the consequences for this oversize mining camp was that it earned a partially deserved reputation for lawlessness. Certainly crime and disorder existed in Bodie, more than in most Californian cities. But R. K. Colcord, a man who lived in both Aurora and Bodie during their primes, reminds us that Bodie, at least, had the pretense of state, county, and local governments during its prime (Colcord 1928:119).

Another set of problems arose from the presence of the Chinese in Bodie. Other ethnic groups, like Italians, Germans, Mexicans, Jews, Irish, Indians, blacks, and Cornish, also lived in Bodie (CDPR 1977:15-16), but it was the Chinese, comprising a Chinatown at the time smaller only than that in Sacramento (Cain 1961:157), who generated the most problems. Like the Mexicans and Indians, many of the Chinese, who were not permitted to join any unions, performed the hardest work at the lowest wages. They toiled in lumbering, hauling, laundries, markets, railroad construction, and restaurants. When times were hard, such as around 1881-82 when Bodie began to decline, sentiment against the Chinese and other minorities rose. As a result of discriminations against them, only a few Chinese were left by 1883 (CDPR 1977:15).

The Chinese contributed to the instability of Bodie by marketing opium and by providing gambling facilities (CDPR 1977:14-15). In part, these were aspects of traditional oriental culture that they had brought with them to the New World. Also, the two vices provided additional income for some Chinese who saw opium and betting as ways to supplement their meager pay. Many involved in the two vices were Oriental, but many were also whites. In a sense these problems added to the stockpile that Bodie had, but they also provided cultural roots for some of the Chinese. The opium and the gambling must have been some sort of consolation to whites and Orientals alike who were confined to that Godforsaken townsite beneath Bodie Bluff.

While all of these problems -- violence, crime, gambling, congestion -- resulted from the deficiencies that accompanied men and women to Bodie, another equally large set of problems resulted from the location itself. The remoteness and the harsh climate made it near impossible for residents of the town to create any sort of stable community life. Travel to and from Bodie was hard and inconvenient, discouraging women, for instance, from migrating there. The absence of efficient and convenient transport to civilization created high prices and scarcities, which added further to tensions among the people at Bodie. The lack of firewood and any other fuel made the cold harder to bear for some (CDPR 1977:16). These sources of discomfort, and human efforts to overcome them, generated plentiful troubles for the community.

But despite the hardships at Bodie, there was money to be made. In terms of output, the mines at Bodie far outstripped those at Cerro Gordo. The total value of the generally high grade silver and gold ore was $21 million. In the peak years from 1877 to 1881, $11,7 million of that sum was produced in gold. The Standard Mine yielded two-thirds of the entire gross output. The very figures suggest to what extent mining at Bodie was a big business. It was completely removed from the subculture of individual panners and prospectors that had dominated mining east of the Sierra two decades before. Consequently, the economic life at the camp was to some degree dependent on outside markets (CDPR 1977:9,17). Moreover, not only did the industrialists have to organize, but the working-men organized as well. The tough, fast, and dangerous work of these hard-rock miners encouraged them to set up their own industrial organization, and the Bodie Miners' Union was established in 1877. By 1880 it had more than a thousand members. This union, which was strong for its day, strove to improve working conditions and to provide mutual benefits. It also became another base for the social life of Bodie in those primitive years (CDPR 1977: 17-18).

The opportunities in mining were almost matched by the opportunities in speculation. One area of speculation was real estate. The property assessments of Bodie shot up enormously fast in the first decade of its existence. In 1870 all property was valued at $316,708. In 1877, values had nearly doubled to $617,120, and in the next year they skyrocketed to $1.5 million (NCHRSP 1940:20). Those who had invested in properties made small fortunes as Bodie became overrun with gold-seekers in the late 1870s. Speculation in mining stocks was another form of legalized gambling, yet there seemed to be more disappointment than success in these stocks. The total amount of dividends paid on Bodie mining stocks was $7 million (Smith 1925:76-77), but the stocks appeared to be manipulated on the San Francisco stock exchange. Stockholders might continually be assessed for more improvements on the Bodie mines, but some of the money may not have been necessary (Smith 1925:77-78). Though the value of the stock rose dramatically in some cases, like that in the Bodie Mining Company which soared from 50¢ to $54 per share (NCHRSP 1940:19), the big gainers were not the little men who had invested, but the capitalists who controlled the mines and manipulated the stocks. Intent on getting as much out of Bodie as they could, the industrialists who developed the town mined not only the minerals but also the town's inhabitants in as many ways as possible.

In order to exploit Bodie to the hilt, the capitalists needed a reliable supply of lumber. The trees were not nearby, but neither were they too far away. Lumber was felled up and down the valleys and the canyons of the eastern Sierra, along the creeks and rivers of Mono County. Much of the lumber was hauled, floated, or towed by snowsled to Mono Mills on the southern edge of Mono Lake, the largest supplier of wood to Bodie. The mill served Bodie from 1881 until 1917, and produced at its peak around 2800 seven-foot railroad ties per day. At first, the operators tried to float their timber across the lake by barge and then haul it to Bodie, but this system proved too inefficient (Maule 1938:37-38; Hill 1969:28). In 1880 and 1881 a narrow-guage railroad was completed between Mono Mills and Bodie, using a good deal of resented Chinese labor. The tracks skirted the shore of Mono Lake and followed Cottonwood Canyon to the town of Bodie (CDPR 1977:18; Cain 1961:17; Loose 1971: 181).

The mill and the railroad, both completed in 1881, served Bodie for a long while, but the mines had already begun to decline slowly. That year was the last of peak productivity. As prosperity seemed to slip away, the gamblers, investors, and hangers-on who depended on surplus money began to leave. In the summer of 1880 the market for real estate sagged, and by fall the stocks in the town's industries had collapsed. As people realized how shallow the veins of ore were, plants began to close down in 1881 and 1882. After 1883 only two companies monopolized all production, and only four or five mines were worked by a residue of 2500 men and women. The Bodie and the Standard companies merged to preserve whatever profits were left in 1887, and managed to operate in the black until 1907, but Bodie was on its last legs. A large fire destroyed much of the town in 1892 and another one leveled even more buildings in 1932. Eighty to ninety per cent of the town was destroyed, and the few residents who had remained through the 1920s left (CDPR 1977:9,18; Smith 1925:76). All that remained in the desolate valley was the ghost town that has since become a state historical park. Bodie had followed Cerro Gordo to its grave, but unlike the silver mine to the south no substantial efforts had since been made by miners to resurrect the town. Summer tourists and a park ranger are today the only signs of life in a town that once sheltered as many as 15,000 people.

The Carson and Colorado Railroad was one of the strange byproducts of this period of mining excitement, and it ironically outlived both Bodie and Cerro Gordo. The line was originally conceived in the late 1870s, though mining east of the Sierra was already experiencing decline. The builders of the C&C hoped to connect Carson City, Nevada, with the Colorado River in southern California. But in the early 1880s, when the road was begun, mining had diminished so much in Mono and Inyo that the tracks from Carson City extended only to Keeler on the eastern shore of Owens Lake, running the length of the Owens Valley (Smith 1978:188-89; ICBS 1966:57; Hungerford 1956:11-14). The builders originally intended to profit from the trade of the mining strikes in the area that the railroad covered, but as the road was finished in 1883 the bottom had already begun to drop out of Bodie. Nonetheless, the road replaced the teams of mules and burros that had been such a frequent sight through the Owens Valley (Nadeau 1948:247). Because of the stagnant mining activity in western Nevada and eastern California, the owner of the railroad D. O. Mills, was forced to sell out to the Southern Pacific in 1900 for $2.75 million. Shortly after the sale strikes at Tonopah, Goldfield, and elsewhere in western Nevada made the line profitable once more, staving off the inevitable decline for twenty or thirty years (Smith 1978:189-90).

Despite its relative lack of success, the Carson and Colorado Railroad influenced the development of the Owens Valley substantially. The line was the valley's first steady and modern transportation to the outside world, connecting it with Reno and San Francisco (Hungerford 1956:8). The function of a narrow gauge railroad in the American West was generally limited to local or regional businesses like livestock, lumbering, and mining. Since these businesses were migratory and temporary, use of these railroads was generally limited, and only two narrow gauges -- the Denver and Rio Grande, and the Carson and Colorado -- survived into the mid-twentieth century. The function of the narrow tracks was to facilitate travel over and through mountain passes. In the case of the C&C, the tracks squeezed over the White Mountains near Benton, connecting western Nevada with eastern California (Turner 1963:foreword).

The railroad stimulated the economy of the eastern Sierra by creating new markets for its agricultural produce in western Nevada, It arrived in the middle of a regional depression and allowed farmers to sell their crops outside the slumping economy of the valley (Anonymous 1886:26-27). But the main interest of the builders of the C&C was mining. As a result, the tracks travelled down the eastern side of the valley, bypassing each of the major settlements that had emerged on the western side of the Owens River, where all of the irrigation was available for farming. Each permanent settlement had to build a station across the river and to the east in order to be served by the narrow-gauge. Bishop utilized the town of Laws, Big Pine the town of Alvord, Independence the station at Kearsarge (which was originally called Citrus), and Lone Pine developed Mount Whitney Station. The tracks also skirted the northeastern shore of Owens Lake, where in later years they provided transportation for the non-metallic minerals extracted from the lake bottom (Krater 1975:8-9; Hill 1969:9).

Despite the comparatively long life of the Carson and Colorado, it was doomed to extinction from its earliest days. Mining activity never picked up substantially enough in eastern California to warrant full-time service, and the strikes in western Nevada were temporary. Towns like Tonopah and Goldfield did provide a market for farmers, but most of the business and the ore went away from Mono and Inyo toward Reno and San Francisco. Competition began to erode the activity on the narrow gauge line. The Southern Pacific extended its standard gauge tracks from Mojave to Owenyo in 1910 to provide transport for the construction of the aqueduct, and traffic began to come from the south (Hungerford 1956:8). Along with most other American railroads, the C&C was also jeopardized by the building of good highways and the increased use of automobiles and trucks. Business along the Carson and Colorado line fell off in the 1920s and 1930s as passable roads connected the Owens Valley to Los Angeles. Finally, when Los Angeles completed its aqueduct in the 1920s and 1930s, the railroad lost the business of the valley's farmers. Though it still made regular trips through the 1940s and 1950s, the C&C fell into gradual disuse. By 1963 it had been almost completely dismantled (Turner 1963:foreword; Hungerford 1956:8; Smith 1978:190; ICBS 1966:59).

Though it had originally been intended to serve as an adjunct to the mines, the Carson and Colorado diverged importantly from the extractive industry because it remained to serve the valley long after it was really very profitable. The operators at Cerro Gordo, Bodie, and other strikes had no such commitment to nearby regions. They came to exploit the area's wealth but were seldom willing to settle and spend their profits there. Mono and Inyo still did not seem attractive enough to draw these ambitious men and women into the permanent settlements. This attitude toward the lands east of the high Sierra was shared by more than miners, however. The city of Los Angeles tended to view the valley in the same way around the turn of the century. It coveted the water of the Owens River, but it did not value the lands of the area very highly. Like the miners, the citizens of Los Angeles wanted the wealth of the valley and were willing to build an expensive aqueduct to tap it, but they did not feel committed to contributing to the settlement and growth of the valley. However, before the subject of the aqueduct is raised the social conditions of the region in the first decade of the twentieth century need to be explored.

Chapter 6

Mono and Owens Valley Around the Turn of the Century.

Since the demise of the boom at Bodie, the economy of Mono County had slumped. Mining still took place in Mono, and some drilling for petroleum had begun by 1900, but in the valleys and basins of the Bodie, Benton, and Coleville planning units livestock and agriculture predominated. Along with these mainstays in the Mono economy, new elements came to be noticed. The presence of the federal government in land management and the beginnings of hydroelectric power foreshadowed forces that would loom large in Mono during the twentieth century. Despite these trends, economic growth remained especially slow. The region remained isolated, for the most part, from other parts of the west, and the population remained small. In 1908 approximately thirty-five hundred people lived in Mono, with three hundred at Bridgeport and eight hundred at Bodie. In light of Bodie's previous peak near 15,000, these figures seem startling and demonstrate the sagging development of the region (McIntosh 1908:12-13).

Livestock comprised the bulk of agricultural activity in Mono. The seasonal transhumance brought more than 200,000 sheep into the valleys and mountain passes of Mono each year, with about one-sixth of that number residing in the county year round. The sheep were joined by cattle, which lay the basis for a budding dairy business. These herds resident to Mono frequently belonged to the largest landholders in the county, for the valleys and basins had been divided up into substantial parcels by the turn of the century. The Rickey Land and Cattle Company owned 35,000 acres in the Coleville area, including virtually all of the town or Topaz, and another 12,000 in the Bridgeport Valley. Other large landholders around Bridgeport, who did not come near to equalling Rickey's holdings, were C. E. Day, N. B. Hunewill, and W. T. Elliot. All of these large owners also held positions in county government (McIntosh 1908:20-56,60,74).

Besides ranching and herding, other crops were raised in Mono, though on a much smaller scale. The nearby farms grew poultry, cereals, fruits, and vegetables on approximately 22,500 irrigated acres of land. Because of the area's short growing season, these farmers must have had to work quite hard to turn a crop. Yet, it seemed necessary that they do so. Mono was still isolated from the rest of California and the West. Only the Carson and Colorado Railroad, which traversed the southeastern corner of the county, connected the region with other parts of the West. The other nearby railroad, from Mono Mills to Bodie, did not even leave the county (McIntosh 1908:52). As a result, prices on imported produce were high. At the same time, the markets for crops grown in Mono were minimal, further inhibiting the county's economy. Transporting produce to and from Mono was too difficult, thereby setting limits on both agricultural export and import.

Besides the 68 miles of railroad, Mono had 300 miles of public roads in 1908. These connected the major towns of the county--Coleville and Topaz, both of which lay on Rickey's lands, Bridgeport, Bodie, and Benton. The county seat, Bridgeport, had only three hundred residents, but it enjoyed the benefits of its central location. It had public schools and telephones by the

first decade of the twentieth century. Bodie, to the east, still retained a population of 800, many hoping for the renewal of mining there. Like Bridgeport, Bodie had telephones, but it also had telegraph connections and piped water, luxuries which Bridgeport then lived without (McIntosh 1908:12-13, 68-93).

As a result of its mining, Bodie had also developed one of the world's first long distance hydroelectric power systems. In 1892 a plant on Green Creek, some fourteen miles away, began to transmit electricity over wires to Bodie (Reveal 4). In 1910, 1917, and 1927, three other power houses were built on Rush Creek and Mill Creek in Mono, foretelling the prominent role that hydroelectric power was to play in the later life of the county (Reveal 4). In later years it would be Los Angeles who capitalized on the downpouring streams of the eastern Sierra in Mono by building power plants.

Long before the city of Los Angeles made its presence felt in Mono, however, the federal government had become a fixture. This process became formalized when the Sierra Forest Reserve was established in 1893, protecting more than four million acres of forest in five California counties. In 1907, when "timber reserves" were redesignated "national forests," parts of Inyo and Mono county became the Inyo and Toiyabe National Forests (ICBS 1966:77; Farquhar 1965:213-214). As a result of this new regulation of land, sheep grazing in Mono was somewhat curtailed. Restrictions on land usage in the national forests diminished the number of animals that flowed through Mono each year (McIntosh 1908:45; ICBS 1966:77).

The federalization of forest lands affected Inyo County as well, but the economy there rested upon a much stronger footing. The Carson and Colorado Railroad, which skirted the centers of Mono's population, ran much nearer to the bigger population centers of the Owens Valley, providing both a mode of export for farm produce and a mode of import for other goods. The longer growing season supported more crop production, though, like Mono, the Owens Valley largely depended on livestock. Just as in the county to the north, Owens Valley residents produced some fruits and vegetables, but they concentrated on feed crops like alfalfa (Bishop Chamber of Commerce [hereafter BCC] 192?:6-8). These combined industries of farming and ranching began to reach their peak around 1912 (ICBS 166:65).

The prosperity of the Owens Valley was limited, particularly when compared to booming places like Los Angeles. But its modest economy supported the inroads of American culture in this strip between the High Sierra and the White-Inyo range. Frame houses continued to replace adobe structures as the valley residents prospered beyond their pioneer economy. Trees were planted, and forms of social organization--clubs, churches, schools, and a vigilante committee known as the "145"--appeared. Unlike the settlements in the Coleville, Bodie, and Benton units, the people of the Owens Valley were strongly linked together in a chain of towns that ran the length of the valley, each sharing the river and the railroad as common communication channels (Smith 1978:190-91). It was these towns that formed the core of the valley, and the basis for its common identity.

Foremost among the towns of the area loomed Bishop at the head of the valley. In 1909 its population numbered around 1200, and it had acquired

power and water, a post office, telephones and a telegraph, six churches, and four schools--a high school and a grammar school, and classes run for both Adventists and Indians (Owens Valley Chamber of Commerce [hereafter OVCC] 1909). After getting a bank, a public high school, and a utility company in 1902, the town was incorporated in 1903 (Smith 1978:191-92).

While the slow but steady growth of Bishop could be sustained by local citizens, faster rates of development seemed impossible in the valley. Efforts to plan a development community at Manzanar demonstrated the retarded potential for growth. Halfway between Lone Pine and Independence, Manzanar, or George's Creek as it was known at the turn of the century, was a settlement of cattlemen. They enjoyed the good pasturage of the area, and had established a stable town. In 1906 the Owens Valley Development Company purchased the Shepherd Ranch in that area, subdividing it into a number of smaller fruit ranches, one of which officially became the town of Manzanar. However, the developers' scheme failed, as the valley was not able to support such a concentrated growth (Krater 1975:62-63). The efforts of speculators, which had been so instrumental to other parts of the American West, found the going hard in the dry valley. Settlement there had to be undertaken at a natural pace.

To the south of Manzanar, another community exemplified one other aspect of the valley's growth. Although whites had always dominated the valley's non-aboriginal population, a strong Mexican community sprang up in Lone Pine. The Mexicans had arrived at Lone Pine during the mining rushes around the valley, and a deeply rooted community remained there. Mary Austin (1950:97-103) depicted the foreign community sensitively in 1903 in The Land of Little Rain.*

Northeast of Lone Pine, another community was begun around the turn of the century by Quakers at Owenyo. The town, which was located at the junction of the Southern Pacific standard gauge from Mojave and the Carson and Colorado narrow gauge, became the center for a 13,000 acre settlement project by William Penn Colonial Association. The Quakers dug out some forty-two miles of irrigation canals, but it soon became apparent that those easterners were quite unprepared to work the arid lands of Owens Valley. Like the sub-dividers at Manzanar, the Quakers were among the first to sell their lands when Los Angeles came buying in the first decade of the twentieth century (Smith 1978: 34).

Just off Highway 395 north of Independence, a small cemetery is the only concrete evidence of another group of religious migrants. Around the turn of the century four Prussian Jewish families arrived in Owens Valley, having traveled from Europe via New York and San Francisco to settle in the Owens Valley. The Jewish settlement there did not really last as the families dispersed, but it endured just long enough for the Jews to begin their own cemetery so that their people would be buried together. The four graves just north of Independence remain as testimony to their efforts (Krater 1975:17-26).

The Basques were another European group present in the Owens Valley and Mono County. Since they came and left as sheepherders, little was ever re-

*Austin's own tragic life in the valley (Krater 1975:31-42) was a segment of the community of Independence at this time.

corded about these men. Actually, many who were labelled Basque were in reality French, Spanish, Mexicans, and Portuguese, which tends to blur our picture of them substantially. These European herders had come to North America as early as the 1850s, working primarily in western California. Some Basques had apparently reached the Owens Valley and Mono Basin by 1865, but they did not arrive in large numbers until the setting for Basque herding began to shift from central and western California to the Great Basin during the close of the nineteenth century. By the 1890s the presence of transient Basque sheepmen in Inyo County was recorded in the Inyo County Sheep License Book, where in 1896-7 all but two of the 34 licenses went to Basque or French herders (Douglass and Bilbao 1975:236, 249-251). In Bishop, the establishment of a hotel catering to Basque and French herders offered further proof of the Europeans' presence in the area, and suggests that they liked to keep to themselves in order to maintain their culture in the face of Americans. Comments like that of Mary Austin, who belittled Basques as "little dark men" who cared nothing for her valley, indicate why Basques perhaps strove to remain aloof from the natives (Douglass and Bilbao 1975:373, 249). Moreover, many who migrated to the United States never planned to stay. Like the miners who had come to the planning units of Coleville, Bodie, Benton, and the Owens Valley, the shepherds wanted only to exploit the lands without settling there.

For permanent settlers in the Owens Valley and the valleys and basins of Mono County, survival posed a different set of problems. To establish lasting settlements the residents literally had to dig into the dry lands to build systems of irrigation. The Paiutes were the first, of course. They built an extensive network of ditches which allowed them to irrigate "nearly all the arable land in that section of the country" (USOIA 1863:226, Lawton et al. 1976). When whites moved into the area, they had to channel the water to their lands, too. At the Monoville mines, an expensive ditch was dug by Chinese labor to provide water to the remote diggings (Chappell 1947:236-37). To the south, whites began to settle where the Indians had dwelled before them, along the river and stream banks. Whites also took over the ditches the Indians had dug, using them to irrigate farmlands just as the Pauite had (Wilke and Lawton 1976:19, 40, 46-47; Lawton et al. 1976:32). As the number of settlers rose in Owens Valley, conflicts over the limited amount of water arose. Farmers and ranchers clashed over water as both tried to employ it in their own interests (Austin 1950:81-82).

As the prime lands along the streams of Owens Valley were taken up, new arrivals began to choose lands that lay farther away. To avoid the conflicts that had permeated the valley since white clashes with Indians, and to prosper as farmers and ranchers, residents began digging their own canals. The first white irrigation projects of any size were undertaken in 1878, when the Mcnally Ditch near Laws, the Bishop Creek Ditch, the Big Pine Canal, and the Lone Pine Ditch were planned. Work began on the Owens River Canal and the Inyo Canal in 1887 (Smith 1978:188). Most of these canals tended to run parallel to the river, with many begun north of Bishop. By 1906 nineteen canals could be counted in Owens Valley (Blunt 1906). By 1910 artesian wells had been successfully dug and employed to irrigate the valley (Smith 1978: 191-192), Water seemed abundant. The combination of plentiful water and prosperous agriculture had overcome the doldrums that characterized the economy of the Owens Valley after the decline of Cerro Gordo. Residents of the valley looked forward to a bright future. Just beyond the crest of their horizon,

however, lay the aqueduct controversy, which would demolish the valley residents' aspirations.

Chapter 7

Los Angeles, the Aqueduct and the Water Controversy.

The story of the Los Angeles aqueduct, one of the strangest and most interesting in California's history, has been told by many other writers. They have dealt with that topic in much greater detail than can be achieved in a cultural resources overview, and have provided bibliographic information for further work. Rather than restate the findings of those others, this report will stress the broader contexts and lines of development in the controversy, giving special attention to the impact of the aqueduct on the valley's lands and people. But before pursuing those ends, one should put previous studies on the controversy into historiographical perspective.

The early histories of the aqueduct controversy echoed the ongoing debate between the city of Los Angeles and residents of the Owens Valley. The forces aligned against the city were represented by the works of Willie A. Chalfant (1922), Morrow Mayo (1933), Carey McWilliams (1946), Will Rogers (New York Times, August 26, 1932), W. T. Spilman (1912), and Richard Coke Wood (1933). Recently, William L. Kahrl (1976) has taken a more neutral stand, but his is flawed by factual error and a continued tinge of bias against the city. Los Angeles argued its position in a number of reports and unpublished documents. Donald J. Kinsey's The Water Trail (1928) was representative of the pro-city point of view.

Since the original arguments were outlined from 1912 to 1946, revisionists have taken up the issue in an effort to move beyond the emotional and passionate accounts of the earlier writers. Because these revisionists have spent much of their time resisting the vociferous anti-city writers, they seem to be pro-Los Angeles at first. Despite that appearance, however, "neutral" historians tend to criticize both the city and the valley. Their most prominent works include pieces by Walton Bean (1973), Abraham Hoffman (1972), Judith and Neil Morgan (1976), Remi A. Nadeau (1950), Vincent Ostrom (1953), W. W. Robinson (1963), and Genny Schumacher Smith (1978). These more objective accounts of the aqueduct controversy demonstrate the complexity and ambiguity of the issues. They show that interpretations which emphasize the fault of one side or the other necessarily offer incomplete and distorted history. One writer even goes on to suggest that a great deal more work needs to be done in unpublished sources (Hoffman 1972:239). This indicates that much of the writing on the aqueduct controversy has been based on incomplete files of information.

Another shortcoming of most of the works on the Owens Valley aqueduct controversy, one which we hope to overcome here, is the lack of proper perspective. Works by both partisan and neutral writers, intent on assigning or dismissing blame, have not really paid enough attention to the broader national and regional contexts within which the aqueduct controversy took place. To understand the conflict, one needs to employ a point of view that encompasses the broader forces prevalent in the United States at the turn of the twentieth century. Specifically, one needs to understand the aqueduct controversy in terms of urbanization.

At the end of the nineteenth century and the start of the twentieth, the American nation was becoming increasingly oriented toward the city. By 1900, forty per cent of the population lived in towns of greater than 2500 people. In 1910, for the first time, the absolute population increase in towns and cities

actually exceeded the increase in rural populations. And by 1920, more than half of the country had been drawn to live in cities and towns. Moreover, these urban areas, long before they attracted the majority of the population, had wielded influence out of proportion to their smaller but growing size. The enormous concentration of people and wealth in single communities proved a great deal stronger than voices in the country. As cities gained in power and size, they also increased their use of resources. Raw materials, food, labor, and even water flowed to urban concentrations for consumption.

Nowhere was this increase in consumption of resources more evident than Los Angeles. The town had been in what seemed like a perpetual boom since the heyday of Cerro Gordo, and the continual influx of people demanded more and more resources. As Angelenos became accustomed to growth and the profits to be made from it, they began to plan for it. Long before they needed the actual resources, men were planning how to bring them to the city. This was especially true in the case of water.

The Los Angeles Basin comprises six per cent of the state's habitable land, but enjoys only .06% of the natural stream flow in California (McWilliams 1973: 183). This small portion seemed adequate until the turn of the twentieth century. At that time the city included approximately one hundred thousand residents, and its phenomenal rate of growth indicated that it would very soon top the two hundred thousand mark (Ostrom 1953:9). Even then, the imminent crisis might not have been recognized had not Los Angeles been in the midst of one of the dry weather cycles that periodically afflict southern California. The dry stretch, which lasted from the early 1890s until 1904, convinced Angelenos that the future growth of their city depended upon attaining water from elsewhere.

One component of the larger process of urbanization that particularly pertained to the boom town of Los Angeles was the commitment to continued growth. It was this that sealed the fate of the Owens River water. "The ethic of growth" (Kahrl 1976:115) demanded the long range planning and building that civic leaders implemented in Los Angeles. The aqueduct, which was a drawn out and uncertain project anyway, was not initially conceived of as a key to the town's immediate survival. Rather, it represented a necessary investment to insure continued prosperity in the future (Ostrom 1953:10). It was essential to the growth of southern California.

The Owens Valley, like Los Angeles, was concerned with growth, and took for granted the steady supply of water that the Owens River offered. Yet the two communities' ideas of growth differed so widely, and the style and attitudes of the residents themselves were so far apart, that conflict between the two seemed almost inevitable. Prior to the aqueduct issue, the growth of the city had seemed beneficial to the valley, but the city had remained distant. Now the expansive city seemed to be encroaching on the valley itself. Two different visions of growth and development came into harsh conflict. The agrarian Owens Valley remained a fortress of rural, nineteenth century American values. Its "conservative and isolated individualism" contrasted sharply with the "boisterousness" of Los Angeles (Ostrom 1953:116). The city, on the other hand, stood for everything that was modern, urban, and progressive in the United States. With these dimensions, the dissension between the valley and the city* was just

* Although I follow tradition in using the terms "city" and "valley" to designate the two sides of the conflict, these labels are somewhat

one of many played out as America grew into the modern age, but it was one of particular force and harshness.

Added to these preconditions for conflict were the vastly different attitudes of each side toward the lands east of the Sierra. Settlers in the Owens Valley had cultivated the land there, like the Indians before them. Though the lands were not as productive as other parts of California, they supported a flourishing livestock industry. As local literature demonstrates (Austin 1950: 46-51), residents of the valley were deeply attached to their land. On the other hand, the city of Los Angeles seemed to inherit the widely shared assumptions that the lands of the Owens Valley were useless, for the most part, for traditional modes of settlement. Like the miners who preceded them, Angelenos admitted that the lands offered valuable resources, but few were willing to live there to enjoy those resources. As most outsiders must have felt, those "wastelands" were there to be exploited, not to be settled. These two different conceptions of the value of valley lands probably added to the frequent inability of the two sides to agree on a price for them.

In 1902, just three years before the city of Los Angeles became overtly involved in the aqueduct project, the United States Reclamation Service began studying Owens Valley in preparation for extending irrigation throughout the basin.** Largely because of the efforts of Joseph Barlow Lippincott, who was employed by both the Reclamation Service and the city of Los Angeles, the federal project was discarded when the city began to show interest in the valley's water (Hoffman 1972). Los Angeles then began to move into the area by purchasing lands adjacent to the river, streams, and canals. In this fashion the city acquired most of the riparian rights to the water in the southern half of the valley. Though their methods were not illegal, the buyers for the city, who were under the leadership of the superintendent of Los Angeles City Water Department, William Mulholland, and ex-mayor Fred Eaton, sometimes employed unscrupulous methods. Posing as ranchers and as agents of the Reclamation Service, buyers purchased valley lands throughout the middle years of the first decade of the twentieth century. By falsely representing themselves, the city's agents were probably trying to avoid any sudden speculation by local landholders, but valley residents later came to feel that a trap had been sprung unfairly upon them.

In obtaining valley lands, the city of Los Angeles received assistance from the federal government. The first two decades of the twentieth century comprised the era of the progressives, who were strong believers in urban reform and municipal ownership. The Roosevelt administration, when it heard of

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* misleading. Some residents of Owens Valley did not object to the policies of the Department of Water and Power, and many profited handsomely by the instrusion of Los Angeles. Conversely, there was some sporadic resistance to the aqueduct from city residents. Neither the valley nor the city were unified in the controversy, as will become clear.

** The following account is primarily based on the studies of Nadeau (1950), Ostrom (1953), Kahrl (1976), and Smith (1978). Citations will be given for an interpretive emphasis. The best bibliographies of the issue were compiled by Ostrom and Doyce B. Nunis (1973:427-434).

the project proposed by the city of Los Angeles, was naturally sympathetic to what seemed like a progressive adventure. It also respected the political and monetary strength of the burgeoning city. As a result, the federal government aided the efforts of Los Angeles by protecting much of the unsettled portions of Owens Valley from the inconvenience of further settlement. This was accomplished when, in 1908, Gifford Pinchot extended the borders of the Sierra National Forest Reserve to include 275,000 acres of valley land, despite the fact that the protected region was virtually treeless (Kahrl 1976:98). This contribution led anti-city writers to conclude that the federal government was an accomplice to "the rape of Owens Valley" by Los Angeles (May 1933:220-246), and probablv encouraged the distrust of the federal government in the valley. After all, it had been the Federal Reclamation Service that, in 1904-1905, had seemed to betray the valley to Los Angeles in the first place.

By the year of Pinchot's action, the voters of Los Angeles had approved bond issues that funded the project, and construction was started. The 233-mile aqueduct, largely the brainchild of William Mulholland, stood as one of the engineering triumphs of the century at its completion in 1913. To finish the project the city had extended railroad tracks to Owenyo, attracting an increased amount of business to the area. It also constructed power plants to provide the builders with electricity, which later benefited valley residents. The aqueduct intake was built at Aberdeen, where the river entered a channel that pulled the water by gravity through a string of reservoirs, pipes, tunnels, and canals to Los Angeles. During the first few years after the completion of the project, the city hardly needed the water for domestic or industrial use, so most of the flow went to irrigate farmlands in the San Fernando Valley.

Though concerned about the actions of the city, Owens Valley residents remained generally optimistic until the 1920s about the future of their homelands. The aqueduct, after all, extended only to Aberdeen, leaving untouched most of the irrigated lands and the riparian rights in the more cultivated northern half of the valley. One promotional tract, which was itself a sign of the residents' confidence, contended in the early twenties that there was plenty of irrigation water left for new settlers:

> Continued appropriation and use has made the water rights of these ditches and canals secure. The city of Los Angeles, in search of a pure and unfailing water supply, turned to the Owens River Valley and filed on the surplus water of the Owens River. This surplus is now conveyed to that city by means of an aqueduct some 250 miles in length. The filings of the city in no way jeopardize existing water rights in the valley (BCC 192?:6).

In that fateful decade of the 1920s, two sets of circumstances combined to shatter the confident illusions of residents in the northern valley. First, a number of factors prevented the construction of a dam and reservoir that would have helped to regulate the inconsistent flow of the river. Because the runoff from the Sierra varied substantially each year, there was no way to be certain of the amount of water that would reach the aqueduct. This worried both valley residents and the city, so in 1921 they agreed to construct a dam at the lower end of Long Valley. In this manner the two parties hoped to create a reservoir to store for later use the extra runoff from wet years. Los Angeles actually began construction on the dam in the early 1920s, but another dispute erupted that destroyed the plan. Valley residents demanded that the dam be fifty feet

higher than the original plan proposed The added height, however, would have flooded more acres, and the city refused to buy these additional lands because the owner, the ubiquitous Fred Eaton, had set too high a price. As a result of this stalemate, work on the dam was stalled for about ten years.

To some historians, the failure to build a dam was the key precondition for the violent clashes that soon followed. Both Remi Nadeau (1950:ch.4,128) and Morrow Mayo (1933:239-240) have argued that if the dam had been constructed, there would have been enough water for both the city and the valley. At the time the failure to complete the dam probably did assure that an acrimonious conflict would ensue shortly. But when one remembers that the city's consumption of Owens River water steadily increased ever since, one suspects that building the dam would merely have delayed what was an inevitable disagreement. Even had the dam been built, the city's fantastic rate of growth would have compelled it to appropriate much more water than the dam could have preserved for valley residents.

A second set of circumstances provided the more immediate cause for the battles that erupted in the mid-1920s. Just as in the first decade of the century, a drought afflicted southern California in the first part of the 1920s. Combined with the fantastic growth that continued in Los Angeles, this latest dry cycle demonstrated the need for the city to expand its holdings in Owens Valley. Initially the farms and ranches of the northern valley had been left with enough water to operate easily. In the dry years of the early twenties, however, these valley residents consumed most or all of the river water before it reached the aqueduct intake. Seeing that it needed to secure more riparian rights upstream, the city launched a new purchasing campaign in the Bishop and Big Pine areas. It hoped to close off the ditches and canals so that all of the Owens River would flow into the aqueduct. The city's new campaigns triggered a series of clashes and retaliations that tainted the reputations of both sides.

When Los Angeles began to purchase lands in the northern half of the valley, it provoked a good deal of intrigue, mystery, and acrimony. In 1923 the city covertly employed the president of one of the largest irrigation canals, the McNally Ditch, to secure options on the land for them. Valley residents viewed this as an act of disloyalty and felt that it served to reiterate the unscrupulous methods of Los Angeles. The residents of the valley themselves added to the problems. Some in the Bishop and Big Pine area desired to sell their lands at the city's prices, and others refused to sell at any price. A third group demanded that Los Angeles meet a somewhat higher price for their agricultural properties. Moreover, they enlisted the voices of town merchants and professionals, who began to seek reparations for the damage the aqueduct had done to business and prosperity in the valley. Despite a number of efforts to resolve their disagreements on price and damages, and disagreeing widely on the value of valley lands, the city and the valley were unable to reach any sort of compromise for most of the decade. Valley residents became increasingly frustrated and turned to bombings and violent threats as a last resort. In their most famous act of desperation, they forcibly opened the Alabama Gates four miles north of Lone Pine in November, 1924. This diverted water from the aqueduct, sending it down a spillway to the abandoned river bed. The five-day siege helped to publicize the valley's cause and garnered a great deal of nationwide sympathy for opponents of the city. But the event had no effect on the ultimate outcome of the troubles.

Students of the aqueduct controversy have focused intently on this desperate behavior for the wrong reasons. Acts of violence perpetrated by residents were not in themselves important. Rather, they reflected a larger dimension of the entire controversy. The violence in Owens Valley during the 1920's was a symptom of the general helplessness that valley residents must have felt in the face of the city's behavior. From beginning to end, the ordeal of the aqueduct was orchestrated by the powerful and wealthy City of Los Angeles. Those who dwelled in Owens Valley could only respond to the city's actions. They felt that they could not determine their own future, that they had lost control of the ability to direct their own lives. This sense of helplessness generated the violence which, if nothing else, lent a false sense of power to valley residents.

The frustrations of the valley residents were heightened by other factors as well. One was the unpredictability of city policies. At first the city merely planned to take the 'surplus' water from the Owens River, apparently meaning anything that remained after valley farmers and ranchers had taken their shares. The continued growth of urban Los Angeles, however, and the unforeseen droughts forced the city to change its goals (Ostrom 1953:128). Valley residents had come to accept the aqueduct by 1920, it seemed, but, when the city sought more lands, farmers and ranchers in the Bishop and Big Pine areas had to readjust their plans and expectations. At all times, valley residents appeared to be subjected to whatever their more numerous, more powerful, and more wealthy rivals in Los Angeles wanted.

Another important set of factors that added to the valley's frustrations resulted from the inability of farmers, ranchers, and townspeople to reach a consensus among themselves. Those who were willing to accept the city's terms sold out and then either moved away or stayed in the valley as tenants of Los Angeles. They came to be seen as traitors by other valley residents, who sought either to hold out for higher prices or to resist Los Angeles altogether. Those who did not want to sell at any price probably resented other opponents of Los Angeles who were merely trying to get more money for their properties. As a result of these different opinions, a great many suspicions, feuds, and community disruptions occurred in the valley in the 1920's. A city report on the conditions in the valley had the following to say in 1928:

> . . . the Valley is, even today, a hotbed of suspicions, prejudices and hatred. Suspicions are mutual and widespread. The Valley people are suspicious of each other, suspicious of newcomers, suspicious of city men, suspicious, in short of almost everybody and everything (Ostrom 1953:130).

Valley residents must have felt that, in addition to Los Angeles, the federal government, and even the weather conspiring invincibly against them, they were conspiring against each other.

The heightened conflict between the city and the valley ended abruptly in 1927. Opponents of Los Angeles had organized behind the leadership of Wilfred W. and Mark Q. Watterson to resist the aqueduct until they received their price. The Watterson brothers operated the only banks in the valley, and represented the only source of loans to valley farmers and ranchers. In August, 1927, the Watterson's banks were suddenly audited and closed, and the brothers were convicted of embezzlement and sentenced to San Quentin prison.

The collapse of the banks destroyed all effective opposition. The valley lost not only its strongest leaders but also the money necessary for resisting Los Angeles. Ironically, some valley residents who had sold out to the city at great gain had deposited their windfalls into the Wattersons' banks. They too suffered from the collapse in 1927 (Morgan and Morgan 1976:103).

In the next few years the city and the valley worked to reconcile their differences (Krater 1975:52-53). The ability to compromise on prices and issues, which had eluded both parties for so long, suddenly made itself apparent. Both parties consented to some arbitration and price adjustments, and Los Angeles proceeded to acquire all the essential land and water rights in Owens Valley. By 1933 the city owned 95% of all farmland. In lieu of paying damages to townspeople who lost business as a result of the aqueduct, the city had also purchased 85% of all town property in the valley (Kahrl 1976: 114; Ostrom 1953:127). Los Angeles now controlled virtually all the lands in the area. It had become the landlord of Owens Valley.

At the same time, the city began to show more interest in "rehabilitating" Owens Valley (Dykstra 1928:9-12). Cognizant of the fact that they were responsible for managing the lands and maintaining harmonious relations on their properties, city leaders launched a new effort to reshape the valley in line with their goals. Los Angeles first of all wanted to protect the watershed that drained into the aqueduct, and resisted certain types of development. But other alternatives, like stock-raising and tourism, were mentioned immediately as the city realized that it could not merely quarantine the valley (Dykstra 1928:11-12). One report proposed the

> establishment and development by the City of Los Angeles of a great park and playground in the County of Inyo, California, including lands of said city, such park and playground to be an integral part of said City of Los Angeles and be governed by said city (Ostrom 1953:126).

Clearly, Los Angeles was now in control of the Owens Valley. That was the greatest result of the controversy over the aqueduct. Its ownership of the rights to land and water, and its need to manage the water supply, dictated much of the ensuing development in the Owens Valley planning unit.

The impact upon the people and lands of the valley was tremendous. At first the valley seemed to slip into an abysmal slump. People streamed out of the valley, cutting its population drastically. Bishop, for instance, suffered a drop in population of 33 per cent (Smith 1978:197). Such a demographic decline intensified the threat to the businesses which remained in the valley. The controversy had also left a legacy of suspicion and distrust that unfortunately remains today. Although the primary division still seems to be between "the valley" and "the city," residents within the planning unit have held grudges against one another (Nadeau 1950: passim).

Land use has also changed drastically in Owens Valley as a result of the aqueduct. For one thing, there was simply less land to farm. The city ultimately acquired about 99 per cent of all privately owned farm lands by 1945. Furthermore, the federal government had withdrawn another "675,924 acres of public land from homestead entry to protect Los Angeles' water rights" (Ostrom 1953:127). The city leased a tiny fraction of its 278,055

acres to farmers and ranchers, so agriculture persisted in the valley. However, the city was given priority for water from the Owens River, so no farmer or rancher in the valley could ever be assured of a steady and certain supply to irrigate his lands. Farming tended to decline as a result of this uncertainty. Because the livestock industry required a good deal less water, it remained in the valley, and some feed crops were also grown (Smith 1978:197; Ostrom 1953: 134). But for the most part, agriculture could never again be the dominant way of life in the valley, as it had been before the coming of the Los Angeles aqueduct.

For a few hard years at the beginning of the 1930s, economic growth in the valley came to a virtual standstill. But with the encouragement of Los Angeles planners and with a concerted effort by local businessmen, the valley came out of the slump after 1935 (see chapter nine). The city of Los Angeles has since encouraged the growth of tourism and recreation in the area, and ironically it has been Angelenos who have taken the greatest advantage of this new playground (Ostrom 1953:137-138). While business in Owens Valley increased as a result, actual development of the lands in the region has been halted, or even reversed since the aqueduct. Genny Smith (Smith 1978:197) viewed this development as the sad return of the sagebrush. But with today's enhanced interest in preserving the environment and retaining natural settings, others have seen the retarded development in the valley as a blessing in disguise. By halting growth in the area, the city of Los Angeles protected, in a sense, the environment of the valley. (In the 1970s this protection has seemingly been weakened as a result of increased pumping of the groundwater. See chapter nine.) Even if it was not intended as such, the aqueduct has encouraged the conservation of the valley's natural resources (Morgan and Morgan 1976:127). Moreover, because the aqueduct mostly uses gravity to move the water, rather than any polluting consumption of fuel, and because the city has provided relatively clean and cheap hydroelectric power, the aqueduct project has contributed to a comparatively clean environment.

Not content to be satisfied with the water from the Owens River, the ambitious and expectant leaders of Los Angeles began to extend the reach of the aqueduct to Mono Basin in 1930. After city voters had approved funding for the project, the Department of Water and Power started to tap the streams that flow down the eastern slope of the Sierra into saline Mono Lake. By diverting Rush Creek, Leevining Creek, Mill Creek, and Gibbs Canyon Creek into a new reservoir at Grant Lake, the city acquired additional water for its residents. From Grant Lake a pair of lengthy tunnels and three miles of conduit transported the flow under Mono Craters and into the headwaters of Owens River (Ostrom 1953:21). To complete this project, the city had to buy the land and water rights that enabled it to secure the stream flow. It also received aid from the federal government, which allowed it to use some federal lands and authorized it to buy additional lands at the cost of $1.25 per acre (Ostrom 1953:139-140; Dana and Kruegar 1958:255; Yongue and Harris 1975:1,10).

The Mono extension was met with virtually none of the hostility that attended the acquisition of land and water rights in Owens Valley. First of all, the city had established itself on the eastern side of the High Sierra, and no longer seemed to be such an offensive and strange force. Secondly, the Mono Basin was much, much less densely settled and developed. There were a

great many fewer people to object to the city, Even the farmers who dwelled in the basin then had much less to give up, since Mono Basin had never become nearly as agriculturally productive as the Owens Valley. Finally, by the 1930s the "benefits" of the aqueduct in Owens Valley were beginning to become apparent as the tourist and recreation business increased in importance to the regional economy. The area around Mono Basin, which had natural wonders equal to those in Owens Valley, came to be seen as another center for tourism and recreation. Though the city would later be challenged over its policies in Mono Basin (see chapter nine), opposition in the 1930s remained minimal.

With the arrival of Los Angeles of the eastern side of the Sierra, the development of the region changed drastically. Growth could no longer occur at its own random pace. Rather, development would now be planned deliberately. Furthermore, the city of Los Angeles could no longer hold the lands in the same sort of disregard that had marked its attitudes prior to the completion of the aqueduct. After all, the city owned much of the land by the end of the 1930s, and had to manage its property in order to protect the watershed.

This new regard for the lands of Mono and Inyo changed the nature of their history in the mid-twentieth century. But before we dismiss the impact of Americans' unfavorable attitudes toward the arid country in the Bodie, Benton, Coleville, and Owens Valley planning units, those attitudes must be viewed one last time as part of another blemish in the history of the area. The lands were still seen as an isolated, economically unimportant resource by some, and this encouraged the federal government to establish a Japanese relocation center there during the Second World War. It is to this development at Manzanar that the next chapter will be addressed.

Chapter 8

Japanese-Americans Come to Eastern California: The Internment Camp at Manzanar, 1942-1945.

Like every other racial minority in California, the Japanese have suffered immeasurably. They began to arrive in the state toward the end of the nineteenth century after their emperor had lifted a ban on emigration in 1886. From the late 1890s until the Gentlemen's Agreement of 1907, which severely restricted their immigration, Japanese men and women flocked to the West Coast, largely taking jobs as agricultural laborers. At first, nativist whites applied the same sterotyped criticisms to the newcomers as they had applied to the Chinese. The Japanese, they said, would never be able to assimilate and would drive wages down for whites. However, the Japanese immigrants soon proved to more upwardly mobile and successful than whites had expected or desired. Inspired by a strong sense of cooperation, these immigrants soon escaped the role of cheap and docile laborers. They organized into farmworkers' unions and staged the first successful strikes among California's agricultural labor force. More threateningly still, the Japanese began to purchase land, often employing the same mutual assistance schemes that they had used in their labor organizations. Once they had begun to buy property, white California farmers, who had initially supported the emigration of Japanese to America, now joined the urban working class to agitate against the Japanese (Bean 1973: 294, 332-335).

Nativist agitation against the Japanese had two overriding consequences. First, the California legislature in 1913 passed a bill that prevented alien Japanese from owning land in the state. Since many of the first generation Japanese, that is, the Issei or those born in Japan, had children by this time, they could circumvent the law by assigning title to the second generation, the Nisei, which was comprised of American-born citizens. Nonetheless, the law made an emotional statement for white Californians who felt threatened by the success of the Japanese. The second upshot of this agitation was the prohibition of any additional immigration from Japan, a part of the federal Immigration Act of 1924 that resulted primarily from pressure applied by Californians (Bean 1973:334-335, 364). Not only could the Issei not own land, but they were now cut off from their homeland as well.

After the Exclusion Act of 1924, tensions seemed to subside (Rice 1947: 2-3), but the distrust and the racial prejudice did not wholly disappear. When war broke out between Japan and the United States in 1941, the dormant feelings were reawakened instantly. In a wave of hysteria that swept the West Coast (but which, ironically, had little impact in Hawaii), white Americans became irrationally suspicious of Japanese-Americans. It was later proved that no incidents of sabotage or espionage had taken place, but at the time the deep-rooted racism and wartime anxiety of whites combined to produce the belief that the Japanese on the West Coast threatened the war effort. As a result, the Department of War ordered the removal or internment of all Japanese-Americans from Washington, Oregon, Arizona and California. Of the 112,000 evacuees on the West Coast, 71,000 were Nisei, or American citizens, and 93,000 came from

California. Because of the exclusion act of 1924 and the Gentlemen's Agreement of 1907, most Issei had been in the country for more than fifteen or twenty years, but they and their American children, who had never known any other nation as home, were indiscriminately removed to the interior (Bean 1973:430-436).

The official intention of the program, which was soon taken over by the civilian War Relocation Authority, was to protect the Japanese-Americans for their own good and to relocate them to other parts of the country. For these alleged purposes "relocation centers" were built, yet with barbed wire fences and guard towers for armed sentries these centers resembled internment camps far more than they did way stations to elsewhere. Moreover, the prison-like significance of the fences and the towers was reinforced by the location of these camps on relatively empty and unwanted lands. One official wrote, "These centers, located in out-of-the-way places, largely desert or wastelands, were desolate and forbidding..." (Myer 1971:5, 24). If isolation and uselessness were the requirements for the location of an internment camp, then the lingering disrepute of Owens Valley and the recent decimation of agriculture there made Manzanar an ideal spot.

In March, 1942, the Army acquired 5800 acres in the Owens Valley from Los Angeles for its first internment camp (Girdner and Loftis 1969:133). For a couple of months these Manzanar grounds were used as an assembly center for Japanese-Americans who were to be shipped elsewhere. By June, however, it had become an impound itself, and by January 1, 1943, it housed more than 10,000 evacuees, almost ninety per cent of them from the Los Angeles area (Myer 1971:315). Manzanar was the first of ten such centers to be built in the western United States, the other ones, like Manzanar, generally located in desolate and distant places.

Residents of the Owens Valley reacted negatively, for the most part, to the new project at Manzanar. There were some indications that they accepted the relocation center as a wartime necessity (Garrett and Larson 1977:8-9). However, most students of Manzanar agree that valley residents were generally hostile or resentful toward the camp and its inmates (Rice 1947:25; Hansen and Hacker 1974: 149n). Believing the hysterical rumors so prevalent in California, local whites began to fear for their safety. They remarked that the interned Japanese-Americans outnumbered the population of the valley, and noted that the inmates were dangerously close to the water supply of Los Angeles, suggesting that they might easily sabotage it (Girdner and Loftis 1969:133). One Independence man reportedly assembled a militia in case "'the Japs broke loose'" (Garrett and Larson 1977:9).

These reactions must have been common throughout the areas where relocation centers were constructed, and they seem readily understandable in the context of the Owens Valley. Since the downfall of Cerro Gordo and the disappearance of its Chinese population, local residents had had very little contact with Oriental peoples. Owens Valley residents probably shared their fellow Californians' racist attitudes toward the Japanese, as well, and held the same patriotic, wartime distrust. Moreover, like the other remote sites of relocation camps, the Owens Valley was used to its seclusion and isolation, and was suspicious of strangers like the Japanese-Americans. All of these factors, then, contributed to the hostility displayed by local residents toward the evacuees.

However, the hostility toward the Japanese-Americans at Manzanar seemed especially virulent and therefore requires additional explanation. As wartime tensions eased, the detainees at most of the other centers enjoyed a greater amount of contact with local whites on the outside. This was not the case at all with Manzanar. Although a few evacuees travelled to Lone Pine during the first four or five months, contact between the inside and the outside was absolutely minimal afterwards (Garrett and Larson 1977:38, 48-49). This may have resulted from wartime sentiments, California racism, and general suspiciousness on the part of valley residents, as mentioned above. But stress might also be placed on the similarity between the Manzanar center and the aqueduct project, which was so fresh in the minds of local whites. The decision to build the internment camp at Manzanar had been reached suddenly by the federal government and the city of Los Angeles, who now controlled the land (Garrett and Larson 1977:12, 46), the same two agencies who had collaborated on the aqueduct. In both the internment camp and the aqueduct project, the residents of the valley had virtually no say in the decisions. Moreover, both endeavors came as surprises to the people of Owens Valley. As with the aqueduct, valley residents seemed frustrated with the Manzanar camp because they lacked a voice in determining the fate of their communities. It must have been a familiar feeling of helplessness that local residents felt when the Japanese-Americans were thrust into their midst. It seems ironic that the people of the valley vented their heightened frustrations and fears on the Japanese-Americans at Manzanar, because the two groups shared a feeling of powerlessness. Both the Japanese-Americans on the inside and the local whites on the outside were victims of the same two levels of government that were beyond their control.

The Japanese-Americans, of course, suffered worse. They were confined to a crude compound in the middle of a strange desert. Manzanar featured thirty-six blocks with sixteen barracks to each block and three-to-five apartments per barracks building. The housing was cheaply constructed, primarily consisting of light lumber and tarpaper. It could hardly withstand the regular dust storms that plagued the internees there. Moreover,the camp and its programs were so hastily constructed that, as one evacuee later wrote, "nothing was completed when we got there, and almost nothing worked" (Adams 1944:29; Girdner and Loftis 1969:215; American Association of Retired Persons, Southern Inyo Chapter (hereafter AARP) 1977:106; Houston and Houston 1974:21). In addition to the housing, the government provided or allowed gardens, meeting halls, factories or workshops, offices, schools, and other support buildings. Despite the cheapness of materials and the haste with which the place was built, "Manzanar was and remained the best-looking of all the camps. Throughout the evacuation period it served as the government showcase" (Girdner and Loftis 1969:145-145). The government simultaneously built an airstrip across the highway from the internment camp (Garrett and Larson 1977:77-78).

Perhaps because of common stereotypes, or perhaps because they saw the evacuees arrive voluntarily or docilely at the camp, some observers assumed that the interned Japanese-Americans were resigned to their fate. Vera T. Jones, a valley resident, later wrote, "All was very quiet and orderly... Everything was well-organized, and the Japanese were gentle and courteous" (AARP 1977:106). It is becoming apparent, however, that the Japanese-Americans did not quietly accept their internment. Recent studies, especially those by Hansen and Hacker (1974) and Gary Y. Okihiro (1973), have begun to reevaluate

Japanese behavior during incarceration. They have persuasively argued that, contrary to standard opinion about the evacuees, the Japanese-Americans at Manzanar offered different forms of resistance to the War Relocation Authority and to the programs at Manzanar. Sometimes this took the form of strong assertions of Japanese ethnicity (Hansen and Hacker 1974:141-142); at other times it took more subtle forms. Okihiro (1973:26-27) suggests, for instance, that the inmates tended to have high production output in occupations that benefited the Japanese-Americans directly, while the output of products that supported the war effort or went outside the camp was much lower. This mode of resistance frustrated camp administrators while providing for the inmate population at the same time. These various responses to evacuation, powerlessness, and incarceration seemed to crystallize in the Manzanar "riot" of December, 1942.

The riot has received much more attention (Hansen and Hacker 1974; Okihiro 1973; Rice 1947; Girdner and Loftis 1969:263-266) than can be given in an historical overview. Nonetheless, if summarized it may illuminate some of the conditions of life at the Owens Valley internment camp. The disturbance broke out between two different groups of Japanese-American prisoners. One group was comprised largely of Issei, the first generation immigrants, and Kibei, or second generation Japanese-Americans who had returned to Japan and felt closely tied to that culture. The smaller, opposing group tended to be more sympathetic with the cause of the camp administrators and the Americans themselves, and tended to be largely Nisei. This latter group included the members of the Japanese-American Citizens League (JACL). The Issei-Kibei majority coalition staged a protest in camp early that December, after a number of brushes with the Nisei group and with the administration. At that final protest, the crowd was first gassed by armed guards, and was fired upon soon afterwards. Two men were killed, and nine or ten others were wounded. The violence subsided immediately, but the riot had lasting significance.

Traditional interpretations of the riot have tended to view it as an aberration in the generally peaceful relations inside the camp. These same studies also tend to stress the American patriotism of the detainees, and such deeds as the accomplishments of the young Nisei who fought in the European theater of World War II. However, these reports rely almost solely on the sources of the War Relocation Authority and the JACL. More scrutiny of the riot suggests that those mutually sympathetic parties formed but one of the two opposing sides, and excessive reliance on their version has distorted our picture of the incident (Hansen and Hacker 1974).

A more plausible approach would view the riot as something more than an aberration and something more than an internal conflict within the body of Japanese-American prisoners. The aggressiveness of the Issei-Kibei coalition appeared to be directed not just at the other group of Japanese but at the camp administration as well, for those target Nisei, including many members of the JACL, had co-operated with the administration in setting up and running the camp. Camp officials rewarded these collaborators with such perquisites as better jobs (Weglyn 1976:300-301) and control of the camp newspaper, ironically titled the Manzanar Free Press (Hansen and Hacker 1974:128-129). In collaborating with the white officials, the Nisei did not mean to sell out the other Japanese-Americans, but rather hoped that by co-operating and proving their loyalty beyond a doubt, American attitudes toward the Japanese-Americans would change.

To some degree this strategy ultimately worked across the nation, but in Manzanar this group was widely outnumbered by the supporters of the Issei-Kibei coalition.

The Issei-Kibei group did not resist because it was disloyal to the United States. Rather, it was protesting against the dehumanization of the evacuation and internment process and was trying to protect Japanese ethnicity from its stiffest challenge. The Issei, who had been the social leaders of Japanese-Americans before the war, and the Kibei held stronger ties to Japanese culture. They felt that their ethnic integrity was compromised by the camps, which not only dehumanized the evacuees but also tried to Americanize them. The JACL and many Nisei, who like so many of the second generations of immigrants to America wanted to be accepted by the new culture, seemed to threaten old ways and values as much as the American administrators. So, both groups became the targets for Issei-Kibei hostility. After the riot, when co-operating JACL leaders had been moved to another camp, the Issei reasserted their dominance at Manzanar, primarily through the limited channels of self-government allowed to the inmates. Manzanar became "a little Tokyo of the desert where, as in prewar days, the most salient community characteristics were group solidarity and the predominance of elements of Japanese culture" (Hansen and Hacker 1974:141-142). Part of this cultural preservation was reflected in those subtle forms of resistance offered by the imprisoned Japanese-Americans, again not as a result of disloyalty but in an effort to preserve their dignity and their ethnicity.

Despite the fact that order was restored permanently to camp after the riot, tensions remained between the internees and the camp officials. But outside the camp, sentiment against the Japanese-Americans seemed to be improving, and official regulations were consequently relaxed. This made life in the camp easier than before. When the camp had first been set up, a "trigger-minded proclivity" prevailed there as a result of a standing order to the guards "to shoot anyone who attempts to leave the Center without a permit, and who refuses to halt when ordered to do so" (Weglyn 1976:90-91). But as time passed camp officials began to leave the compound's back gate open, so that the inmates could tend their outlying gardens, wander into the nearby mountains, or fish in the neighboring streams (Girdner and Loftis 1969:299). The front gate, which would have let the inmates have contact with the valley population, of course remained closed, but security had become less of a concern.

American attitudes toward the Japanese-Americans had begun to change by late 1943 and 1944. Programs of re-entry into American society, which found jobs for the evacuees in the East or Midwest, began to function properly, and a number of prisoners made their way out from Manzanar. Instead of serving solely as detention camps, the relocation centers finally began to live up to their names. The prospect of departure from the compound, and the increase in space that resulted from departures, made the camp more bearable. Yet troubles still faced the evacuees. Though they might find jobs in other parts of the nation, they could not return yet to the West Coast, and when they did they often found their possessions stolen or confiscated. Moreover, though the outside world had become more tolerant, it still held a great deal of hostility for Japanese-Americans. One group of departed evacuees "returned en masse to Manzanar with harrowing tales of near lynchings, of being bilked by unscrupulous employers, and other indignities endured" (Weglyn 1976:100). Such experi-

ences confirmed the sad truth felt by both camp administrators and some of the interned Japanese-Americans--that the evacuees were safer within the fences of the detention camps than they were without.

As American attitudes slowly changed, so did those of Owens Valley residents. The War Relocation Authority liked to stress its public relations program as a factor in improving the image of Japanese-Americans, but its influence seemed weak in Owens Valley. One is more inclined to look at the obvious impact the camp itself had on the community. After an initial wave of hostility and resentment, local whites began to tolerate the camp. The internees certainly did not prove to be dangerous. Moreover, especially for the town of Lone Pine but for other valley communities as well, the camp came to be a source of income (Garrett and Larson 1977:9, 34-35). In this region with an economy so recently ravaged by the coming of the aqueduct and the Great Depression, the extra money and the few jobs the Manzanar Relocation Center provided were quite welcome. But while local whites could put up with the camp, welcome the additional money, and relax about the internees, their aversion to contact with the Japanese-Americans remained steadfast. No consistent or organized efforts were made to interact with the residents of the camp, and camp inmates themselves might have remained reluctant to approach local residents. Thus, while they lived next to each other for more than three years, and while they shared similar complaints about the city of Los Angeles and the federal government, there was virtually no meaningful interaction between the residents of Owens Valley and the internees at Manzanar.

As the war began to wind down, and as Supreme Court decisions began to overturn the authority of the government to incarcerate loyal citizens in wartime, the evacuation and relocation program came to an end. Like two groups before them--the dispossessed Paiutes, who had marched to the reservation at Fort Tejon in 1863, and the dispossessed settlers, fleeing the damage wrought by the Los Angeles aqueduct--the Japanese-Americans left behind a valley of sadness and bitterness when they departed from Manzanar in 1945. The center was officially closed on November 21 of that year. Most of its buildings were torn down or moved away, though the Inyo County roads maintenance crew kept one of them for a garage. Markers and guard posts, a number of old foundations, and the disturbed remains of gardens and cemeteries are all that is left of the former relocation center. Regular return trips to Manzanar by former internees have kept the memory of the center alive in the valley, and the California Department of Parks and Recreation is currently considering the site for a future state historical park.

Just north of the Owens Valley, near Coleville, the internees at Manzanar would have found a staunch group of sympathizers. The Sage O'Pinion,* the community newspaper of the Civilian Public Service camp in Antelope Valley, waged an editorial campaign against the evacuation and relocation program from 1942 to 1945. The men at Camp Antelope, as the Civilian Public Service facility was called, must have had some idea of what the Japanese-Americans were experiencing. They were themselves just a handful of the nation's conscientious objectors to the war who served in a quasi captive capacity in order to fulfill an obligation to their country. Like the Japanese-Americans, these men had faced the hostili-

*This monthly paper was also called The Monolog.

ty of their fellow Americans, but they too were not disloyal. Their religious convictions demanded that they avoid participating in the war. With the help of churches and pacifist groups, conscientious objectors across the country had reached a compromise with the selective service. They agreed to perform public services, for no pay, in lieu of their military duty. More than one hundred public service programs, operated by both the government and by church organizations, were established across the country to perform civilian services that ranged from staffing mental hospitals to participating in medical experiments (Sibley and Jacob 1952:ch. 6).

Camp Antelope attended to a number of Forest Service functions, like fighting fires, clearing trails, and developing parks. It served as the center for approximately a dozen subsidiary camps located throughout Mono County and the Mono National Forest. The civilian service camp was disbanded in 1945, and apart from the monthly newsletter little remains to illuminate its history. In any case it would be mistaken to discuss it at too much length here; after all, in significance, in size, and in the extent of suffering, Camp Antelope hardly compared to Manzanar. Yet, the work of the conscientious objectors in Mono County reflected some major modern developments in eastern California. Their involvement with parks and forests, and the related presence of the federal government in the area, foreshadowed the three themes of government intervention, tourism, and environmentalism in the recent history of the Coleville, Bodie, Benton, and Owens Valley planning units. These three themes dominate the final chapter of this historical overview.

Chapter 9

Government, Tourism, and Environmental Controversy: Major Developments from 1935 to the Present.

The recent history of the Owens Valley, Benton, Bodie, and Coleville planning units has been dominated by the influence of various arms of government. Different agencies of the federal government, the Department of Water and Power from the city of Los Angeles, and even the state Departments of Fish and Game, and Parks and Recreation have been the primary instigators of developments in eastern California. Of course, the impact of these public bodies is directly related to their control of the lands. In 1958, federal agencies owned 80% of the land in Mono County and 96% in Inyo County (Dana and Krueger 1958:83-84). The city of Los Angeles owned 62,000 acres in Mono, and managed even more as a result of special use permits issued by the Forest Service and the Bureau of Land Management. In Owens Valley, the city and the national government own 99% of the land, and Los Angeles has rights to virtually all of the water (Dana and Krueger 1958:86, 105; Los Angeles Times, December 1, 1974). The state controlled lands for parks and fish hatcheries, as well. With control such as this, it is obvious why governments have dominated life in the planning units in modern times.

Private citizens in Mono County and Owens Valley have been ambivalent about the impact of government there, finding both advantages and disadvantages. The local economies have benefited from the efforts of all three levels of government to promote tourism and recreation in the area. In addition, federal agencies have worked to manage the resources in the area, providing jobs in the process. Los Angeles has provided employment, too, along with electric power and watershed management. Moreover, the city pays more than $4 million in taxes to Mono and Inyo counties, almost half of the revenue collected there (ICBS 1966:70; AARP 1977:42). Finally, co-operating in such programs as the Interagency Committee on Owens Valley Land and Wildlife, outside branches of government have often worked to maintain harmony with local interests.

On the other hand, residents of the area have ample justification for being wary of those outside bodies. The federal government, for instance, has founded a tradition of misusing the lands and mistreating some of the residents in different ways. Over the last 120 years, it has proposed that Owens Valley be turned into an Indian reservation, participated in the ruthless massacre and removal of Indians, co-operated in several instances with the city of Los Angeles in building and extending the aqueduct, and established an internment camp for Japanese-Americans during World War II. Even when it has sought to protect the land, it has created problems. In 1902 the Forest Service incurred the wrath of local businessmen when it began to regulate sheep grazing, thereby cutting down the region's commerce with herders (ICBS 1966:77). Even the promotion of parks and recreation facilities, in the interest of tourism, has created sanitation and law enforcement problems for local residents (Dana and Krueger 1958:158-159).

The city of Los Angeles, of course, has generated even more antagonism since it entered the area with its aqueduct. The problems were plentiful in

the first half of the twentieth century, and new ones have continued to arise. In fact, two large environmental controversies, which are discussed below, have dominated relations between the city and the two counties of eastern California during the 1970s, and have involved state and local governments in the process of resolution. Even state government, with its relatively innocuous fish hatcheries and its historical park at Bodie, has encountered some opposition recently to its plans to make another park at Manzanar. Consequently, the four planning units still comprise a troubled region with an uncertain future.

Apart from these continuing problems, steady growth has characterized the recent populations and economies of Mono and Inyo counties. In 1960 Inyo contained 11,684 residents, most of them in Owens Valley. In 1970 the county's population has risen 33% to 15,571. Mono's rate of growth was even faster. It rose 81.5% from 2,213 citizens in 1960 to 4,016 in 1970 (Beck and Haase 1974: 65). In both counties the populations have always clustered around the major towns. In Mono, the development of resorts like Mammoth and June Lake have become new centers of population as well.

The basis of life for the growing population has been a growing regional economy that has relied on new sorts of occupations. Livestock still accounts for some employment, but it by no means has nearly the influence it once carried. In fact, ranching seems to be shrinking rapidly as a source of work for local residents. This is reflected in the elimination of ranches from the Mono Basin (Yongue and Harris 1975:12), though cattle and sheep are still raised elsewhere in the county. A similar reduction of jobs in livestock was apparent in Owens Valley. Although the number of cattle remained largely the same from 1920 to 1964 at around 25,000, the number of ranches dropped 80% to around one hundred (ICBS 1966:79). Ranching, like farming, has declined in Mono and Inyo since the coming of the aqueduct.

Mining remains somewhat important in the economy of the planning units, but like agriculture and livestock it no longer holds a supreme position. Approximately five hundred new claims were filed annually during the 1960s, indicating that interest remained high in the minerals of eastern California. The tungsten mines just west of Bishop, which produce more than half the nation's supply of that metal and generate four hundred jobs, provide one continuing success. The relatively new field of nonmetallic minerals is another, more limited success. Extraction of such nonmetallics as dolomite, talc, sulphur, and a variety of sodic ores, particularly from the bed of Owens Lake, contributed to the general prosperity of the region and to the survival of such towns as Keeler and Olancha (DeDecker 1966:10-11; ICBS 1966:91-92; Morgan and Morgan 1976:118-124). But even these new developments have not been able to support a substantial part of the economy. For example, the nonmetallics managed to keep the Carson and Colorado Railroad alive in the 1940s and 1950s, but they were simply not enough to sustain it any longer. As a result, the dismantling of the old narrow-gauge tracks, which had begun in Nevada in the 1930s and had extended to Laws by 1943, was completed between Laws and Keeler in 1960 (Hungerford 1956:5; Turner 1963:35-36). When the death of the Carson and Colorado was commemorated by the opening of the Laws Railroad Museum in 1966, it symbolized a pervasive change in the economy and life of eastern California. No longer was business oriented to production or transportation; it was now oriented to tourism.

The growth of tourism and recreation in Owens Valley and Mono County had begun in earnest during the late 1930s. With improvements in cars and highways, the lands of the four planning units and the forests and parks adjacent to them became popular destinations for visitors. In 1939 Inyo National Forest received 156,821 visitors. In the next year it was figured that a million travelers poured through Owens Valley, nourishing a $5 million tourist trade. By 1961, tourism accounted for twice as much money in the valley as the combined incomes of mining, ranching, and lumbering. And by 1965, Inyo National Forest hosted more than 3 million visitors each year (ICBS 1966:77; Nadeau 1950:132-133; Smith 1978:189-199). Observers noted that most of the visitors ironically came from southern California, and remarked that commerce with them seemed like a return on the minerals and the water that Inyo had sent to Los Angeles over the years (ICBS 1966:70). The tourists made their way into Inyo and Mono by automobiles, usually, bringing the attendant traffic problems. And, with the onset of gas shortages in the 1970s, some wondered about the future of the industry. Nonetheless, it remained the bulwark of the economy of the four planning units. The same outsiders who had always exploited the region and discounted its lands now became the means for the survival of eastern California communities.

Tourism did not, of course, flourish on its own. To some extent the promotions of the local residents were instrumental in developing it. While at the nadir of economic life in Inyo and Mono during the 1930s, concerned residents banded together to restore the confidence and economy of the area. Under the leadership of Ralph Merritt and Father John J. Crowley, the Inyo-Mono Association formed in 1937 to publicize the features of the two counties. Serving largely as a regional chamber of commerce, the association helped to pump life and confidence into the economy. By getting local businessmen to subscribe they raised an annual budget of $20,000 by 1942, money that went to advertising and other public relations causes. As the efforts of the association coincided with the completion of a paved highway from Los Angeles to Owens Valley, their success was rapid (Garrett and Larson 1977:21-22, 44-45).

Perhaps the most important achievement of the association and its supporters came when they convinced the Los Angeles Department of Water and Power to co-operate in their efforts to make the region a tourist haven. Such an idea had been proposed long before, even by planners in Los Angeles, but the city had resisted any further development of the valley because it seemed to threaten the watershed. During the 1930s the Department of Water and Power began to change its mind and started working with local interests to promote tourism and recreation. Its main contribution was the release of some of the city lands in Owens Valley. In some cases this meant leasing or selling property back to town businessmen; in others it meant allowing city land to be used for recreational purposes (Dykstra 1928:9-12; Garrett and Larson 1977:22-23; ICBS 1966:70). With the valley's strongest landowner participating, efforts to promote tourism, a new type of land use, seemed assured of success.

In the 1970s, however, spokesmen for the Mono Basin and Owens Valley came to see the city less as a benefactor and more as an ecological threat. In an age of heightened awareness of the environment, when shortages of both water and energy became stern realities, and when the quality of life underwent serious

reconsideration, the impact of the city came under scrutiny. The problems crystallized around two related controversies--groundwater pumping in the Owens Valley, and the reduction of Mono Lake. The Department of Water and Power had been pumping groundwater from the Owens Valley water table intermittently since the 1930s, and as a result of the city diverting stream waters from Mono Lake, the lake had been shrinking ever since the completion of the aqueduct extension into Mono Basin in 1940. In a sense, then, these were hardly new issues. Only the heightened consciousness of ecology, and the building of an addition to the first aqueduct that enlarged its capacity 50%, brought the crises to widespread attention. With the completion of the "second aqueduct," Los Angeles both diverted more water than ever before from Mono Lake and initiated an intense groundwater pumping program in Owens Valley. As the levels of both Mono Lake and the Owens Valley water table were jeopardized, the city came under attack. Yet, while environmentalists seemed to be in the forefront of the opposition, the city itself argued from an environmentalist perspective at times. An extremely complex set of issues resulted, and efforts at resolving the controversies often created more complications.

It is in part because of this complexity that the two related controversies can only be sketched in their broadest outlines in this overview. As the groundwater controversy developed, for example, it was played out in the courts of the state of California. A legal biography would have to be written in order to understand the groundwater situation fully, and it may be that the Mono Lake controversy will evolve in the same way. And as if a legal understanding weren't enough, the two controversies involve a great many scientific or technical issues. Moreover, these technical questions are themselves often matters of speculation and projection. It is perhaps typical of our new efforts to assess the environmental impact of major public and private measures that no certain knowledge or reliable predictions have resulted in either controversy. This has heightened the tensions in both controversies while dimming any hopes of immediate solution. Consequently, relations that had become harmonious between the city and eastern California have again become uneasy.

The rekindled problems began in the 1960s when competition for both intrastate and interstate sources of water increased.* Faced with the need to compensate for an anticipated loss of water from the Colorado River, and believing that its supply from Inyo and Mono would always be cheaper and more convenient than other California sources, the city of Los Angeles planned an addition to its aqueduct in the Owens Valley. The completion of the project in 1970 allowed the Department of Water and Power to increase its water export by 50%. The department had two methods in mind for obtaining the extra water. First, it dug new wells and utilized its many old wells in the Owens Valley in order to pump water from the underground basin. Second, it increased its supply from Mono Basin by a more regular diversion of Rush Creek into the Grant Lake reservoir. Previously, Rush Creek had only been diverted to the aqueduct on an irregular basis. In relatively wet years it was allowed to run into Mono Lake,

*The history of these two controversies comes from the following sources: Smith 1978:201-227; Los Angeles Times, December 17, 1978, January 22, 1979: Georgeson 1978.

thereby helping to slow the rate at which the lake surface was falling. After 1970, the shrinkage of the lake accelerated, drawing the attention of a public that was increasingly ecologically minded. At the same time the city stepped up its regular pumping of underground water in Owens Valley. This apparent threat to the valley's water table, and the threat to the quality of life in Owens Valley, provoked the first recent clash between the city and the residents of eastern California.

When Inyo County presented a suit to halt the extended groundwater pumping in 1972, the issues between state and valley were drawn clearly. Inyo contended that the increased drainage of the underground basin threatened the precarious ecology of Owens Valley. It believed that increased pumping in 1970-1972 had already dried up local springs, and that local plants and wildlife faced extinction or drastic ecological change. Moreover, by lowering the underground water table the Department of Water and Power appeared to be increasing the frequency and severity of dust storms, much to the discomfort of valley residents, especially the increasing numbers of retired people wanting to settle there. Finally, in establishing its new groundwater pumping policies, the city had decreased the number of acres it would be obligated to irrigate, though it promised to irrigate the reduced acreage more reliably than before (Smith 1978:203-204).

The Department of Water and Power countered these charges in a number of arguments. It contended that the county's claims of ecological damage were exaggerated and unreliable, and presented counter-claims. It also reminded the public that it had acquired the rights to both groundwater and surface water legally and permanently. Finally, it pointed to the increasing demand for Owens Valley water. In 1963 the United States Supreme Court, in the matter of Arizona v. California, had granted Arizona and Nevada increased rights to water from the Colorado River, and another claim on the Colorado River water by the Navajo Indians threatened that supply even more. As the cheaper, preferable, and more accessible supply, Owens Valley water seemed the logical solution to the problems of Los Angeles (Smith 1978:218-220; Los Angeles Times, December 17, 1978).

Despite some substantial concessions to the city, the rocky course of the legal battles between Inyo and Los Angeles favored the county. The state Court of Appeal set a compromise rate of groundwater pumping in order to settle the immediate issue of water usage, but the rate was intended to be temporary. It was to be replaced when the major part of the court's mandate--the preparation of an environmental impact report (EIR) assessing the effect of expanded pumping on the Owens Valley--had been fulfilled. By demanding an EIR, the court found that the groundwater project fell under the regulations of the California Environmental Quality Act of 1970, even though the project had been conceived and initiated before that act was passed.

By ordering an EIR, the court recognized as well the need for more knowledge about the potential impact of tapping the water table under Owens Valley. Unfortunately, the Department of Water and Power did not initially share that interest in a comprehensive environmental impact report, a report that would meet the legal requirements of the California Environmental Quality Act (CEQA). Much to the chagrin of both Owens Valley residents and the justices hearing the

suit, the Department of Water and Power defined the scope of the EIR much too narrowly to answer all the questions of environmental impact, and then compounded its shortcoming by failing to discuss possible alternatives to groundwater pumping, such as a mandatory conservation program in Los Angeles.

Two regrettable results followed from the myopia on the part of the city. First, the major issues of the case were sidetracked. Instead of focusing on the legal and environmental ramifications of groundwater pumping, the judicial process had to concentrate on the EIR document. Thus, the original arguments of both the county and the city were partially forgotten, this despite the fact that the city itself had some compelling arguments for its actions. Besides delaying the decision-making process, the city also postponed the effort to learn more about the effects of their actions in the valley. Second, all the while the court actions were dragging on, the groundwater pumping continued at the compromise rate, a rate set not to guard the quality of the environment but to accomodate immediate interests.

Nonetheless, the extended court battle produced some important results. It gave specific meaning to CEQA, which had been comparatively vague before the court interpreted certain clauses in the case between Inyo and Los Angeles. The legal battles also helped to set precedents for water use in both California and the entire western United States. Finally, the extended conflict ultimately compelled the county and the city, at the behest of the state Attorney General and the state Department of Water Resources to establish a procedure for out-of-court settlement to the legal and environmental issues facing them. They opted for "co-operation," as Inyo attorney Antonio Rossman phrased it, instead of "confrontation" in order to manage their shared water resources and the of Owens Valley (Smith 1978:216). Rossman seemed confident about this last turn of events, but the historical record of conflict casts a shadow of doubt on the possibility of lasting co-operation between the city and the valley.

If the troubles between Owens Valley and Los Angeles over groundwater pumping have produced any lessons, one hopes that they will be applied to the presently developing Mono Lake controversy before it too has lost its meaning and its focus. Despite differences in the circumstances of the two controversies, some of the same arguments and barriers to resolution could easily come into play. As with the lowering of the water table in Owens Valley, too little is known about the impact of diverting inflow from Mono Lake. The lack of knowledge makes it virtually impossible to decide between the claims of the two sides. Until the impact of lowering Mono Lake can be predicted, the major issue remains whether to limit diversion in order to prevent possible damage, or to continue diversion at its present rate because no certain evidence urges otherwise and because the city of Los Angeles seriously needs the water.

To defend its claims on Mono Basin water, the city employs arguments similar to those for pumping Owens Valley groundwater, stressing especially the financial and environmental costs of alternative supplies. Not only does the water from Mono travel to Los Angeles by gravity, thereby avoiding the ecological expense of operating pumps, but it also creates a relatively clean and cheap supply of hydroelectric power during its descent. Moreover, in developing and maintaining the flow of this water to southern California, the city has helped

to establish recreational centers like Crowley Lake, which also serves as a water storage facility. Without the present regular flow of water from Mono Basin, those facilities would be jeopardized, according to the Department of Water and Power.

The opposition to the policies of the city has been led to two national environmental giants--the Sierra Club and the Audubon Society, the latter of which sponsors the Mono Lake Committee based in southern California. These groups offer a three-pronged attack against city policies. First they contend that the damage done to a unique and valuable natural resource perhaps outweighs the advantages gained from diverting stream flow. Saline Mono Lake depends on the fresh water creeks of the eastern Sierra to replace lake water lost to evaporation. Without the replenishing runoff, Mono Lake had decreased substantially in size. This reportedly threatened the ecology of the lake itself by increasing its salinity, thereby endangering a species of brine shrimp in the lake, a traditional but obsolete food for Native Americans.

The shrinkage of the lake is also causing a land bridge to form between the mainland and Negit Island inside Mono Lake, a rare rookery for the California Gull and other bird species. If connected to the mainland, the nesting grounds would fall prey to predators such as coyotes. Since spring, 1978, measures have been taken to blast a channel between the Island and the lake shore to prevent a land bridge from forming. Moreover, the city argues that the rookery could relocate on to Paoha Island, which is less threatened by land bridges. The city also argues that the lake will at some predictable date stabilize, implying that the damage to both rookery and lake will be limited.

In responding to the last two points of the city--the notion that the rookery can be relocated, and the belief that the lake size will stabilize--critics of stream diversion have fashioned the second prong of their attack. They argue that no adequate knowledge of the lake and the birds exists on which to base decisions or hopes such as **the** city's. In essence, they are calling for the same sort of information that Inyo County demanded in the groundwater controversy, for some sort of adequate environmental impact statement.

The third flank of the environmentalists' attack focuses on the city's arguments about alternative water supplies. The city, they say, simply assumes that the water lost from Mono Basin will have to be made up from elsewhere. But opponents of Los Angeles suggest that if rigid conservation measures were enforced in southern California, the twenty per cent of the city's water that comes from Mono would not be needed, and the lake could be saved without resorting to costly alternative supplies. When one recognizes that Los Angeles is not well-known for its environmentalism or for lifestyles that encourage conservation, the enormity of the opponents' request is made clear. They would ask the citizens of Los Angeles, and perhaps even the citizens of Owens Valley, to cut back water consumption in order to protect a "bitter, saline lake" and the nesting grounds of "some birds." Although ecological consciousness has been raised substantially in the previous decade, it is doubtful whether it has reached such proportions.

As in the case of the groundwater pumping, some sort of court-determined compromise appears to be in the offing, but the controversy has not progressed far enough to be understood fully. As with the groundwater dispute in the Owens Valley, efforts at resolution are still being made. Yet one important result has already emerged from both cases. For perhaps the first time, because of the heightened awareness of the environment, residents of eastern California have been able to resist or modify the demands or larger, wealthier, and stronger groups of people. Throughout the history of the Benton, Bodie, Coleville,and Owens Valley planning units, the lands and the native residents had been subject to the needs and preferences of outsiders. Outsiders had dispossessed and decimated Indian cultures, exploited and removed both renewable and non-renewable resources of the land, and imposed their will upon the local peoples. Undeniable benefits of course accrued from the intervention of these outsiders, but so did frustrations and problems. Local residents frequently disagreed with outsiders over the value and the proper usage of the lands of eastern California, making the history of the four study units one of controversy and sadness.

But if increased ecological concern has given eastern Californians a tool with which to oppose outsiders in the 1970s, tourism, which is itself a form of appreciation for the environment, has also reiterated the dependence of eastern Californians on those outsiders. It is too easy merely to condemn the interlopers as greedy and exploitative. Not only have outsiders met their own real needs, but they have also developed Mono County and Owens Valley in beneficial ways that were beyond the capacity of local residents. Cerro Gordo and Bodie could hardly have been cultivated profitably without the resources of an outsider like Mortimer Belshaw; agriculture and ranching could not have succeeded without outside markets and interest; and outside parties like the Los Angeles Department of Water and Power, the national Forest Service and Bureau of Land Management, the state Departments of Fish and Game, and Parks and Recreation, and individual travelers and vacationers have made eastern California into a lucrative tourist haven.

Not all outside interventions have had their advantages. Time has made the whites' treatment of both Indians and Japanese-Americans inexcusable, and hostilities still remain, in part justifiably, as a result of twentieth-century efforts to use Owens Valley and Mono Basin water. The local residents, too, must shoulder some of the responsibility for the mistreatment of the Native American and Japanese-American populations, and for the continuing troubles with the city of Los Angeles. In these instances and in others, the history of the Bodie, Coleville, Benton, and Owens Valley planning units has spoken to the universal human problems of the environment and of successful co-existence. Over the last century and a half, the wide-ranging uses of the natural resources of eastern California and the radically different conceptions of lands there have created a rich laboratory for probing man's relationship to the ecology. Part of the relationship between man and his environment, of course, is the interaction between man and man. The history of Mono County and Owens Valley has spoken just as loudly to the dilemma of respecting and harmonizing people's different needs and different ways of life.

Figures 16-21.

Key to Historical Sites and Features Shown On the Coleville, Bodie, Benton East/West and Owens Valley Planning Units:

1. Alleged campsite of Fremont Party, 1844, on the lakeshore.
2. Site of Civilian Public Service Facility, Camp Antelope, 1942-1945.
3. Bodie.
4. Green Creek Power Station.
5. Dogtown, first settlement by whites east of the Sierras.
6. Monoville and the Sinnamon Cut.
7. Negit Island, site of gull rookery endangered by diversion of water from Mono Lake.
8. Mono Mills.
9. Lake Crowley Resevoir and Dam, one of the problems in the aqueduct controversy in the 1920's, now one of the state's most popular sites for fishing.
10. Town of Benton, vicinity of Montgomery Canyon mines.
11. Benton Hot Springs, alleged campsite of Walker party during its eastbound trip in 1834.
12. Blind Spring Hill, vicinity of several mines during the brief heyday of mining around Benton.
13. Laws, a station on the Carson and Colorado Railroad line, and present site of a railroad museum.
14. Owensville.
15. Site of battlefield during Owens Valley War between Paiutes and whites.
16. Alvord station on Carson and Colorado Railroad.
17. Aqueduct intake and vicinity of Aberdeen station on the route of the Carson and Colorado Railroad.
18. Possible site of Chrysopolis, a very short-lived mining town.
19. Former site of Camp Independence and its cemetery.
20. Cemetery for four Jews, buried around the turn of the century.
21. Site of San Carlos, short-lived mining camp of the 1860's.
22. Kearsarge station on Carson and Colorado Railroad.
23. Site of Bend City, a nineteenth-century mining camp.
24. Manzanar airstrip.
25. Manzanar Relocation Center.
26. Alabama Gates and Spillway.
27. Owenyo, site of Quaker settlement, 1900-1905, and junction of Carson and Colorado Railroad and the Southern Pacific.
28. Cemetary of the victims of the 1872 earthquake.
29. Mt. Whitney station on Carson and Colorado Railroad.
30. Site of Indian massacre by whites during the Owens Valley Indian War.
31. Interagency Visitor's Center, facility of the Interagency Committee on Owens Valley Land and Wildlife.
32. Cerro Gordo.
33. Site of Stevens' kilns used to convert wood into charcoal for Cerro Gordo; also near site of Indian massacre by whites during Owens Valley Indian War.

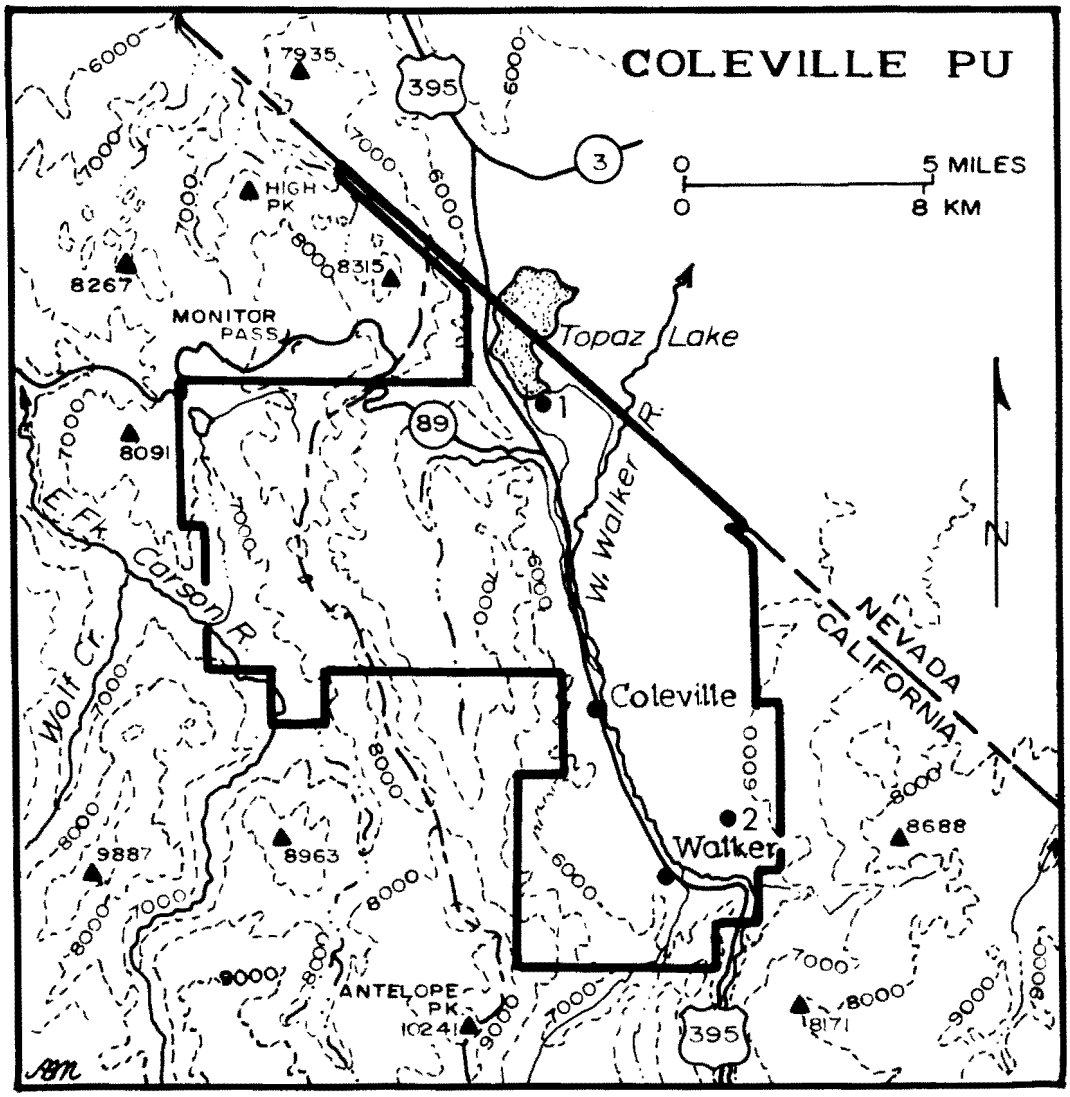

COLEVILLE PU
0 5 MILES
0 8 KM
7935
395
HIGH PK
8267
8315
MONITOR PASS
Topaz Lake
89
8091
W. Walker R.
E. Fk Carson R.
Wolf Cr.
NEVADA
CALIFORNIA
Coleville
2
Walker
9887
8963
8688
ANTELOPE PK
10241
8171
395

Figure 16

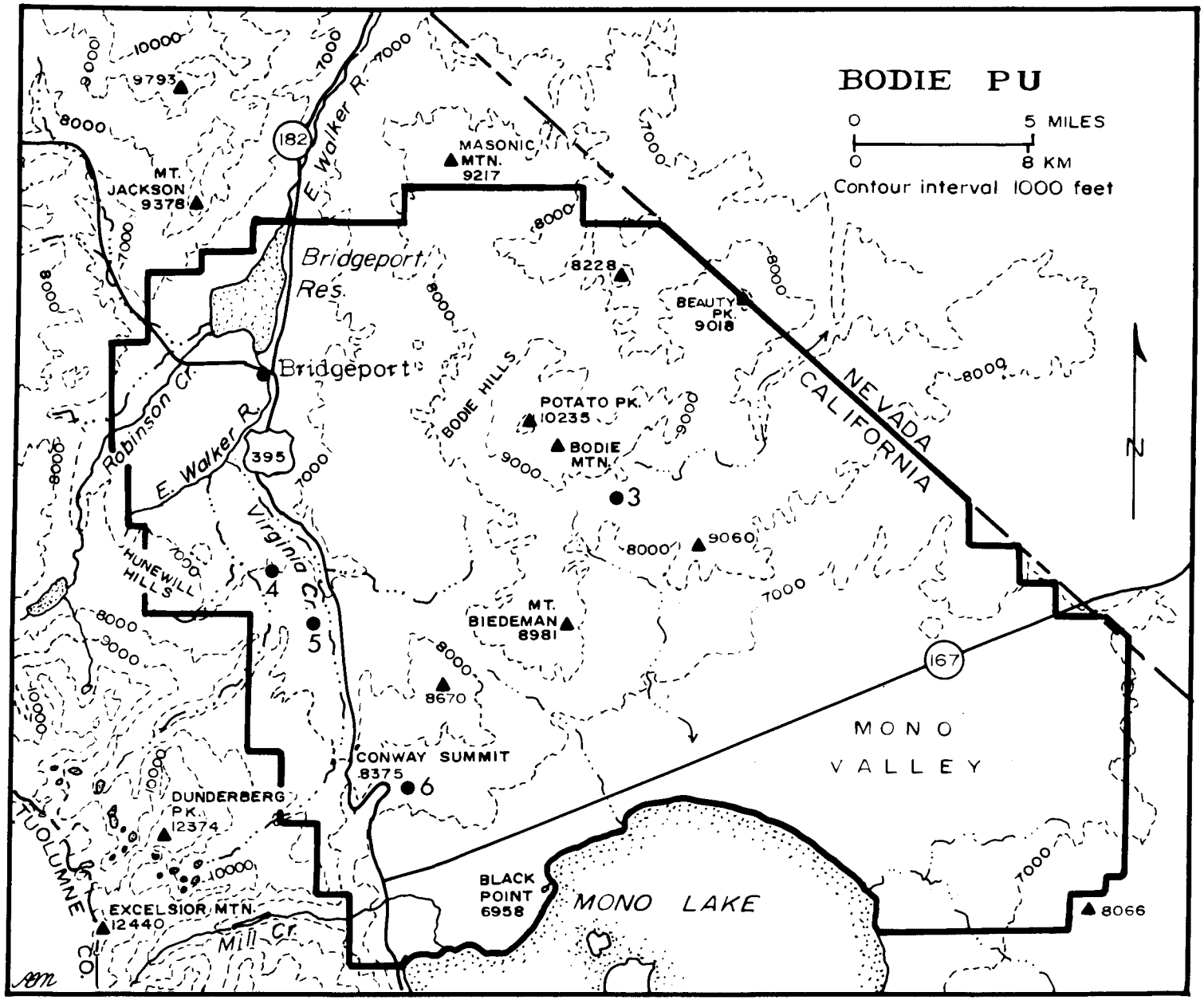

BODIE PU
0 5 MILES
0 8 KM
Contour interval 1000 feet
MASONIC MTN. 9217
MT. JACKSON 9378
9793
182
E. Walker R.
Bridgeport Res.
Bridgeport
8228
BEAUTY PK. 9018
NEVADA
CALIFORNIA
Robinson Cr.
E. Walker R.
395
BODIE HILLS
POTATO PK. 10235
BODIE MTN.
3
9060
HUNEWILL HILLS
Virginia Cr.
4
5
MT. BIEDEMAN 8981
8670
167
MONO VALLEY
CONWAY SUMMIT 8375
6
DUNDERBERG PK. 12374
TUOLUMNE CO.
EXCELSIOR MTN. 12440
Mill Cr.
BLACK POINT 6958
MONO LAKE
8066
N

Figure 17

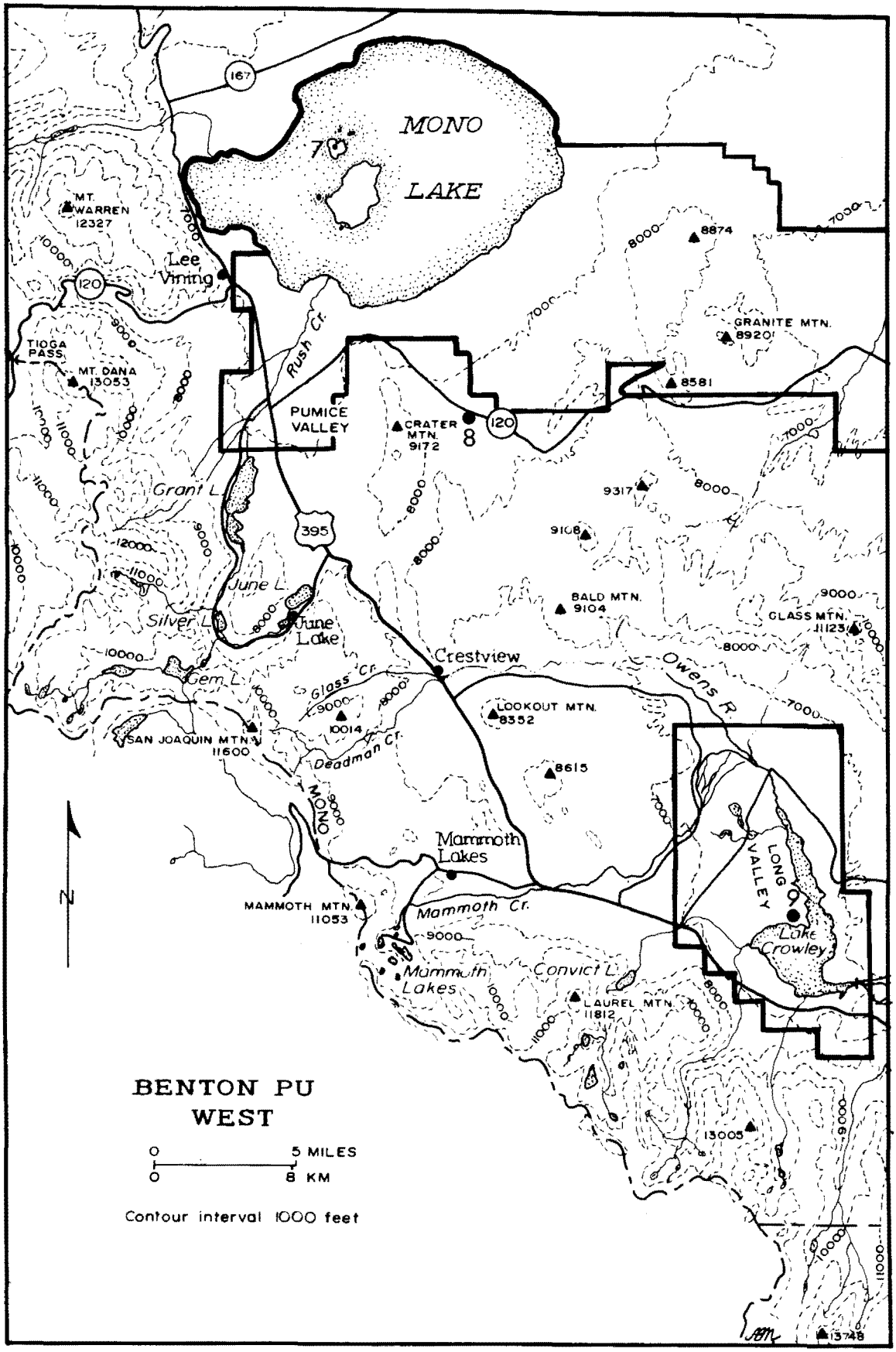

MONO
LAKE
MT. WARREN 12327
Lee Vining
TIOGA PASS
MT. DANA 13053
Rush Cr.
PUMICE VALLEY
CRATER MTN. 9172
GRANITE MTN. 8920
8874
8581
9317
9108
BALD MTN. 9104
GLASS MTN. 11123
Grant L.
June L.
June Lake
Silver L.
Gem L.
Glass Cr.
Crestview
Owens R.
LOOKOUT MTN. 8352
8615
SAN JOAQUIN MTN. 11600
10014
Deadman Cr.
MONO
Mammoth Lakes
MAMMOTH MTN. 11053
Mammoth Cr.
Convict L.
LAUREL MTN. 11812
LONG VALLEY
Lake Crowley
13005
13748
BENTON PU
WEST
0 5 MILES
0 8 KM
Contour interval 1000 feet

Figure 18

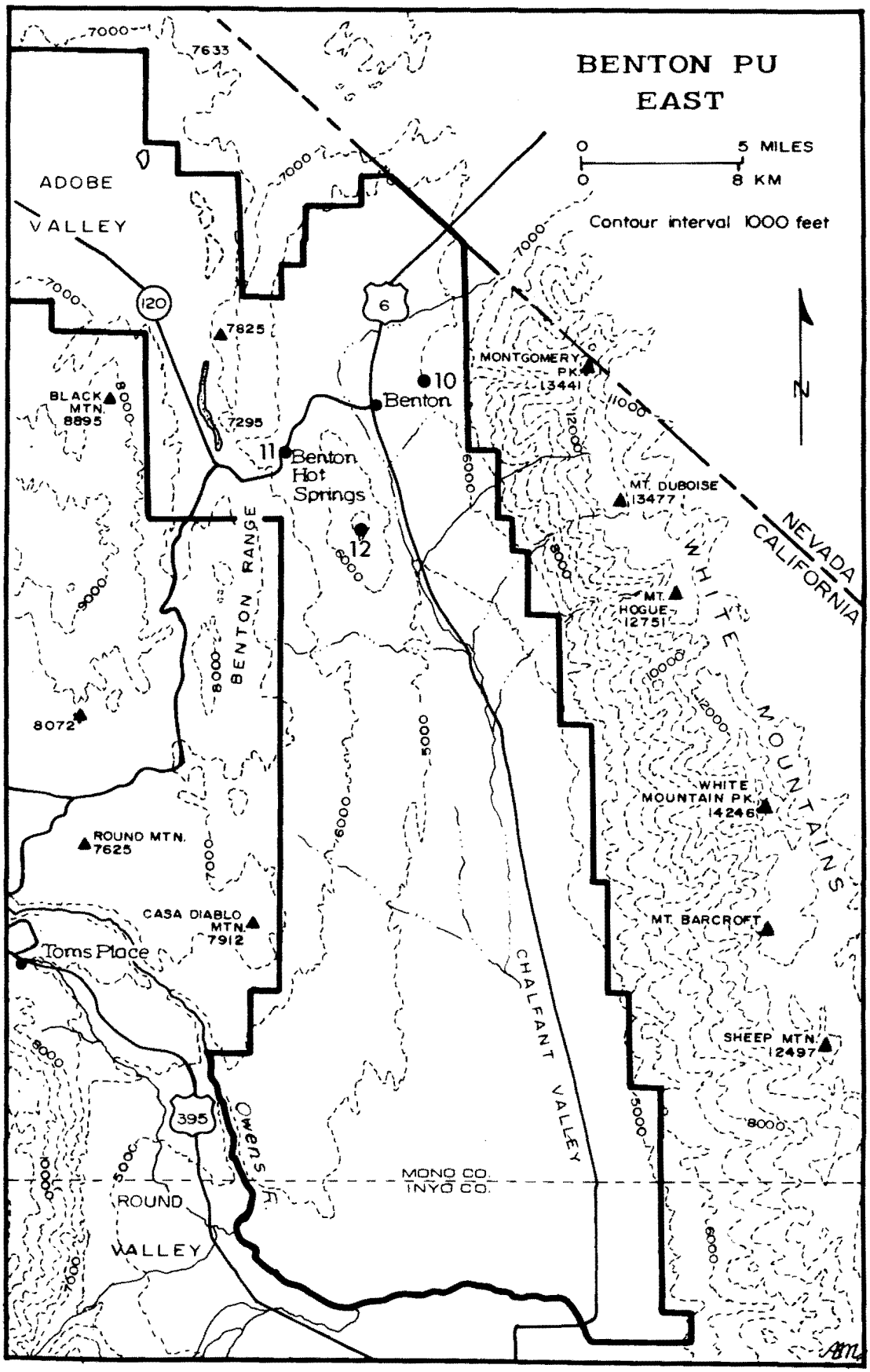

BENTON PU
EAST
0 5 MILES
0 8 KM
Contour interval 1000 feet
N
ADOBE
VALLEY
120
6
7825
7295
BLACK MTN.
8895
10
Benton
11
Benton
Hot
Springs
12
MONTGOMERY PK.
13441
MT. DUBOISE
13477
MT.
HOGUE
12751
NEVADA
CALIFORNIA
WHITE MOUNTAINS
WHITE
MOUNTAIN PK.
14246
MT. BARCROFT
SHEEP MTN.
12497
BENTON RANGE
8072
ROUND MTN.
7625
CASA DIABLO
MTN.
7912
Toms Place
CHALFANT VALLEY
395
Owens R.
MONO CO.
INYO CO.
ROUND
VALLEY
7633
7000
8000
9000
10000
11000
12000
6000
5000

Figure 19

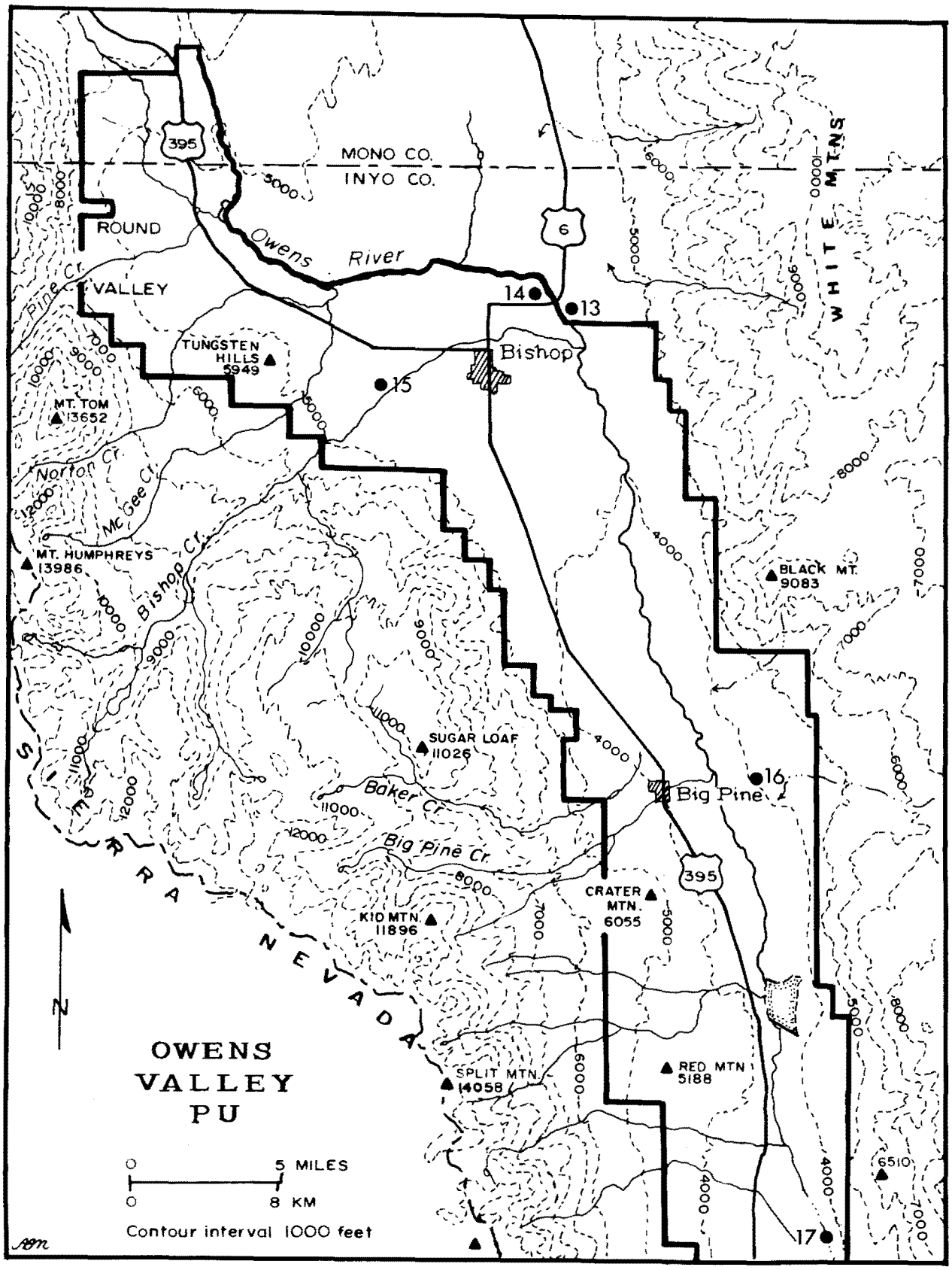

MONO CO.
INYO CO.
395
6
ROUND VALLEY
Pine Cr.
Owens River
Bishop
TUNGSTEN HILLS 5949
MT. TOM 13652
MT. HUMPHREYS 13986
Norton Cr.
McGee Cr.
Bishop Cr.
SUGAR LOAF 11026
Baker Cr.
Big Pine Cr.
Big Pine
KID MTN. 11896
CRATER MTN. 6055
SPLIT MTN. 14058
RED MTN 5188
BLACK MT. 9083
WHITE MTNS
SIERRA NEVADA
13
14
15
16
17
OWENS VALLEY PU
5 MILES
8 KM
Contour interval 1000 feet

Figure 20

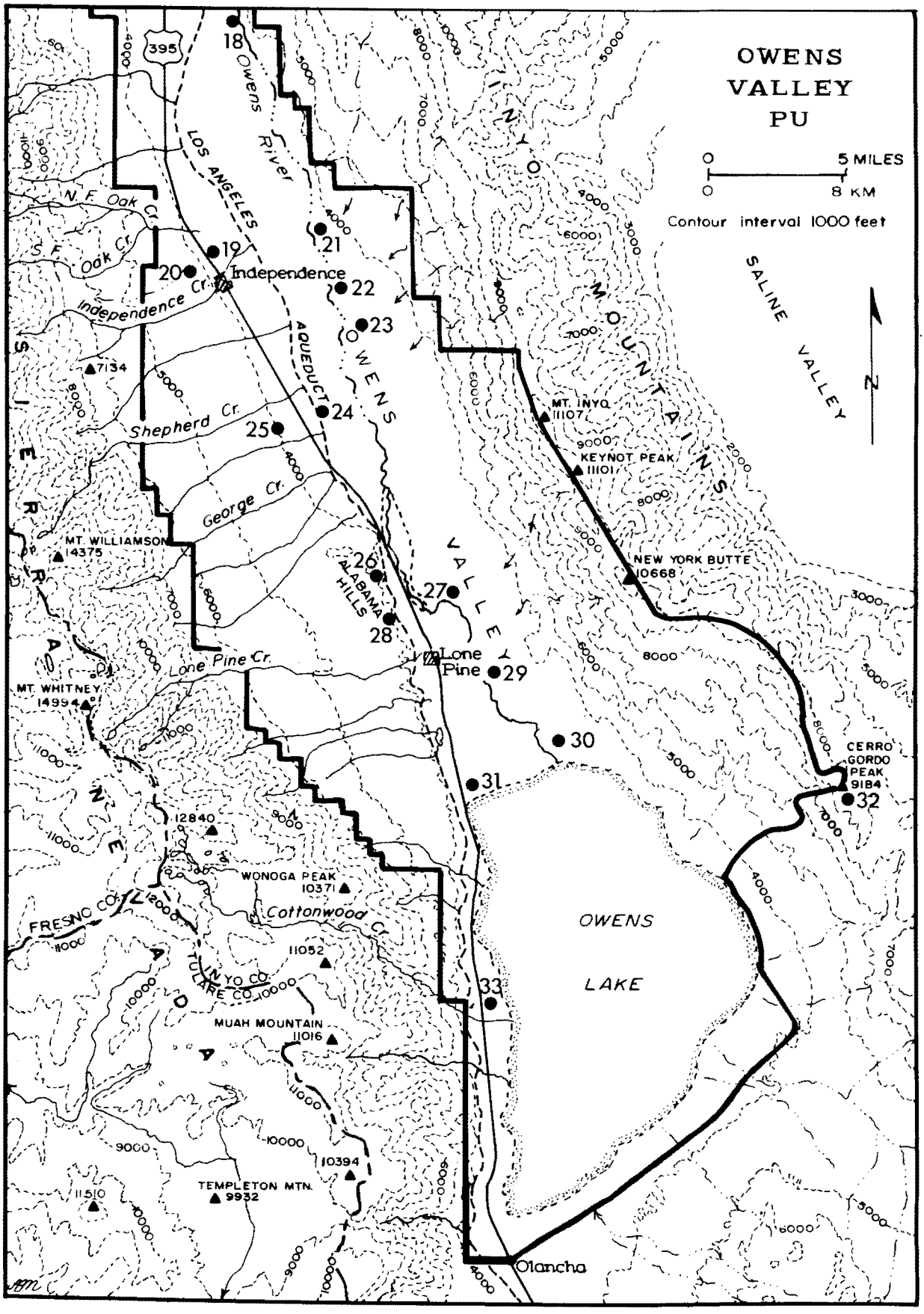

OWENS VALLEY PU
0 5 MILES
0 8 KM
Contour interval 1000 feet
SALINE VALLEY
N
Owens River
LOS ANGELES AQUEDUCT
OWENS LAKE
Independence
Lone Pine
Olancha
Shepherd Cr.
George Cr.
Lone Pine Cr.
Independence Cr.
N. F. Oak Cr.
S. F. Oak Cr.
Cottonwood Cr.
ALABAMA HILLS
MT. WILLIAMSON 14375
MT. WHITNEY 14994
MT. INYO 11107
KEYNOT PEAK 11101
NEW YORK BUTTE 10668
CERRO GORDO PEAK 9184
WONOGA PEAK 10371
MUAH MOUNTAIN 11016
TEMPLETON MTN. 9932
11052
10394
11510
12840
7134
INYO CO.
TULARE CO.
FRESNO CO.
SIERRA NEVADA
INYO MOUNTAINS
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33

Figure 21

ETHNOGRAPHIC OVERVIEW

Introduction

The ethnographic overview of the various planning units is intended to meet three prime objectives. The first of these is to provide an ethnographic context for archaeological interpretation. The detailed information available in the historical and ethnographic literature can provide the archaeological researcher with an important data base. It has been argued that for archaeological purposes ethnographic information should be used as a theoretical model against which to test archaeological data (cf. Thomas 1973, Bettinger 1975a). Therefore, this summary is intended to provide a basis for such model testing in terms of verifying or rectifying existing archaeological hypotheses, forming new 'testable' hypotheses and providing an ethnographic framework within which archaeological interpretations can be placed, although Wobst (1978) has recently issued a warning on the pitfalls of 'Archaeo-Ethnology.'

The second objective is to identify from both literature and archival sources the aboriginal groups, their territorial boundaries, their linguistic affiliations and their demographic structure during precontact times.

The third major objective is to provide a reasonably comprehensive bibliography on the Native American groups resident in the study area prior to 1860. A select annotated bibliography is appended to aid future Bureau of Land Management researchers who may require additional information and data.

A select number of social and economic features are discussed in detail with regard for their relevance to the archaeological record. Subsistence patterns are discussed in some detail as are environmental features related to these practices. Social organization, mythology and shamanistic practices/beliefs among other areas are treated generally as they are in the existing literature. Material culture and other institutions peculiar to or affecting the various groups such as intertribal trade, warfare, etc. are included where reliable information exists.

A caution is in order before proceeding. The ethnographic record as collected by various anthropologists and interested observors during the past 100 years is biased and should be interpreted with some care (for a history of Great Basin ethnography cf. Baumhoff 1958 and C. Fowler 1977). That is to say, the information used to compile the recent ethnographic record was obtained from individuals who were either very young at the time of Anglo contact (1860 for the Owens Valley area, cf. Bettinger 1975a and History, this report) or who had obtained their information second-hand through interaction with older individuals (cf. Steward 1936). In either case, memory-loss, acculturation and lack of first-hand knowledge/experience may have contributed to a notable bias in the data available to the anthropologist. The ethnographic record can be and is a valuable data base if these reservations are kept firmly in mind (cf. Wobst 1978).

Aboriginal Groups Resident in the Region

Kroeber (1925), utilizing the ethnographic data available to him, assigned three separate aboriginal groups to locations within the boundaries of the four planning units (cf. also Heizer 1966a). Cnly two of these groups - the Mono Lake or Kuzedika Paiute and the Owens Valley Paiute - used the region as a major resource base. The third group, the Washo, appear to have had a territorial claim to portions of the Coleville unit although they apparently only used the area on a peripheral basis (Fig. 22-29). Neighboring Native American groups are illustrated in Figure 22 and Murdock and O'Leary (1975) should be consulted for a listing of relevant ethnographic materials.

Washo

The definition and delineation of the Washo territorial boundaries has been subject to various problems and controversy. Omer Stewart (1966), in his research for the Indian Land Claims Commission, has presented an excellent synthesis of both published and unpublished materials pertaining to the tribal 'boundaries' of several western North American Indian groups - among them the Washo and Northern Paiute. While his work, especially on the Washo, has been subjected to some detailed criticism (cf. d'Azevedo 1966) his research can be considered as essentially valid for the purposes of this report. Both authors (Stewart 1966 and d'Azevedo 1966) caution on the use of 'fixed, legal' boundaries as strict tribal territorial definitions. While boundaries did exist to some degree, they were apparently fluid and 'variable' between adjacent tribal groups (e.g., the Washo and Mono Lake Paiute). Price (1962) has noted that while the territory ascribed to the Washo covered approximatley 4000 square miles, only about 2000 square miles can be considered as "nuclear" lands while the rest are termed "peripheral" lands (Fig. 24). The nuclear lands have been noted as lands which the Washo defended as their own against outsiders, while the peripheral lands surrounding the nuclear lands were used by the Washo when necessary.

The "Findings of Fact" by the Indian Land Claims Commission (1959) have described the Washo tribal lands as:

16. The Commission based on the foregoing findings of fact and the record as a whole, and cognizant of the fact that "intertribal boundaries were vague, inexact, with marginal areas equally available to tribes living in geographic continuity" in the region within which the claimed lands were situated, finds that the Washoe Indians, petitioner's predecessors in interest, aboriginally exclusively used and occupied in customary Indian fashion the following described lands:

> "Commencing in the north at Adams Peak, thence south along the summit of the ridge between Long Creek and the Feather River drainage across Beckwourth Pass east of Vinton; thence in a westerly direction on the summit of the ridge between the drainages of the Little Truckee and the Feather River to the crest of the Sierra Nevada Mountains just west of Webber Lake; thence in a southeasterly direction along the crest of the Sierra Nevada Mountains passing over Donner Pass and Echo Summitt Pass to Raymond Peak; thence in a northeasterly direction to Leviathon Peak; thence (as depicted on Pet. Ex. 7-13) northeasterly to



Figure 22: General Tribal Boundaries of California Indian Groups. Heavy Line Indicates Approximate Area of Study Region.

Figure 23 (Map is from Stewart 1966:Map 28)

0 0 0 0 Findings of Fact: Docket 288 Indian Land Claims Commission area "aboriginally exclusively used and occupied" by the Washo Tribe.

——— Area claimed for Washo by O.C. Stewart, 1955.

+++++++ Riddell 1960, "Northern Paiute."

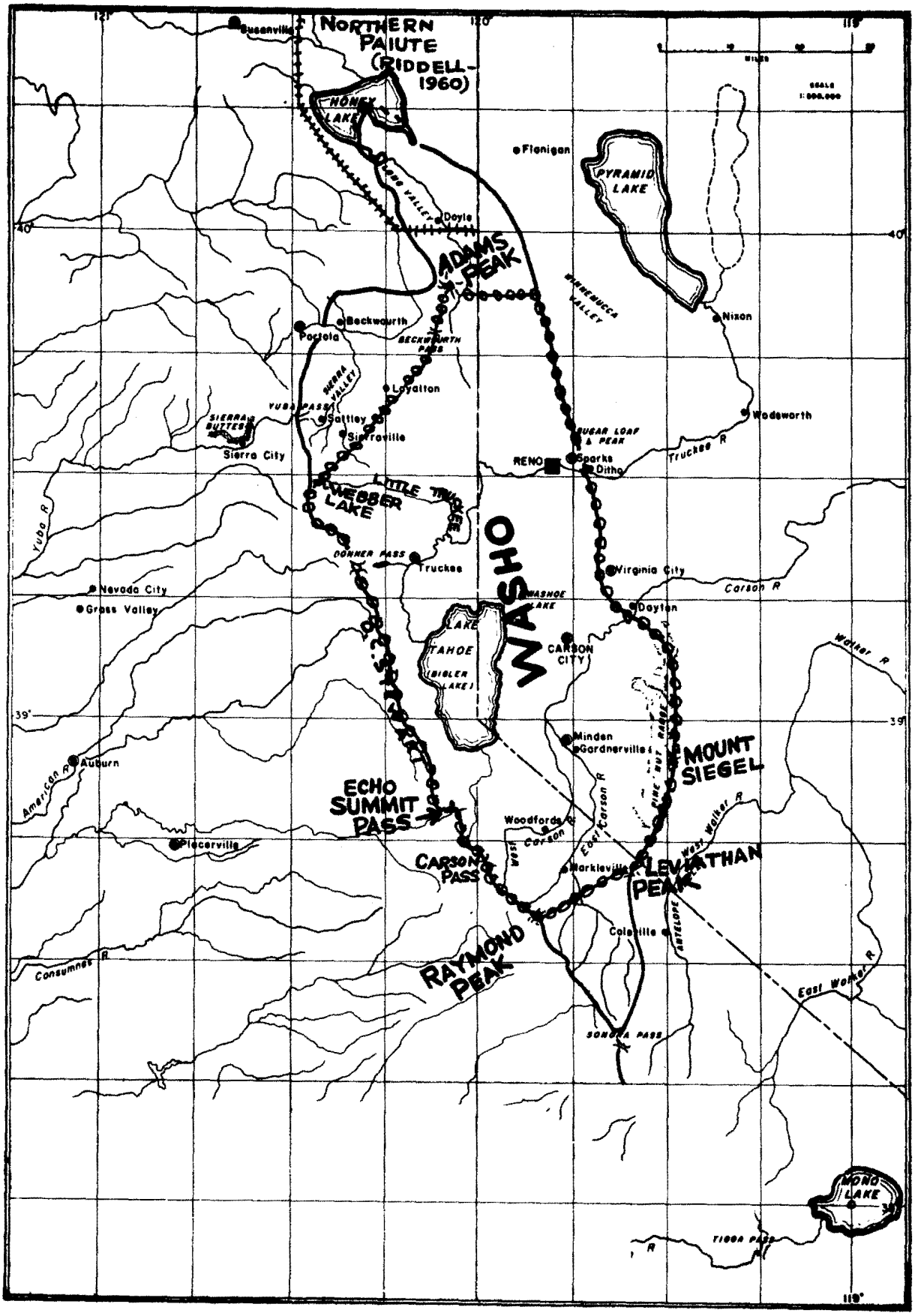

NORTHERN PAIUTE (RIDDELL-1960)
HONEY LAKE
Susanville
Fleniger
PYRAMID LAKE
Doyle
ADAMS PEAK
Beckwourth
Portola
BECKWOURTH PASS
Loyalton
SIERRA BUTTES
Sierra City
Sattley
Sierraville
YUBA PASS
SIERRA VALLEY
Nixon
Wadsworth
SUGAR LOAF & PEAK
RENO
Sparks
Ditho
Truckee R
LITTLE TRUCKEE
WEBBER LAKE
DONNER PASS
Truckee
Yuba R
Nevada City
Grass Valley
Virginia City
Carson R
Dayton
WASHOE LAKE
LAKE TAHOE (BIGLER LAKE)
CARSON CITY
Walker R
Minden
Gardnerville
MOUNT SIEGEL
Auburn
American R
ECHO SUMMIT PASS
Placerville
Woodfords
West Carson
East Carson R
Markleeville
CARSON PASS
LEVIATHAN PEAK
West Walker R
Coleville
ANTELOPE
Consumnes R
RAYMOND PEAK
East Walker R
SONORA PASS
MONO LAKE
TIOGA PASS
39°
40°
119°
120°
121°

Figure 23

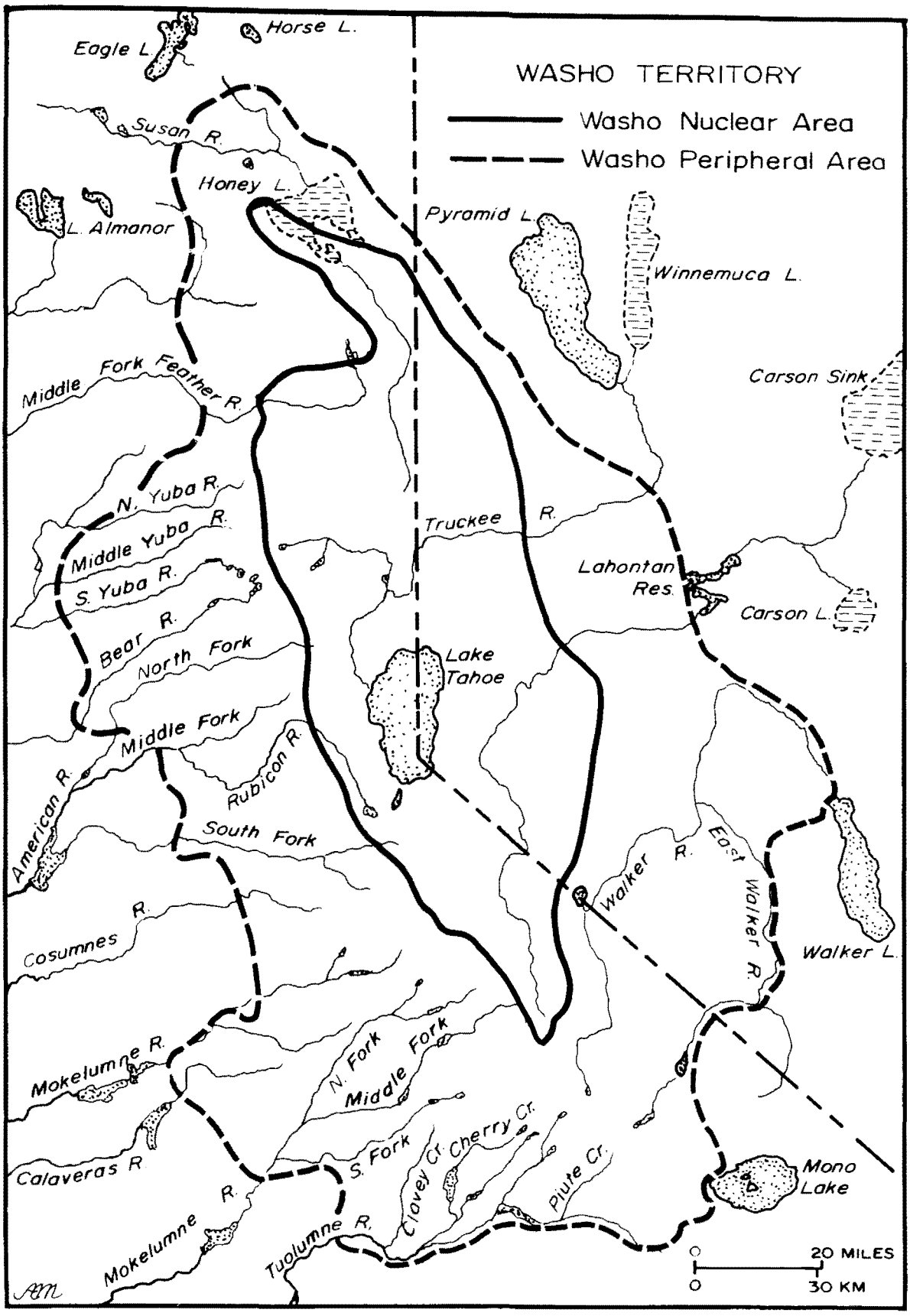


Figure 24

(From Price 1962)

> Mount Siegal; thence northerly along the summit of the Pine Nut Moutains to a point about due east of Carson River and passing about two miles west of Dayton, Nevada; thence in about a northerly direction along the river of the Washoe Mountains, (west of Virginia City and to the east of Steamboat Valley) to a point about 2 miles east of Sparks, Nevada; thence across the Truckee River and continuing in a northwesterly direction along the crest of the mountains west of Winnemucca Valley to a point directly east of Adams Peak; thence westerly in a direct line to the place of beginning (Indian Land Claims Commission, Docket No. 288:266-281, March 20, 1959)." (Fig. 23)

However, in spite of this 'legal' definition, d'Azevedo (1966) provides convincing evidence for assigning both Little Antelope and Antelope Valleys to the southern Washo (hangɛ̨lɛ̨lti - cf. Merriam 1904:38, Lowie 1939:301), even though Stewart (1966) in his synthesis rejected this area and assigned it to the Northern Paiute. This area of the Coleville Planning Unit can be considered to be in dispute.

Northern Paiute - Mono Lake Paiute and Owens Valley Paiute

The territory south of the Washo 'boundary' discussed above has been assigned to the Northern Paiute (cf. Stewart 1939, 1966, Steward 1933, 1938a, Merriam 1955, Merriam and Talbot 1974, Davis 1965 among others; also cf. Merriam 1955:168, 170-174 for a list of names applied to the Paiute groups in the area) with the area of use extending southwards to the southern boundary of Owens Lake. Stewart (1966) has synthesized the material presented to the Indian Land Claims Commission used for defining the boundaries of the general 'Northern Paiute Nation' (Fig. 25)

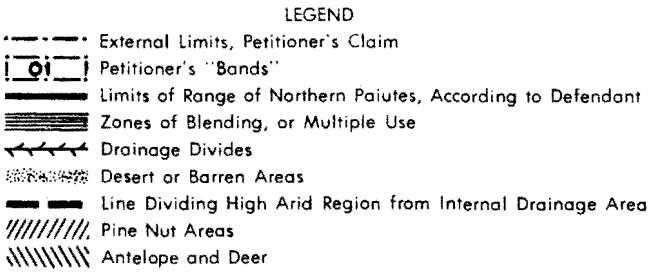
However, we are mainly concerned with the boundaries between the two Northern Paiute groups present within the Mono Basin and Owens Valley region. These have been assigned the names Kuzedika Paiute (Davis 1965; Merriam and Talbot 1974, koo-tsab-be-dik-ka - Mono Basin area) and Owens Valley Paiute (Steward 1933; Merriam and Talbot 1974, Owens Lake Monache Paiute) (cf. Table 1). The analysis of linguistic data from the two groups has indicated a boundary between the two groups/languages at the watershed divide between the headwaters of Owens River on the south and Mono Lake basin to the north (cf. Kroeber 1959, Merriam 1955:151, 161, Merriam, Appendix I in Grosscup 1977, Linguistic Affiliation this report). Grosscup (1977) on the basis of an intensive study of C. Hart Merriam's file data, describes the boundary between the Long Valley-Mono Lake group and the Benton Valley-Round Valley (Merriam and Talbot 1974, Pahng-we-hoo-tse) and southern group as:

> "The boundary would start in the west at the crest of the Sierra Nevadas near Red Slate Mountain, run east near Mt. Morgan to the narrows between Long Valley and Round Valley, which contains the canyon of the Owens River, across to Casa Diablo Mountain, then north, apparently along the crest line, along the Benton Range which lies between Adobe and Benton Valleys to the divide at the head of Benton Valley (Grosscup 1977:131)." (Figs. 26 and 29).

Figure 25

(From Stewart 1966)

Indian Claims Commission Docket 87: "THE NORTHERN PAIUTE NATION", Defendant's request for Findings of Fact, Objections, to Petitioner's requested Findings of Fact, and Brief. Barnard M. Newburg, Attorney.



MAP 17

Northern Paiute Territory according to government witnesses.

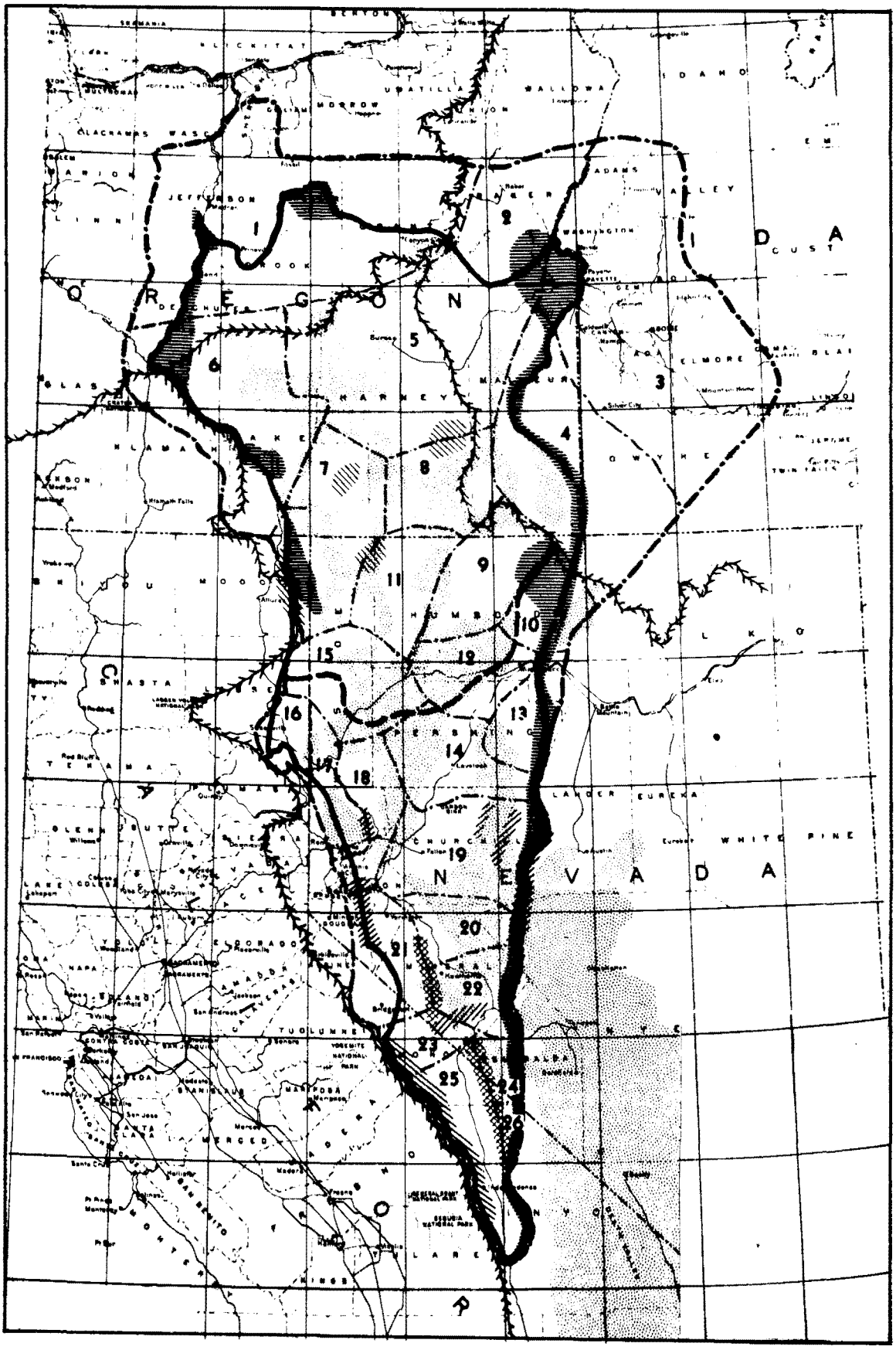


Figure 25

(From Stewart 1966)

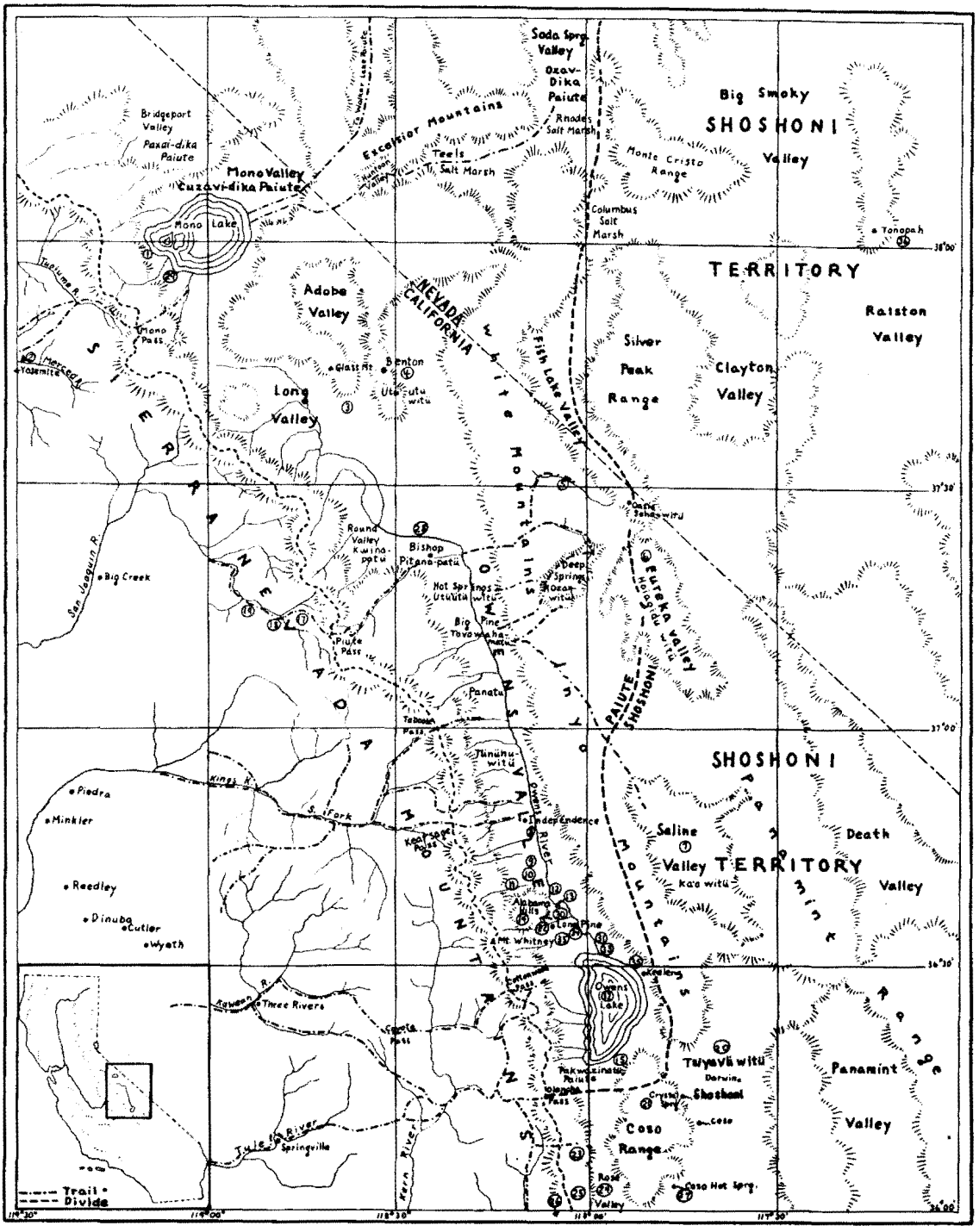


Figure 26: Paiute Subdivisions and Boundaries (Steward 1933:Map 1).

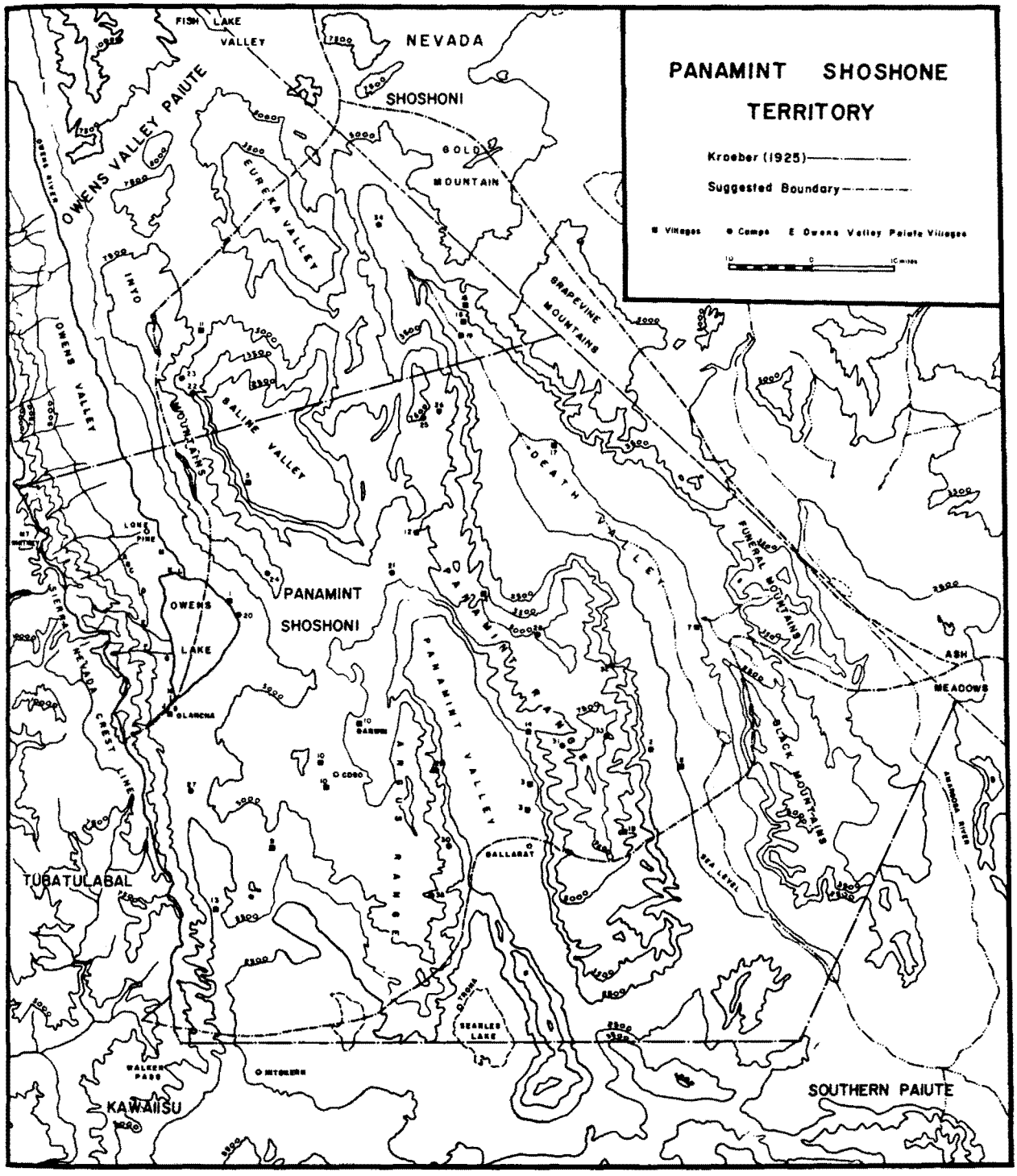


Figure 27: Suggested Panamint Shoshone Boundaries (Grosscup 1977).

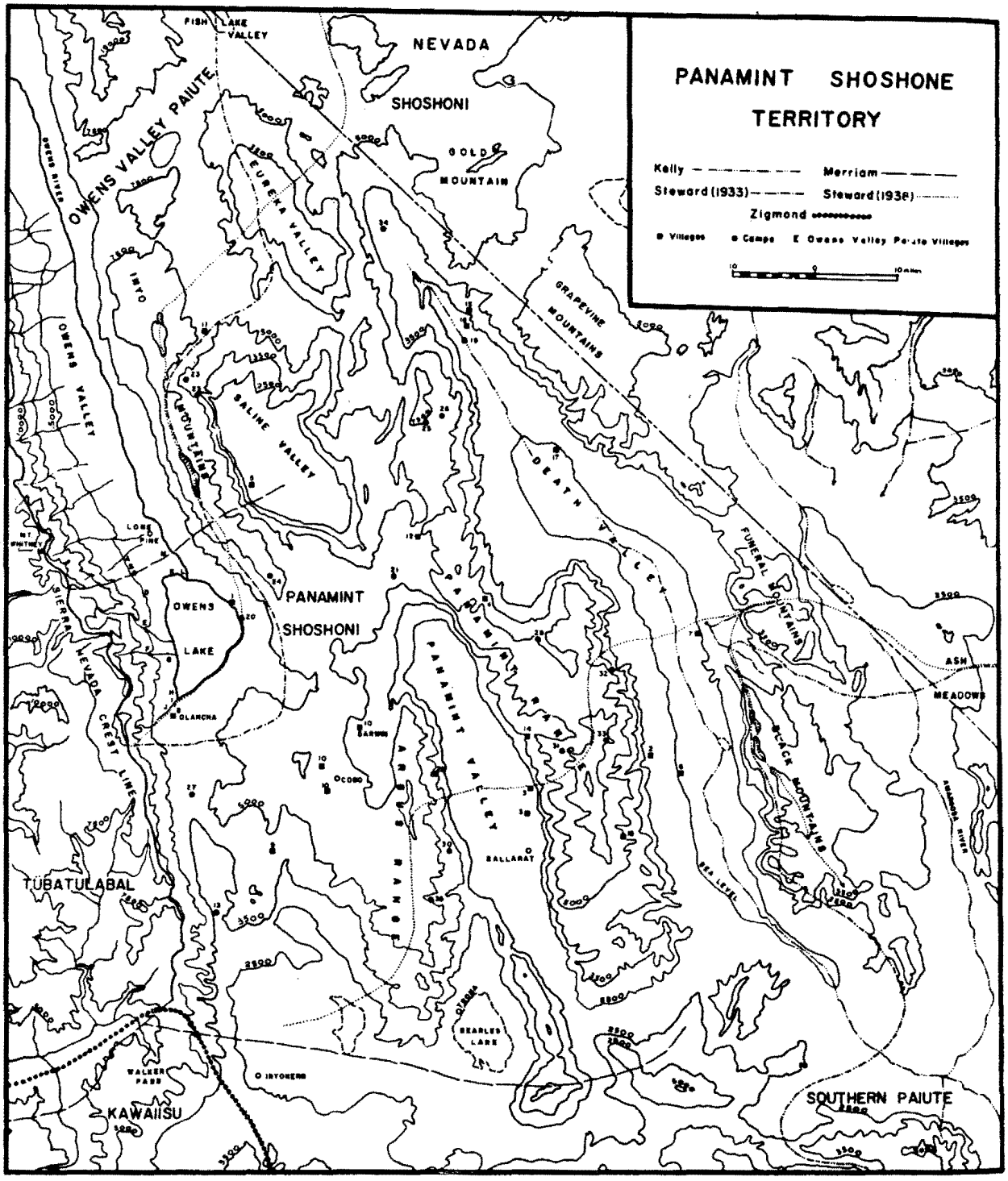


Figure 28: Suggested Panamint Shoshone Boundaries (Grosscup 1977) and Owens Valley Paiute Villages.

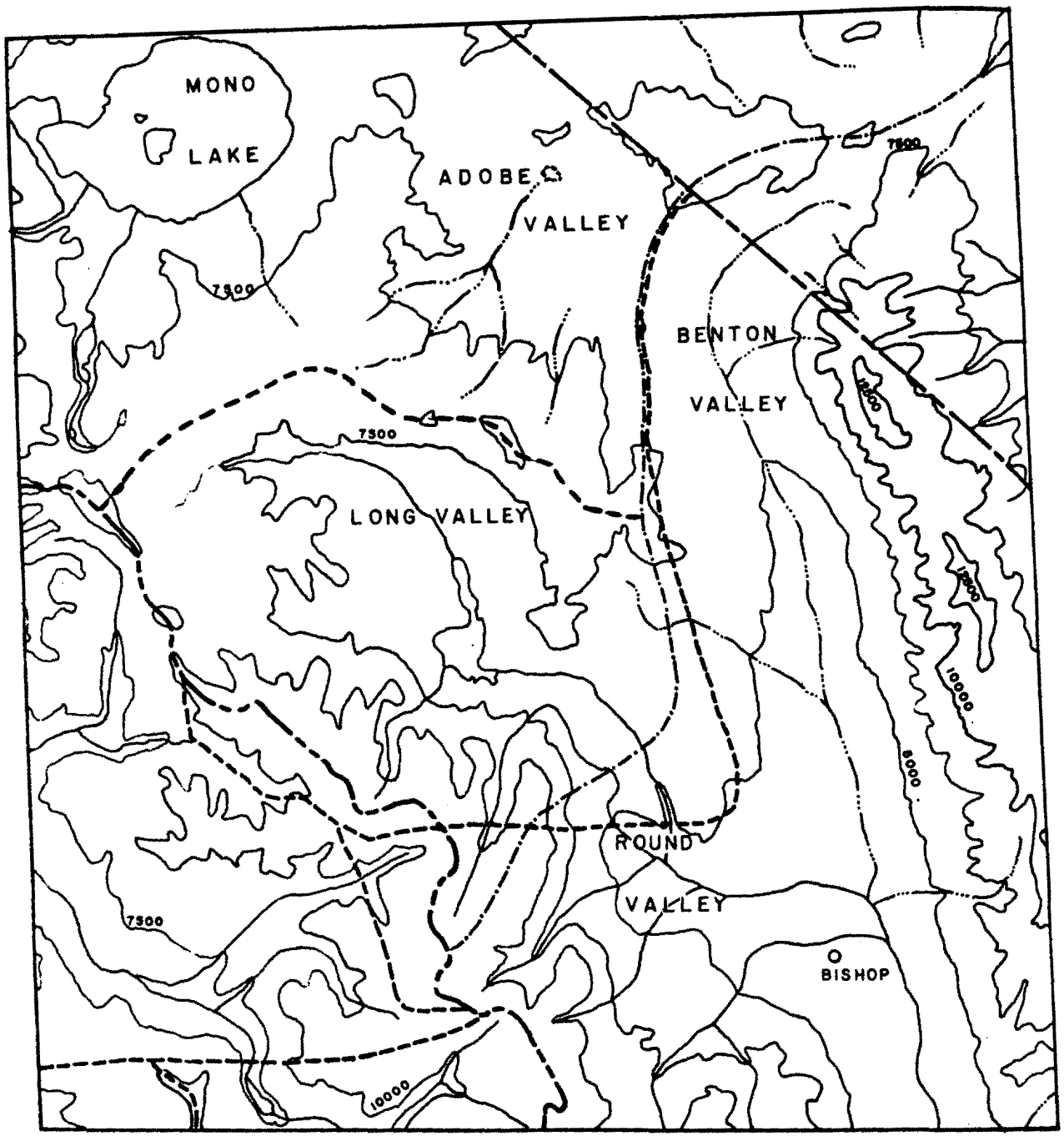


Figure 29: From Grosscup (1977).

The Owens Valley Paiute group's territorial boundaries have been set by the Indian Land Claims Commission "Findings of Fact" as:

> "Commencing at the present town of Olancha, California (south of Owens Lake), thence to a point about 4 miles east of the present town of Keeler, California, thence north to the crest of the Inyo Mountains and continuing north, northwest along the crest of the Inyo Mountains to a point at 36'50" N latitude, 118'00" W longitude, thence north, northeast to the present town of Coaldale, Nevada, thence west, northwest to the summit of Potatoe Peak, thence southwest to the summit of Dunderberg Peak, thence southeast to the summit of Mt. Morgan, thence southeast to the commencing point at the present city of Olancha (Indian Land Claims Commission, Docket No. 322)."

While the ILCC has 'set' the southern boundary of the Owens Valley Paiute with regards to the Panamint Shoshone, Grosscup (1977) notes that the Owens Lake area has been a problem. Kroeber (1925) gave the lake to the Panamint Shoshone while Steward (1933) gave it all to the Owens Valley Paiute plus a part of the valley south of the lake. Steward (1938a) revised the boundary to show a line between the two groups along the southeast shore of the lake (Fig. 28). Merriam (from Grosscup 1977) drew his boundary just south of Lone Pine (Fig. 28). In his research, Grosscup (1977) notes the presence of Owens Valley Paiute villages on the west shore of Owens Lake with the possibility of the Panamint Shoshone owning the east shore from Olancha to somewhere between Keeler and the mouth of the Owens River, possibly even further up the river almost to Lone Pine. Grosscup (1977:116) suggests his own version of the boundary which disagrees slightly with those proposed by Steward (1933, 1938a) (Fig. 27). For the purposes of this study, Steward's (1938a) boundary will be accepted as valid although Grosscup's (1977) analysis of the Merriam data raises several valid points.

Again, it must be stressed that these boundaries are in many ways ethnographic constructs that may be of only moderate validity as 'transition' zones between the various tribal 'groups.'

Table 3

The following names are applied to the Mono Lake Paiute by other tribes (Merriam 1955:168).

Kôô-chah'-be-ah-wah'-te neu-mă (Kwe -chah dik-kah)---by Bishop Cr. Paiute

Koo-tsa'-be dik'-kah kud'-dy new'-mă---By Pyramid L. and Truckee Paiute

Kwe'-nă-gwet'-tah - Bishop Cr. Monache name for Long Valley Piute (sic) (tribe same as at Mono Lake)

Koo-zab'-be-te-kah' (Poo-tsah'-be-te-kah')---Monache name for Mono Lake Piute (sic)

Moan'-au-zi---By Nishinam

Mo'-nah, Mo-ni'-ah---By Yosemite Muwa; applied to both Mono Lake Piute (sic) and Piute tribes of the Sierra

Mo'-nah and Mo'-nă-mus-se---By the Nis'-sim Pa'-we-nan of Poosoone

Mo-nahk or Mo-nok---By Tuolumne Mew-wah
Pah'-be-o'-zo --- By Olancha Pak-wa-zid-je
Se'-be-doo-mah --- By Muwa (?)
Se-wan'-a-gwat --- By Muwa (?)
Too-ne-gă-bah --- One of their names for themselves
Tu'-in-de-sow'-wa (Tun'-de-sow'-wa) --- Nuvahandit name

The following names were applied to Owens Valley Monache (Owens Valley Paiute) and their several bands by themselves and neighboring tribes (Merriam 1955: 170-171).

Chak'-ke-sev'-uts --- Name used by Monache (of Long Pine) for Monache band on first creek N of Independence Creek
Horse-thief tribe --- Term used for Indians of Owens Valley and of W slope of Sierra, San Francisco Daily Chronicle, June 26, 1854
Kwe-am'-mit --- Olanche (Pahkwăsidje) name for Bishop Creek Indians
Kwe'-nah-pat'-se --- Monache name for related band in Round Valley
Mo-nă'-che --- New--'-ah and Wiktchumme name for Owens Valley Monache
Monache --- Yokut name for Owens Valley Monache
Monachi --- Yokut name for E and W "Monosh." Kroeber (1925:585)
Nom-bi'-ie --- Olanche (Pahk'wasid'je) name for Owens Valley Monache
No'-no-pi-nă-neum --- Name used by Monache of Independence Creek for Monache of Lone Pine
O'-Kah-vi-da-kah --- Name used by Monache (of Lone Pine) for Bishop Creek Piute
Pah-ah'-go-hots (or Pah-hah'-gah-hootch') --- Name used by themselves by Monache on Turtle Creek in Owens Valley
Pak-wă-zid-je --- Name given by Olancha Shoshone to Owens Lake tribe
Pe-ag'-gah-te-kah' --- Name used by Monache of (of Lone Pine) for band in Long Valley
Pe'-sah-poo'-at-te-new'-ma --- Bishop Creek Piute name for themselves
Pe-tah'na-gwaht'-ta --- Name used by Bishop Creek Monache for related bands at Big Pine, Lone Pine and Independence
Pe-ton-ă-kwaht (or Pe-tah'-nă-gwat) --- Mono Lake Piute name for Monache band at Bishop Creek
Pitankakwat --- "Mono" of Owens Valley name for themselves; also used by their kinsmen for them (Kroeber 1925:585)
Se'-ve-nă-gwet'-tah --- Bishop Creek Monache name for related band in Fish Lake Valley
Tak'-ke-sev'-vuts --- Monache band on Oak Creek N of Independence
Ut'-tă-oo'-le gwet'-tah --- Bishop Creek Monache name for Monache band at Benton
Wo'-ko-rōb' --- Monache band on Independence Creek
Yiwinanghal --- Tubotelobelă name for Monache Piute of Inyo Co. (Kroeber 1907, 1925)

Note

See Heizer(1966a:37-37) and Merriam and Talbot (1974) for a list of current equivalent tribal designations.

Ethnographic Groups - Linguistic Affiliation

Linguistic criteria, in conjunction with geographic distribution, has been the traditional method of ethnographic differentiation for historic Great Basin groups. Two language families are present within the planning unit boundaries. The Washo of the Coleville unit have been placed in the Hokan language family (cf. Jacobsen 1966 for a review) while the Mono Lake and Owens Valley Paiute groups are part of the Uto-Aztecan family (cf. Kroeber 1907, 1925, Lamb 1958, 1964, Miller 1966, Hopkins 1965, Goss 1968, 1977 among many others). The linguistic studies pertaining to the Hokan-speaking Washo have been synthesized and reviewed by Jacobsen (1966) and the reader is referred to this article and its references (cf. also Goss 1977) for an overview of Hokan (also Miller 1966, Goss 1968). The linguistic details concerning the two Paiute groups will be treated in some detail as they occupied the majority of land in the study area during the recent and prehistoric past.

The languages of the historic Great Basin were included by Kroeber (1907, 1925) in his classification of the Shoshonean languages which he divided into four branches - Pueblo, Kern River, Southern California and Plateau. The branch we are concerned with is the Plateau Shoshonean which included the languages of the Great Basin groups. Three subdivisions are recognized (Kroeber 1934):

I. Ute-Chemehuevi (Ute, Southern Paiute, Chemehuevi and Kawaiisu);

II. Shoshoni-Comanche (All true Shoshoni, including the Wind River and Comanche east of the Rocky Mountains and Panamint or Koso); and

III. Mono-Bannock (Bannock, Northern Paiute or Paviotso and Mono).

The ethnographic groups resident in the study area are included in subdivision III of Kroeber's classification scheme.

Lamb (1958) for a number of reasons, has proposed the family name of Numic for Kroeber's Plateau Shoshonean branch. He (Lamb 1958:96) agrees with Kroeber's (1907, 1925) conclusions considering Numic as a distinct genetic group and in dividing it into three branches. Lamb has proposed the following revised branch names which have been more or less adopted by linguists in the Great Basin.

1. Monachi-Paviotso: (a) Monachi: Owens Valley, California; (b) Paviotso: the remainder of "Northern Paiute."

2. Panamint-Shoshoni: (a) Panamint: Shoshoni of southwestern Nevada; (b) Shoshoni: Shoshoni of northern Nevada, Wyoming, Utah, Idaho and Comanche.

3. Kawaiisu-Ute: (a) Kawaiisu; (b) Ute: Ute, Southern Paiute and Chemehuevi.

The two distinct Paiute groups present fall within the Monachi-Paiute category

of Lamb with the Mono Lake Indians within the Northern Paiute or Paviotso Linguistic group and the Owens Valley Paiute (cf. Kroeber 1959:267-268 for a discussion of the ethnic nomenclature, also Merriam 1955) in the Mono-Monache group.

The Northern Paiute speech is essentially homogeneous throughout its area - northwestern Nevada, a fragment of eastern California, southeastern Oregon and a portion of Idaho. Lamb (cf. Kroeber 1959) believes that this speech homogeneity over a large area indicates that the spread of "Northern Paiute" must be relatively recent (cf. Lamb 1958) perhaps on the order of the last thousand years.

The other language according to Lamb (cited in Kroeber 1959:265-267), Monachi or Mono, occurs in three superdialects - northwestern, northeastern, and southern. The first two are located east of the Sierra Nevada crest while the southern extends across it. Each of these "superdialects" contains two or three dialects. Northeastern Mono contains three dialects. The first is on northern Owens River including Long Valley (with a subdialect around Benton); the second along and abreast middle Owens River, at Round Valley, Bishop and Laws; the third off the river to the east, across the White Mountains, in Deep Springs and Fish Lake Valleys, bordering on the Shoshone. This last dialect, according to Dr. Lamb, seems to be the most archaic Mono and shows some resemblances to southern Owens River (Kroeber 1959:265-266).

The Southern Mono dialects are those of southern or lower Owens River drainage and of the upper Kaweah River west of the Sierra Nevada crest. Three southern Owens subdialects are known: at Big Pine and Fish Springs; at Independence; and at George's Creek, Lone Pine and Owens Lake (cf. Steward 1933, Maps).

Kroeber offers a pertinent remark on this distribution:

> "We have in this entire Mono array an example of typical California speech fractionation; there are recognizable subdialects even along the same stream, as compared with the much larger areas of speech identity among the Northern Paiute of the Intermontane semidesert plateau. Identity of speech could apparently be maintained among only a few hundred people, and in the desert these had to space out over a much larger territory to subsist (Kroeber 1959:266)."

Kroeber also theorizes (1959:266) that the movement or migration of the Mono dialect occurred from east to west perhaps with a Mono-Paviotso group forming in the general area of the Owens Valley and Mono Lake basins, differentiating slightly, and then spreading westward and northwards. This gradual migration across the Sierras may have occurred between 500 to 200 years ago based on dialectical inferences (Kroeber 1959:266).

Several models have been formulated to explain Great Basin linguistic prehistory over the past 10,000 years. These studies have primarily involved proposing hypotheses to account for the protohistoric language distributions of the area as well as trying to account for some of the apparent

disparities between the archaeological and linguistic records (cf. Fowler 1972; Goss 1968; Gunnerson 1962; Hopkins 1965; Lamb 1958; Miller 1966; Swadesh 1964; Swanson 1966; Taylor 1961; among others). A review of the literature indicates that the present data is often in conflict (especially glottochronological and lexiostatistical material). It is possible that future detailed archaeological and linguistic research will provide material that may be of value in interpretation and reconstruction. The reader is referred to Goss (1977) for a current view of linguistic prehistory in the Great Basin (and the references therein).

Population - Aboriginal

A reliable estimate of the aboriginal population of California has occupied a number of scholars since the turn of the century. Merriam (1905) using mission data estimated 260,000 while Kroeber (1925) based his calculations on ethnographic material and arrived at a figure of 133,000 for the state. Cook (1943), excluding several groups (the Modoc, Paiute, Washo, Mohave and Yuma), estimated 133,500 while Baumhoff (1963:226) suggested a total of 350,000. Cook(1976a), based on an exhaustive study of the problem, has recently suggested an original aboriginal population of 310,000 (± 10%) for the presently defined boundaries of California. This figure, of course, may be subject to some revision but seems a reasonable estimate (cf. Cook 1976a).

Cook (1976a) has accepted Kroeber's (1925) estimates for the territory east of the Sierra Nevada as valid(1976a:xvi). This data, along with other researchers material (Mooney 1928, Leland 1976, Price 1962, d'Azevedo 1966, Curtis 1926, Steward 1933, 1938a, Davis 1965) will be used to present an estimate of the aboriginal population present within the general study area. The data are in many cases few and represent at best only estimates of the aboriginal population at the time of white contact.

Washo

The estimates of the aboriginal population vary considerably for the Washo as given by several researchers. Kroeber (1925) gives the total in pre-white times at around 1500 while Mooney (1928) estimated 1000 Washo in 1845 and 300 by 1907 (1928:20). Curtis (1926:91) estimated 800 in 1910 basing his guess on United States census data. Leland (1976) presents a 'tentative' population baseline figure of 1365 for 1873 deriving this figure from a backwards extrapolation based on the average rate of decrease of Great Basin Indian groups during the period 1873-1910. Price (1962) tends to accept Kroeber's (1925) earlier estimate of the population and has calculated a density of 2.7 square miles per person utilizing both nuclear and peripheral lands. Warren d'Azevedo (1966) presents a lucid discussion the early Washo population and suggests a much larger group than the population figures in the literature. He indirectly suggests an aboriginal population numbering 2000-3000 people based on his extensive research among the Washo. The figures presented by the various researchers for aboriginal times should be interpreted cautiously in any future research. The present population as indicated by a census of the tribal roll is 1500 (Leland 1976).

Mono Lake (Kuzedika) Paiute

Demographic data on this group in aboriginal times are extremely sparse. Davis (1965) has hazarded a guess, based on her in-depth research, that the semipermanent population of the Mono Lake basin was not much over 200 people. Reliable information may be available through various archival sources but apparently no statistics or observations are currently available in the anthropological literature. A population density of 1 person per ca. 4 square miles can be calculated using Davis' figure of 800 square miles area (both useable and unuseable land) for the Mono Basin. At present, the Mono Lake Paiute are included in the overall population figures for the Northern Paiute.

Owens Valley Paiute

Population data for the aboriginal Owens Valley Paiute are available from various sources. Steward (1933) during his ethnographic research estimated the Paiute population in and around Owens Valley at near 1000. Chalfant, quoted in Steward (1933:237) presents the following data:

Table 4

Resident Owens Valley Indian Population Data

Year	Number
1855	1000 (est. by von Schmidt, cf. Lawton et. al (1976))
1863	1812 (906 Indians removed to Fort Tejon with the military commander estimating twice as many remaining - which included some Indians from outside the area)
1870	1350 (est. by Egbert which included about 1000 for Owens Valley proper - Bishop Creek, 150; Round Valley, 150; Big Pine, 200; Independence, George's Creek and Lone Pine, 400-500.
1880	637 (United States Census)
1890	850 (" " ")
1900	940 (" " ")
1910	792 (" " ")
1920	632 (" " ")
1930	736 (" " ")
1930	970 (Indian Service Survey)

Based on the available population data Steward (1933, 1938a) calculated an area population density ranging from between 0.50 to 2.50 persons per square mile for the Owens Valley Paiute.

The journal of Captain J.W. Davidson during his expedition from Fort Tejon to the Owens Valley in 1859 (Wilke and Lawton 1976) indicates a population of 1200 for the Owen's Lake and River area ". . . tho' my guide and Mr. David McKenzie, a mountaineer of great experience & judgment, make them much more numerous (Wilke and Lawton 1976:29)." A figure of 2000 for the Paiute population of Owens Valley was given by Mr. McKenzie (Wilke and Lawton 1976:46, Editor's note No. 78). If this estimate is correct as Lawton et al.(1976:15) believe, this would double Steward's guess (estimate ?) as well as the population density of the region.

The current resident Native American population (including Benton) totals ca. 1450 (BIA Tribal Directory 1978).

ETHNOGRAPHY

Mono Lake Paiute

Ethnographic data are scanty for the Northern Paiute of the Mono Basin. The main ethnographic synthesis of the peoples of this area is a report by Emma Lou Davis (1965) along with several related ancillary reports concerned with both archaeology and ethnography of the region (Davis 1959, 1961, 1962, 1963, 1964). Other reports concerned with the Kuzedika Paiute are the observations of Merriam (1955, 1968:Pt. 1),Curtis (1926)and Kroeber (1925). References are made to the Mono Lake Paiutes in Steward (1933, 1938a); Kroeber (1959); Lamb (1958); Grosscup (1977); Merriam and Talbot (1974) among others.

As noted in the introduction to the ethnographic portion of this report, ethnographic information should be used as a theoretical model of a localized social system to be tested against archaeological data (Thomas 1973:171). Therefore, this summary of the Kuzedika Paiute ethnographic record (and the other groups in this report) is intended to provide a basis for such model testing (cf. Thomas 1973, Bettinger 1975a, also Wobst (1978) for a cautionary note). In addition, the data presented here will provide insights into the nature of aboriginal land use in the region.

Subsistence Pattern

The Kuzedika Paiute relied on a variety of seasonally available plant and animal species for their subsistence. Bettinger (1979a) has ranked a series of food source categories, more or less by importance, in regards to their utilization by the inhabitants of the Inyo Mono region (cf. Bettinger 1973a, 1977c for a discussion of this region) as derived from the ethnographic literature (Table 5).

Table 5

Rank Ordering of Subsistence Categories - Inyo Mono Region

1. Seeds	6. Insects
2. Roots and Greens	7. Fish
3. Pine nuts	8. Deer and Mountain Sheep
4. Cultivars	9. Antelope and jackrabbits
5. Small Game	10. Waterfowl

(From Bettinger 1979a)

As is typical of most hunter/gatherer groups, plant foods comprise the bulk of the exploited resources (cf. Steward 1933). The aboriginal procurement of these subsistence resources is discussed in some detail below for the Mono Lake Paiutes.

Gathering

The ethnographic report by Davis (1965) provides little information on gathering in terms of specific species utilized, the amount collected, or other data on specific utilization of many of the above listed categories. Steward (1933, 1938a) presents data for the Owens Valley Paiute to the south and it is probable that a large number of the resources (i.e., species) mentioned in these reports were also available and utilized by the Mono Lake people.

The gathering of seed plants occurred from late spring through the fall (cf. Davis 1965, Steward 1933, 1938a). Seed bearing plants were usually collected on a daily basis in the vicinity of either base or temporary camps. The seeds were either used immediately or stored in a cache for future use. The number of species in the area along with their ecological situation (riparian, desert scrub, marsh, riverine) (cf. Bettinger 1979a for a discussion on seasonality of seed plants) allowed for the almost continuous collection of this resource by movement from locality to locality (cf. Davis 1963) over the 'harvesting' season. The seeds were collected by women (Willoughby 1963) who beat the seeds free of the stalks and collected them in a shallow basket tray. Later the seeds were winnowed of extraneous material, ground, re-winnowed, toasted and then ground to a flour for use in a gruel or 'bread.' The heads or infloresences of some plants - e.g. sunflowers (cf. Steward 1933:239) were picked and processed at the base camp for use.

Roots and greens were collected from early spring to fall with their being of critical importance in the spring owing to their availability at a time when the winter food stores were nearly exhausted. Available on both the foothills and valley floors greens and roots were frequently found in a riparian setting. Davis (1965:29) has listed three roots and greens gathered specifically by the Mono Lake Paiute - parúsi - a wild onion (Allium sp.); kohíxya - the bulb of the Mariposa lily (Calochortus leichtlinii); and water cress. Steward (1933, 1934) lists several greens and tubers - tomcat clover (Trifolium tridentatum), cow clover (Trifolium involucratum), tiger lily (Lillium parvum), wild hyacinth (Dichellostemma pulchellum) - that were consumed by the Owens Valley Paiute to the south.

Tubers and roots were dug with a digging stick while greens were hand gathered. They were eaten raw or cooked. Storage for future use was in the ground in grass lined pits which were covered with grass and dirt. Tubers and roots were occasionally robbed from rodent stores (Steward 1933).

Pinenuts (Pinus monophylla) were collected on the slopes west, north and east of Mono Lake when the crop matured in late August or early September (cf. Davis 1965:33). Steward (1933,1938a) asserts that the pine nut is the most important staple Paiute food plant although there is some debate if this emphasis was due to White contact conditions and a biased ethnographic record or other conditions (Nissen, personal communication, 1978; cf. Bettinger 1975a, McGuire and Garfinkel 1976).

Several detailed descriptions by various authors of the pinenut harvest and pinyon camps are presented in Busby (1974). For the Mono Lake area, John Muir (1917) has reported on a group of Mono Lake Paiute preparing for the pinyon harvest in 1870. When crops were good, the people wintered in the pinyon groves. In the case of a locally poor crop they moved to other areas to obtain a sufficient supply and stayed at the lower elevation meadow/foothill camps (Davis 1965:35). The Mono Lake Paiute are also known to have occasionally wintered with the Miwok in Yosemite (cf. Steward 1933) especially when the pinenuts were scarce and the winters severe.

Acorns were not a staple food as in California but were obtained through trade with the Sierra Miwoks or Western Mono of the eastern Sierra. Steward (1933:246) notes the gathering of acorns from small areas in Owens Valley by the Owens Valley Paiute. The Mono Lake Paiute stored acorns with the shells removed in pits lined and covered with sage bark (like their pinenut caches). Steward (1933:246) notes that this group ground the acorns, then leached them in gravel lined pits 4 feet in diameter by pouring hot water through the meal. The acorn flour was then put into a semi-spherical basket (wavoi') with water and heated by placing hot rocks in the container (cf. Mayer 1976 for a discussion of Miwok balanophagy).

Several species of berries were utilized. These were usually sun dried and stored for future use. Elderberry (Sambucus mexicana), golden currant (Ribes aureum), 'buffalo berry' (Rhamnus california) and manzanita (Arctostaphylos sp.) were some of the collected species. Muir (1916:226-227) notes that the buffalo berry sometimes constituted the chief food at Mono Lake for several weeks. A list of other minor gathered plants is given in Steward (1933).

Hunting

Hunting was either on an individual or communal basis usually by the male members of the group (cf. Willoughby 1963). Resources provided from this source probably provided ca. 15% of the group's total subsistence base.

Small game, comprising both the cottontail rabbit (Sylvilagus nuttalii) and the small rodents, was an important source of hunted protein. Both the cottontail rabbit and rodents were taken by individual hunters using either a bow and arrow or through the use of traps and snares. Burrowing animals were dug or smudged out of their holes. Davis (1965) notes three species of ura?A

or chipmunk, one species of kangaroo rat, squirrels, voles, shrews, rats, gophers and a number of mice (punadz?E) with the most widely distributed species being the big-eared deer mouse (Peromyscus maniculatus) for the Mono Basin. These were roasted buried in the coals after the entrails were removed and the skin sewen up with a stick (Steward 1933:255). Small game provided a consistent supply of meat throughout the year (especially the lagomorphs - rabbit family) due to its year round availability.

The jackrabbit (Lepus californicus and L. townsendii), a medium game animal and the antelope (Antilocapra americana), a large game animal, are most common in the desert scrub and upper sagebrush meadows (Upper Sonoran and Transition Life Zones). Both were commonly taken by communally organized drives during the late summer and fall usually prior to or during the pinyon 'harvest.' The drives were commonly regarded as great social events. Steward (1938a:34-35) offers an excellent description of a drive with the antelope being driven/herded into a V-shaped brush corral, trapped, and then selectively killed as needed. Drives usually occurred every 10-15 years as the antelope population suffered a considerable loss from this hunting method (Steward 1938a: 35).

Rabbit drives involved a communal effort with the animals being driven by lines of men, women and children into a net strung in a large semi-circle. Clubs and bows and arrows were used to kill the rabbits caught in the net (cf. Steward 1933:254). Occasionally brush fires were used to frighten the rabbits.

Data on the hunting of other large game animals, deer and mountain sheep, are sparse for the Mono Lake Paiute. These animals were undoubtedly hunted both communally as well as individually as the overall ethnographic record from Owens Valley (Steward 1933) and the Great Basin (Steward 1938a) suggests. Both animals were available in the Mono Basin aboriginally - deer in the foothills during the winter; in the mountains during the summer with mountain sheep located in the higher more rugged mountainous areas of the Sierras. The seasonal migration of both species also offered excellent hunting opportunities (cf. Heizer and Baumhoff 1962, Nissen 1974, Heizer and Clewlow 1973 among others). Steward (1933) supplies a number of details on the hunting and preparation of these species for the Owens Valley region and he should be consulted for data that may be typical of the Mono Lake aboriginal behavior.

Mono Lake attracted a large number of assorted waterfowl, especially during the winter months (cf. Browne 1865:415) as well as during the spring. Swans, ducks, brant, geese, seagulls, coots and phalaropes are known from the lake while land birds such as quail, sagehens and blue grouse were hunted in the surrounding upland and forest areas (Davis 1965:28). Waterfowl were usually hunted by bow in the early morning by hunters concealed in blinds on the shore (Steward 1933:255), Merriam 1955:74). Steward (1933:255) lists a number of species and their aboriginal names. Waterfowl were boiled in ceramic pots. Quail were shot or caught in traps and either boiled in pots or broiled on coals.

Insects

A number of insect species were especially sought after as subsistence resources by the Mono Lake Paiute. This group was especially reliant on the pandora moth (piuga - Coloradia pandora) and brine fly larvae (kutsavi - Ephydra

hians) respectively restricted to the Jeffery pine forests and Mono Lake littoral zone.

The caterpillar of the moth, Coloradia pandora, was gathered in alternate years during July in the Jeffrey pine forest south of Mono Lake. Specific localities mentioned by Davis (1965:32) for piuga are the high springs near June Lake, Bald Mountain and Indiana Summit while Aldrich (1921) notes that Mono Mills was another favorite gathering spot. The larvae were collected in quantity by means of trenches as they descended to pupate at the base of the pine trees (Aldrich 1921). Smudge fires were occasionally used to stupify the larvae remaining on the trees or to hasten their downward movement (Davis 1965, Steward 1933). The caterpillars were gathered in special, open-twined, round-bottom carrying baskets (cf. Steward 1933:Plate 10f) and killed by smoking over or dumping into a fire. Aldrich (1921:36-38) also notes another technique in which they were baked for an hour in a mound of earth which had been previously heated by a fire. Following this, they were sifted/winnowed, sun dried, and then stored in a cool place to retard heat spoilage. For eating, the dried larvae were boiled in pots or baskets and added to soups or stews. Steward (1933:256) notes that one and a half tons were gathered by an individual in 1920 during the period of availability.

Kutsavi, or the larvae of the brine fly (Ephydra hians), was an important staple food and an item of trade for the Mono Lake Paiutes. The species was gathered during late summer when it washed ashore at Mono Lake. The larvae collected in windrows about 2 feet wide and 2-4 inches thick (Browne 1865, Loew 1876, Aldrich 1912, Muir 1916, Steward 1933:256, also Heizer 1950 and 1960: Plate 5). This food was collected, sun dried, the shell rubbed off by hand and stored for future use. The larvae were added to various dishes or boiled for half an hour into a mush (cf. Steward 1933:256). Muir (1916:227) noted that 'families and tribes' claimed sections of the shore for their exclusive collecting and disputes occasionally arose over encroachment by others.

The larvae of ants, wasps, bees and other insects were eaten (cf. Muir 1916:46, 206) as well as lizards (tuvo'dza).

Mono Lake Subsistence and Settlement

The Mono Lake Paiute subsistence adaptation emphasized frequent movements by independent family groups similar to the family band pattern proposed by Steward (1938a, 1955). The largest settlements were the winter villages located either in the pinyon groves if the harvest had been plentiful and the winter mild or in the lowland areas near the lake when the crop was poor and the winter severe (cf. Davis 1965:34-35). In historic times two areas were favored as winter camps. The South Side People preferred the sand hills about a mile from Warm Springs at the east end of Mono Lake. The North Side People camped in the Lime Kiln and Twin Peaks area at the northeast corner of the lake (Davis 1964:Map 1, 1965:35). Winter occupation among the Sierra Miwok in Yosemite Valley is also known (cf. Davis 1965). These winter villages were broken in the spring as individual families began the spring-summer-fall cycle of successive short term occupations at the scattered temporary camps necessary to exploit the scattered plant and animal resources of the Mono Basin (cf. Davis 1963, 1965).

Springtime settlements focussed on travelling to the canyons at the west end of the lake for the gathering of wild onions, early bulbs and water cress. Hunting concentrated on the procurement of deer migrating to their summer ranges in the Sierra Nevadas west of the lake.

The early summer months saw the establishment of temporary base camps at the southwest and northwest corners of the lake for the collecting of various wild grass seeds, bulbs and roots. Travel and trade occurred to both the east and west as the Sierra passes opened up. Late summer saw movement to the south of Mono Lake to the Jeffrey pine forest during alternate years to gather the larvae of the pandora moth as well as to the northern shores of Mono Lake for the gathering of kutsavi. Deer and mountain sheep were hunted on their summer ranges in the Sierra high country.

Communal rabbit (and antelope) drives were the main hunting activity of the fall. Pinyon harvesting occurred in late fall in the groves north and west of Mono Lake with hunting of deer as an ancillary activity. Gathering of berries and the desert peach occurred in the foothills. The major social activities of the year - feasting, gambling, round dancing, etc. - took place in the fall after the pinyon harvest at temporary camps in the Upper Sonoran meadows. A summary of the 'seasonal round' of the Mono Lake Paiutes is presented in Table 6 .

Socio-political Organization

The Mono Lake Paiute sociopolitical organization generally conforms to Steward's (1938a, 1955) family band model. Using data gathered during his research among Great Basin ethnographic groups Steward (1938a, 1955, 1970) has postulated the 'nuclear family' or 'family household' as the basic socio-economic unit. Several other scholars have disagreed with Steward's interpretations (1938a, 1955, 1970) of Great Basin sociopolitical organization (Service 1962, cf. Fowler 1966), but for this report Steward's views will be generally accepted although terminology and concepts introduced by other researchers will occasionally be used to elaborate on Steward's material.

D. Fowler (1966) has argued that the emphasis on Steward's 'nuclear family' concept as the basic socioeconomic unit seems unwarranted and has suggested the term "kin clique" as an alternative. This grouping has the nuclear family as the focal point or core of a group of related persons allied together as the 'normal' socioeconomic unit. The use of this term takes note of the fact that 'households' or 'camp groups' were composed of related persons. Relationships could be either affinal or consanguineal and particular relationships could vary from place to place through time. The sociopolitical situation of the Mono Lake Paiute groups can be considered as operating as 'kin cliques' (cf. Davis 1965) with its activities and decisions dictated by 'family'interests without reference to any larger groupings (e.g. villages, bands, tribes etc.). This, of necessity, made any large groupings, e.g. the winter village, fluid in character as each kin clique determined its own pattern of movement (cf. Davis 1965:16).

The general picture of Great Basin social organization has been summarized by Murdock (1955:91):

Table 6

Mono Lake Paiute - Seasonal Round

Season	Area	Life Zone	Activity
Spring	Stream canyons at west end of lake.	Upper Sonoran	Leave winter camps, east end of lake, move to west end, collect cress, wild onions, early bulbs, hunt returning deer.
Summer	Large meadows at SW and NW corners of lake are base camps for entire summer.	Upper Sonoran	Collect grass seeds, bulbs, roots; group work centers about colonies of bedrock mortars.
	Sierra passes open up for travel.	Alpine	Travel and trade - westwards to Yosemite and the coast, eastward into Great Basin.
	Biennial transhumance to Jeffrey pine forests south of lake.	Transitional	Caterpillars emerge, circular trenches dug and worms trapped, dried, stored.
	Annual transhumance to lake shores, chiefly on north side of lake, near streams and springs.	Upper Sonoran	Collect lake-fly larvae, rub off husks, dry, store.
	Sierra high country.	Canadian Hudsonian	Hunt sheep and deer on summer ranges.
Fall	Sierra foothills.	Upper Sonoran	Harvest berries and desert peaches, dry, and pound in mortars.
	Meadows and thickets about west end of lake.	Upper Sonoran	Communal rabbit drives.
	Large camps in meadows.	Upper Sonoran	Last collecting, rainprayers (to ward off rain), feasting, gambling, round dancing, major social activities of year.

Table 6

Season	Area	Life Zone	Activity
Fall	Transhumance to pine nut forests north and west of lake.	Upper Sonoran, Transitional	Break up into family groups, harvest winter supply of green cones, store in caches ringed with stones; hunt migrating deer.
Winter	Camp in lower edges of pinenut forests (when harvest bountiful).	Upper Sonoran, Transitional	Families establish tipi camps near nut caches; gamble and tell stories; some small game snaring.
	Migrate to other areas when nut crop fails.	?	Survive by any means possible and seek refuge with kin.
	East end of lake, in sheltered canyons.	Upper Sonoran	Visit nut caches periodically, trap rodents, use remaining stores; gamble and tell stories.

(Above charts from Davis 1965:30-31)

> "All these tribes live in semi-nomadic bands of shifting composition. Residence is fluid, being optionally either exogamous or endogamous with respect to the band and either patrilocal or matrilocal, with slight preference for the latter. Independent nuclear families are the norm; polygny is comparatively rare and nearly always sororal; and extended families do not occur. Descent is bilateral. Unilinear kin groups are completely absent, and kin terms are of Hawaiian type in twenty-two out of twenty-five tribes for which information is available."

Specific features have been listed by Fowler (1966) while Davis (1965: 16-21) has listed a number of salient items and a kinship term schedule for the Mono Lake Paiute. The Mono Lake peoples generally conform to the picture presented by Murdock (1955).

Marriages were somewhat informal and brittle with divorce frequent. However, marriage was a necessity essential for the distribution of the family work load.

> Although any particular marriage might be of brief duration a person could not, in the interest of self preservation, afford to remain long single. He was generally wed to one person or another during most of his adult life. Another motivation to marriage was the necessity of caring for children. That a person would acquire a spouse in self-interest was insurance that children would be supported by two parents most of the time, even though one was often a stepparent (Steward 1938a:242).

Marriage rules excluded any marriages between individuals related to a known lineal ancestor (cf. Davis 1965, Steward 1938a).

In summary, the organization described for the Mono Lake Paiutes is typical of the overall Great Basin sociopolitical structure known from the ethnographic record (Steward 1938a, 1955, 1970, Davis 1965) with the kin clique group suited to the seasonal pattern of intensive exploitation of widely spaced resources in the Mono Basin area.

Structures/Architecture

Construction of huts, shelters and other protective features varied widely depending on the season, exposure and available materials. Semi-circular brush shelters, low brush and piled rock windbreaks and conical pole and brush houses were among the common types of constructed shelters.

Open brush huts erected within the boundaries of a cleared area were favored for summer use (Merriam 1955:Plate 19b, Heizer 1960). These were essentially a simple 'domed' framework of willow poles over which brush had been placed. The floor plan was semicircular with a large opening facing away from the prevailing winds (cf. Heizer 1960:Plates 4 and 5).

> Construction: a pit, 10-12 feet diameter, 2 feet deep; four poles were set up, their butts on the pit edge, their upper ends

> joined; smaller poles filled spaces between these, but leaving a smokehole; bundles of wild rye or oats, and pine or juniper needles, completed the covering. Earth was not used. The doorway extended eastward several feet. In deep snow, the smokehole served as a doorway.

Merriam (1955) notes two other winter house types - a dome-shaped, thatched shelter of tule or straw (Plate 20a) and an upright one of interwoven willow poles (cf. Chalfant 1922:26).

Another specialized structure found among the Mono Lake Paiute was the sweathouse. Steward (1933) indicates that in contrast to the ones in Owens Valley the Mono Lake house was small, poorly built, earth-covered with a fire in the center. The house was a sudatory only and was not used as a men's club house, dormitory or social hall.

Other structures that may be present in the archaeological record are the remains of 'house rings' (cf. Meighan 1955, Davis 1964, Tuohy 1969), boulder hunting blinds (cf. Muir 1917), rock windbreak walls outside rock shelters and stone circles associated with past pinyon nut caches (Davis 1964: Fig. 1b-e).

Material Culture

A number of material culture items and their uses have been described by ethnographers and observers of the Mono Lake Paiute. A series of brief descriptions and uses of selected items are presented below.

Basketry

There was an extensive use of basket items among the Mono Lake groups. Both coiled and twined types were made and used. The most characteristic categories of baskets in use by the Mono Lake Paiute were:

1. Storage/Container baskets
2. Burden baskets
3. Basket hats
4. Water bottles
5. Cradleboards
6. Winnowing trays

Steward (1933) has an excellent description of basketry technology for the neighboring Owens Valley Paiute while Merriam (1955) should be consulted for additional information on the 'Mono' Paiute.

Cord for twine, nets, etc. was of a two ply construction made of pounded and twisted fiber. Steward (1933) notes that wicivi (Amsonia brevifolia) and avanava (Asclepiaes speciosa) and possibly A. mexicana were the plant species used.

Clothing

A minimum of clothing was ordinarily worn by most Great Basin groups. The general dress of the known ethnographic groups has been described in detail by Steward (1933, 1938a, 1939) and Kelly (1932, 1964) and will not be elaborated on here. Rabbitsksin capes or blankets were worn in cold weather. These were usually made by the men and consisted of the fur of 50-75 jackrabbits killed in the fall. The fur strips were twisted together into a rope and were then 'woven' into a blanket via a weaving frame and cord warp (Steward 1933:270, 1939:Plate 18). They also served as a blanket or bedding and a large one could cover a small family.

Moccasins (so'omaka) are known to have been worn by the men while women sometimes wore sack-like, woven sagebrush socks tied around their ankles for snow protection (cf. Steward 1933).

Milling Equipment

Seeds were ground on a 'portable' metate with a muller or mano. Bedrock mortars with cobble pestles of natural, unshaped stones are known to have been used for acorn processing and undoubtedly seed processing as well (Steward 1933:246, Meighan 1955). Steward (1933:246) reports a wooden mortar 15 inches deep by 15 inches in diameter from near Benton, although no data is available on its function.

Pottery

Pottery use or manufacture was apparently very limited according to the available ethnographic data. The Owens Valley Brownware type (cf. Steward 1928, Riddell 1951) is known from the Mono Lake area (Davis 1964), but Steward (1933:268) notes a conflict as to whether or not this group actually made any pots. Davis (1962) indicates that the Mono Lake Paiute used pottery but does not elaborate on this in her more detailed work (1965) on the group. Steward (1933) has described the Owens Valley Paiute's use of pottery while Gayton (1929) has detailed the manufacture among the Yokuts and Western Mono on the western side of the Sierras. Pottery vessels were used for cooking as substitute basketry containers.

Weapons

No specific data on the bow and arrows used by the Kuzedika Paiute are known except for a passing mention in Merriam (1955). The Owens Valley Paiute used a short to medium length (up to 5 feet) sinew backed bow made from seasoned juniper wood (Steward 1933:259-260). Manufactured by 'professional makers' these bows were strung with either some from of twisted cord or sinew. Self bows are also known (maximum 6 feet in length). Large game bows were sinew backed while small game bows were simple, of black willow or oak. Painted decoration of bows is known (cf. Steward 1933:259-260).

Arrows were of cane or willow and approximately 3 feet in length. The shafts were straightened on heated stone shaft straighteners. Three 6 inch

half feathers, of hawk or eagle, were used and these were bound to the notched end by sinew. Cane arrows had willow foreshafts 6 inches long (Steward 1933:260).

Chipped stone arrow points, primarily of obsidian, were used. Game and war arrows were of cane with wooden foreshafts and obsidian points. A plain blunt greasewood foreshaft was used for rabbit. Duck arrows were similar but the foreshafts were wrapped with sinew to form a bulge making the arrow skip on the water. The striking surface of an arrow was enlarged with two pairs of sticks about 2 inches long tied at right angles across the end for birds. Projectile points were attached to the shaft with sinew and a sage shellac (Steward 1933:261-262).

Poisoning of the arrow point was practiced among the Owens Valley Paiute and undoubtedly among the Mono Lake group. Both a mineral derived material and various decayed animal-vegetable substances were utilized (cf. Steward 1933:263).

Musical Instruments

Flutes (woina) were made of elderberry wood, 8-9 inches in length, with 4 holes. They were blown across the end. Rattles are known for the Owens Valley Paiute but are not described for the Mono Basin (Steward 1933:278 for a description). Drums, while unknown for the Owens Valley Paiute, were used by the Mono Lake Paiute. The drum described by Steward (1933:278) was double headed, 15 inches in diameter, 5 inches deep with the two heads cross-laced together. It was held in the left hand by a rope fastened to its side and beaten with a 12 inch stick with hide on the end.

The musical bow (tugudagan) used by the Mono Lake Paiute, was of elderberry, 5 feet long, strung with sinew and plucked with the finger while one end was held in the teeth. The bullroarer and musical rasp are also known to have been used.

Non-Material Traits

Mythology

A large body of material is available on the mythology of the region especially for the Owens Valley Paiute (cf. Steward 1933, 1936, Appendix A this report, Iroquois Research Institute 1979) to the south of Mono Lake. However, material specific to the Mono Lake Paiute is sadly lacking in the ethnographic record. Davis (1965:13) has presented a brief analysis of the myths based on her fieldwork among the Kuzedika Paiute. The mythology contained the following main elements:

1. There was a creation myth in several forms.
2. Wolf was the creator, assisted (and sometimes confounded) by his younger brother, the marplot Coyote.
3. Coyote was a favorite character: lecherous, wily, humorous, malapropos and irresponsible; a catch all for antisocial urges.

4. A single woman, some of whose characteristics were heroic while others were menacing, bore all the people in the world at one birth.
5. In the beginning, all was water.
6. Helldiver brought up the first land.

It is regrettable that more oral material concerning Mono Lake Paiute folklore is not available for study and comparison with the surrounding groups.

Singing

Singing was an important part of dances, ceremonies and various activities. Songs are known from the Owens Valley Paiute (Steward 1933:278-285) for the cricle dance, hand game, funerals and shamanistic activities. No songs have survived for the Mono Lake Paiute.

Dancing

Dances or 'fandangos' (annual social dances) usually preceded pinenut, or piuga expeditions or rabbit or deer drives with the dances and games occurring one day before and serveral days after these communal enterprises at Mono Lake (Steward 1933:322). The 'popular' circle dance was held in a specially constructed dance corral. The men and women formed a circle holding hands and side stepped/hopped to the left or clockwise to the music and/or songs. An intermission followed 5-10 minutes of dancing (Steward 1933:321). Other dances that may have been performed at Mono Lake include the "War Dance," and "Bear Dance" (cf. Steward 1933:321-322).

Games

A number of games are known for the Northern Paiute. Steward (1933) presents a list and description of a number of Owens Valley Paiute games. Of these, Davis (1965) notes only the hand game (nayekwe?), a game of chance, as 'popular', having both secular and religious connotations, among the Mono Lake Paiute. Undoubtedly other games such as the stick dice game, basket hiding game, arrow game, hoop and pole, racing, wrestling and others were played, but this information is not available for Mono Lake.

Facial Painting

Davis (1965:14) notes that face paint was regularly used along with tattooing of the chin in aboriginal days. No sexual differentiation is noted. Steward (1933:275) presents a series of 'designs' for the Owens Valley Paiute. J. Sherwin's (1963) monograph reviews face and body painting among the California Indians and presents additional information for the Eastern Mono while Rose (1979) presents data on aboriginal tattooing.

Birth and Childhood

No data are available for this category at Mono Lake. The reader is referred to Steward (1933) for information on nearby groups.

Puberty Rites

The girl's rite lasted five days at Mono Lake and was similar to that practiced for the Owens Valley group. The ceremony occurred after the girl's first menstruation and was essentially a physiological treatment for health, preparation for childbirth and an industrious life. During the five day rite the young girl ran "about a mile" morning and evening, gathered wood daily, bathed each morning in cold water, avoided meat and salt and ate mainly pine-nuts and acorns, used the head scratcher for fear of lice and brushed her hair with a brush of wild rice root fibers. Men avoided her although she was not confined. Steaming was omitted but it was practiced in the Owens Valley. A feast concluded the fifth day (Steward 1933:293). No data are available for the Mono Lake boy's puberty rite although it was probably similar to that reported for Owens Valley (Steward 1933:293-294).

Death

Information on funerary customs and practices is sparse. Steward (1933) offers little data while Davis (1965) has minor details. After a death a prayer was said over the dead person". . . you must face the sun . . ." and the body was flicked with water from a sprig of sage to speed the soul. Burning of the deceased's possessions and hut was practiced with the relatives then abandoning the locale. Interment was by primary burial although cremation may have also been used (cf. Gould 1963, Kroeber 1925). A taboo was observed on the mentioning of the names of the dead and a 'crydance' was performed. Archaeological data on mortuary customs are nonexistent. The only burial excavated in the area (Davis 1959) cannot be definitely linked to any group.

Religion

Organized religion as it is known in the Western world did not exist among the Mono Lake Paiute. Religious data are extremely scanty in the ethnographic record. It is apparent that there was a belief in a 'soul' (cf. Steward 1933:306). Prayers (or 'talking to') appear to have been common and were directed towards both inanimate as well as animate objects (Davis 1965: 13-14). Belief in the supernatural was vague and generalized although ghosts of the dead were clearly conceived.

Shamans and Powers

Warfare

Warfare was apparently rare among the Mono Lake Paiute both between kin cliques and neighboring groups. Relationships with their trading partners, the Miwok, appear as mostly friendly although some hostilities took place at the headwaters of the middle and southern Stanislaus River.

> "There was hostility between the Miwok and Shoshonean 'Paiutes' along the portion of their boundary line at the southern head of Stanislaus River, although still farther to the south, in the

> vicinity of Yosemite Valley and southward, the people of the two stocks were on very friendly terms, making amicable trading trips both ways across the summit of the Sierras"(Barrett 1908:348).
>
> ". . . it may be noted that in the region of the headwaters of the middle and south Stanislaus the Miwok and Mono were on bad terms in recent times, while along the Merced they were more at ease with each other" (Kroeber 1925:443).

While the Yosemite Valley in Southern Miwok territory was a focal point for trade among the Miwok, Mono and Washo (Barrett and Gifford 1933: 129, 256, cf. also Davis 1961) the Hetch Hetchy Valley, however, appears to have been disputed by the Miwok and Eastern Mono (Mono Lake Paiute ?).

> " . . . the Valley was disputed ground between the east and west slope Indians but the Piutes from across the range had gotten the upper hand and were accustomed to spend time in Hetch Hetchy in the fall of the year gathering acorns" (Kuykendal, in Hall 1921:38).

Merriam (1955:76) also remarks on a bloody fight between the Miwok and Mono Lake Paiute.

> "Besides the nuts of the pinon, which grows so abundantly in their own country, the Mono prize the acorns of the California black oak, which is found far away on the other side of the High Sierra. To obtain these acorns special trips are made over the rugged mountain passes and down the west slope to the lower or yellow pine belt in which the oaks grew. In former years some of these trips led to bloody wars with the Yosemite Mi-wa and other bands of so-called "Digger" Indians, whose territory includes the black oak belt; now they are the occasion of friendly visits with the few survivors of these interesting people."

Hostilities also existed between the Yokuts and the Western and Eastern Mono (Gayton 1948). An early observer Lieutenant Estudillo in 1819 wrote:

> "From the people of the interior I learned some particulars of the people who live on the other side, who, they told me, gather their harvest of pine nuts and seeds from both sides, but that they themselves did not go far into the mountains for the inhabitants were very bad people (Gayton 1936:75)."

Gayton later noted:

> ". . . trade relations between Eastern Mono (Owens Valley Paiute). east of the Sierra Nevada, and their linguistic relatives and neighbors of the Yokuts, the Western Mono, were limited to few summer weeks when known mountain passes were open to foot travel. The trans-Sierra visitors, not welcome in Yokuts villages, rarely ventured alone beyond the Western Mono groups. The topographic barrier was surmounted, but the weather barrier could not be, and it presumably served to maintain the strangeness and hostility

> between Eastern Mono and Yokuts, which only was assuaged temporarily and periodically by the presence of the mutually acculturated intermediaries, the Western Mono (Gayton 1946:258-259)."

An account of a war or more precisely an 'incident' in moderan parlance has been recounted by one of Gayton's informants. The Eastern Mono referred to in the incident (Gayton 1948:159-160) may be either Owens Valley Paiute or Mono Lake Pauite.

The Eastern Mono were also close with the Western Mono (as noted in several of the excerpts above) their cultural kin (cf. Kroeber 1959).

Relations with the Washo to the north (cf. Boundaries, this report) appear to have been amicable with the Washo apparently gathering kutsavi at Mono Lake (cf. d'Azevedo 1966), although undoubtedly disputes did arise over food sources.

Trade

Trading was a major activity of the Mono Lake Paiutes during the spring, summer and fall when the Sierra passes were open. Trade was primarily with the Owens Valley and with the Miwok of Yosemite Valley. Pinenuts, kutsavi, salt, obsidian, baskets, red and white paint and other items were traded west and south with acorns, material goods (e.g., clamshell disc beads, steatite items) and other goods coming east. One of the main trade routes between Mono Lake and the Yosemite Valley went via Bloody Canyon from Walker Lake, CA to the Sardine Lakes (Davis 1964:Map 2). Here the trail crossed Mono Pass, headed northwest to Tioga Summit and then down into a number of trails used by the Owens Valley Paiute.

Summary

The Mono Lake or Kuzedika Paiute were a group of Northern Paiute who spoke a Shoshonean dialect of Uto-Aztecan. Centered around Mono Lake they maintained close ties with the neighboring Owens Valley Paiute to the south and the Miwok of Yosemite Valley on the western side of the Sierra Nevadas. Their population has been estimated at approximately 200 individuals or one person for every 4 square miles.

Mono Lake Paiute economics involved a combination of gathering, hunting and trade. Meat staples were derived from individual and group hunting of jackrabbit, deer and mountain sheep. Vegetal foods were derived from the exploitation of a wide range of seasonally available wild plants. Insect larvae of the Coloradia pandora moth and brine fly (Ephydra hians) were important dietary staples.

The basic level of the Kuzedika sociopolitical organization was the kin clique or extended family. These constituted the basic work unit in the system and the day-to-day group for individuals. This group generally moved as a unit between the various resource areas.

The Mono Lake Paiute were adapted to a system of environmentally and culturally controlled movements through time and space. Their seasonal round followed a series of moves to resource areas based on the current availability of certain seeds, roots, greens, insects, nuts and other economic subsistence items.

The trade network maintained primarily with the Owens Valley Paiute and the Yosemite Valley Miwok provided trade items from other groups in exchange for raw materials and food common within the Mono Lake Paiute's sphere of influence.

The Washo

The ethnographic data concerned with the Washo, while not as complete as we would like, are a far cry from Kroeber's concluding remark in the Handbook of California Indians (1925) - "It is clear that some real information on the Washo is highly desirable." Among the main ethnographic information sources are the research of d'Azevedo (1963); Barrett (1917); Beals and Hester (1971); Barrett and Gifford (1933); Cartwright (1952); Curtis (1926); Dangberg (1927, 1968); Downs (1961, 1966): Freed (1960, 1963, 1966); Handleman (1967); Kroeber (1907, 1917, 1925); Lowie (1939), Freed and Freed (1963a-b); Merriam and d'Azevedo (1957); Mooney (1896); Park (1938, 1941); Powers (1877a, 1970); Price (1962, 1963a-b); and Stewart (1941) among many others (cf. Fowler 1970). Warren d'Azevedo of the University of Nevada, Reno has presented an excellent history of ethnographic research concerning the Washo (1963) as well as a select annotated bibliography on Washo sources with John Price (d'Azevedo and Price 1963). These sources should be consulted along with Downs' (1966) thorough summary by anyone interested in the Washo Indians of California and Nevada.

Subsistence Pattern

The pre-contact Washo, like other California and Nevada aboriginal groups, relied on a variety of seasonally available plant and animal species for their subsistence. As is typical of most hunter/gatherer groups, plant foods comprised the bulk of the exploited resources (cf. Lee 1968; Bicchieri 1972, for examples). The aboriginal procurement of these subsistence resources and seasonal exploitation patterns are discussed in some detail below for the Washo.

Gathering

The ethnographic reports available for the Washo, while detailed in some aspects, provide little information in terms of amounts collected, daily time spent gathering, or other data on specific utilization of the many collected resources.

The gathering of seed plants occurred from late spring through the fall (Downs 1966). Seed bearing plants were collected on a daily basis in the vicinity of either base or temporary camps. The seeds were either used immediately or cached for future use. The number of species in the Washo area along with their ecological situation (riparian, lacustrine, desert

scrub, high meadows, etc.) allowed for an almost continuous collection of this resource. However, the irregularity of these 'harvests' and the limited areas in which plants ready for collecting occurred led to a wide dispersal of the population and frequent movements from area to area (Downs 1966:19).

A number of species were utilized, among them the seeds of the wild mustard, pigweed, saltbrush, rabbitbrush, sand grass, cattail, and other grasses were commonly collected (The C. Hart Merriam Collection, University of California, Berkeley, has a number of species lists of plants and animals commonly used by the Washo). The seeds were collected by the women (Downs 1966:21), who beat the seeds free of the stalks and collected them in a shallow basket tray. Later the seeds were winnowed, parched and then ground to a flour for either immediate consumption or storage. The heads or infloresences of some plants - e.g.,a native sunflower (Downs 1966:18) were picked and processed for use.

Roots and greens were collected from early spring to fall with their being of critical importance in the spring owing to their availability at a time when the winter food stores were nearly exhausted. Available on both the foothills and valley floors, greens and roots were frequently found in a riparian or marshy setting. Watercress, wild lettuce, wild spinach, wild potatoes, Indian sweet potatoes, wild rhubarb and wild onions are specifically mentioned by Downs (1966:17-19) as among the various species collected by the Washo. Tubers and roots were dug with a digging stick while greens were hand gathered. They were eaten raw or cooked. No storage methods are known although Downs (1966) indicates that roots and tubers were stored for use against the winter food shortages.

Pinenuts (Pinus monophylla) were collected by the southern band of the Washo in the area to the south and east of Minden and Gardnerville, Nevada, when the crops matured in the early fall. This harvest provided a staple food of the Washo (cf. Downs 1966) and other Great Basin groups (Steward 1933, 1938a) although there is some debate if this emphasis was due to White contact conditions and a biased ethnographic record or other conditions

Several detailed descriptions by various authors are presented in Busby (1974) of the pinyon harvest and camps (cf. Price 1962:Plate II; Downs 1966: 25-26; also Barrett 1917, Fenenga 1975 for a description of an archaeological Washo pinyon camp). When the crops were good some families wintered near the pinyon groves while others moved west to the lower elevation foothill camps. A few families also spent the winter in the Sacramento Valley foothills wintering either close to or with the Miwok. Price (1962:58) estimated that about 1200-2400 pounds of nuts were gathered per household over a period of several weeks. Property rights were recognized for groups of trees. These plots were marked off by rock strips (dimasha) about one-third to one half of a mile wide that ran up the hill following the natural contours (Lowie 1939:303; Price 1962). The nuts were cached in stone and grass lined pits (damyeo) for future use. Caches of cones with the nuts still in them were built up the side of the hill near the groves (Price 1962:Plate II-B). The pinenuts were often eaten whole but they were usually converted into a mealy flour from which a gruel or mush was made. The meal was cooked in a basket by means of heated stones (Barrett 1917:14).

Acorns were not a staple food according to Barrett (1917) but Price (1962) notes that they were. Downs (1966) has little to say except he emphasizes the use of pinyon nuts as the staple food. Barrett (1917) indicates that the Washo gathered acorns (ma'lil) regularly in their own territory as well as through trade with their western neighbors the Miwok. The acorns were ground into a meal, leached and eaten in the form of a mush (Barrett 1917:14, cf. Mayer 1976). A dish called megi'gela was prepared by mixing acorns and venison.

Several different species of berries were utilized throughout the summer and fall. Fruits which could not be preserved were eaten to relieve pressure on the easily storeable grass seeds. Many species, including the buckberry gathered in quantity around Topaz in the Coleville unit - were dried for future use. Strawberries, gooseberries and chokecherries were among the collected species.

Hunting

Hunting was either on an individual or communal basis usually by the male members of the group (cf. Downs 1966). Game was usually taken whenever and wherever it was encountered throughout the year, but generally hunting occupied the brief period between the late summer and first snow. Each type of animal demanded special skills and knowledge for hunting as well as years of training to be successful in the hunt. Ritual and magic, stalking expertise, weapons-use and other skills were taught to the boys by experienced hunters so they would be successful hunters (cf. Downs 1966).

Small game, comprising both the cottontail rabbit (tsa'li - Sylvilagus nuttalii) and the small rodents, was an important source of hunted protein. Individual hunters using both bow and arrow and various snares and traps took squirrels, muskrat, foxes, badgers, wild cats and other small mammals. Gophers and ground squirrels were frequently taken by the women who either smoked them or flooded them out of their burrows. Field mice, kangaroo rats and moles were occasionally eaten. No methods of preparation are noted in the ethnographic data but similar methods to those reported in Steward (1933:255) were probably utilized. Small game provided a small but consistent supply of protein throughout the year due to its seasonal availability.

The jackrabbit (Lepus californicus and L. townsendii), a medium game animal and the antelope (Antilocapra americana) a large game animal were most common in the desert scrub and upper sagebrush meadows (lowlands and Sierra foothills of the Washo area). Both were commonly taken by communally organized drives during the fall usually just after the pinyon harvest. The drives were commonly regarded as social events. The entire process of the antelope drive was surrounded by an aura of ritual and sacredness. Antelope were hunted under the guidance of a chief (aiyes kumomli') who achieved his power by dreaming (Lowie 1939:324-325; Downs 1966:30-32). This man was believed to have the ability to locate a herd of antelope and 'charm' them into the corral by means of his power. A number of ritual taboos were observed by the entire population (cf. Downs 1966:32) prior to and during the drive. The most common method of antelope hunting was the surrounding or corralling method. Steward (1938a:34-35) and Downs (1966:31) both offer an excellent description of the general method

with the antelope being driven/herded into a V-shaped brush corral, trapped and then selectively killed as needed over several days. One such hunt usually exhausted the antelope population in the area and would not be repeated for 10-15 years (Steward 1938a:35). Downs (1966:32) notes that individual Washo hunters seldom attempted to take antelope apparently lacking the knowledge and skill to undertake this job as contrasted to the neighboring Paiute, who frequently hunted individual animals.

Rabbit drives, held every year in late October or November, involved a communal effort with the animals being driven by lines of men, women and children into a series of nets connected into a large semi-circle. The rabbits caught in the net were dispatched by hand, club or bow and arrow (cf. Barrett 1917:12; Lowie 1939:236-237; Downs 1966:27). Drives were held in the flatlands. The rabbits were skinned and their hides used in the manufacture of rabbitskin blankets. The flesh was broiled, boiled with pine-nut soup or dried for future use (cf. Lowie 1939:327).

This communal hunt was under the direction of a "rabbit boss" (pe' leu leweti'yeli) a heriditary official without whom no organized hunt or drive could be carried on without his sanction. This 'boss' also regulated fishing activities (Barrett 1917:12; cf. also Swezey 1975).

The large game animals, deer, sheep and bear, were hunted with different methods. Of the three animals deer was the most important as a food resource after the rabbit. Deer were stalked both individually and communally. Hunting parties often travelled beyond "Washo Country" (cf. Fig. 24) into Maidu and Miwok territory in California where the deer were more numerous. The Washo might be viewed as having practiced a primitive game management policy as the Washo preferred to 'harvest' deer from late August to until early winter when the animals were at their best. In time of need (e.g. starvation) deer would be taken whenever encountered.

Several methods of hunting memdewe (deer) were utilized depending on the situation. A frequent method was to stalk deer either individually or communally using a disguise. In this manner, the hunter was able to imitate a deer, enter the herd and get close enough to select a kill. The bow and arrow was the favored weapon. Another alternative method was to build a blind near a spring or salt lick and lay in wait for the deer. Hunting parties of 6 to 8 men often went into good deer areas and hunted either on an individual or communal basis. A drive was organized if there were many deer with the men selectively driving the deer past several hidden skilled bowmen. The meat collected by these isolated hunting parties was dried and transported back to a base camp. Deer killed near any base camps were usually eaten fresh with portions dried for the winter months.

An occasional method used in the early fall in the foothills was the surround with the deer driven into the open by deliberately set brush fires. Noose traps (cf. Osborne and Riddell 1978 for an example) were suspended along deer trails to snare deer, although this method appears to have been rarely used.

Sheep (ogul - Ovis canadensis) were occasionally hunted by parties of expert hunters during the early fall in the mountainous areas. Stalking and ambushes were the preferred hunting methods.

Black bear although common in the Washo area, played only a minor role in Washo subsistence. The bear was considered a special, if not sacred animal, and was hunted more on a ritual rather than economic basis. Killing a bear assured a man's reputation as a hero and possessor of great power. Bears were generally taken in their winter lairs after having been aroused from their hibernation. The hide was claimed by the man whose arrow first hit the animal as it was emerging from its den.

Fishing

Early spring to early summer saw the majority of the Washo centered at Lake Tahoe and vicinity engaged primarily in fishing. The primary activity of early spring was the taking of white fish (math cauwa' - Coregonus williamsoni) some of which were broiled for immediate consumption or air dried for future winter use. By early June, a number of fish species were spawning in the streams surrounding Lake Tahoe and the Washo concentrated on harvesting and preserving as many as could be caught during the two week spawning period. The two most important species were the cutthroat trout (Imgi - Salmo henshawi) and a large sucker (?). A first fish ritual (cf. Downs 1966:19) may have been practiced in aboriginal times. The fish were fileted and air dried for future use as well as consumed on the spot.

A number of fishing techniques were used by the Washo. Harpooning was practiced from the shore, in the water and from fishing platforms. Fish blinds (Freed 1966) were also constructed and were used only by the person who had built it. Dams or weirs were utilized for 'fish drives.' A dam was built at a suitable location on a stream. Starting upstream a group of Indians pushed a bundle of willow branches reaching from bank to bank towards the dam. Fish being swept towards the dam were caught with the bare hands and either thrown into a burden basket or onto the bank for later collection. Streams were occasionally diverted and the stranded fish collected from the former channel or any shallow ponds left behind. Fish nets, similar to the rabbit drive nets, were employed usually for large fish only and then only in conjunction with a 'fish drive.' Conical basketry traps were fixed in a stream and left overnight with the catch being collected daily. Hand fishing was used for early spring fishing of whitefish. Dip nets of fine basketry were also used although primarily for minnow fishing. Elaborate bone hooks on a cordage line were utilized for deep pool or lake fishing. Fishing traps and platforms were individually owned by individuals or families. Bait of angleworms, salmon eggs and minnows was used. Ice fishing with nets, spear or hook was practiced in the winter. Lowie (1939:329) reports that the Washo used to fish in Lake Tahoe from rafts made of willows and tule. Freed's informants (1966:17) disagree with this and indicate that all fishing was done in the rivers. Rafts were used solely for transportation and not for fishing.

Fish preparation practices varied. Minnows, suckers, chubs and whitefish were not split for cleaning but instead had their guts extracted by a sharp stick thrust into the fish just below the gills. These fish were often cooked

on a coarsely woven, twined winnowing basket (dugÁbal) with charcoal and hot sand. Another favorite method was to put the fish on hot charcoal and cover them with hot sand. Large fish were split for cleaning and then cooked in hot sand or over an open fire (Freed 1966:77).

Fish were dried for winter use. These were either cooked on a hot flat rock or on a stick in front of a fire. They were also pounded into a fish flour. Fish eggs or roe were dried, wrapped in sunflower leaves and cooked in hot ashes. A soup was often made with dried fish eggs (Freed 1966:77-78).

Birds

A number of species of birds and wild fowl were found within the diverse ecological zones present in Washo territory. The marshes of the eastern valleys provided a number of waterfowl species while the sage flats/foothills saw an abundance of quail, sage hen, prarie chicken and dove. Hunting was confined mainly to late summer and involved a number of techniques. Birds were often taken by hand, by bow and arrow, in drives, by snaring and trapping and with nets. Birds were usually prepared and consumed immediately and generally represented 'targets of opportunity' rather than deliberately sought after hunted species (Downs 1966:33-34).

Insects and Reptiles

A number of insect and reptile species were eaten by the Washo. Locust swarms (ta'cek) were gathered and roasted in the coals. These were also dried and ground into a flour that was mixed with other foods. Grasshoppers (pakc'-tomu) were similarly gathered and prepared. Lowie (1939:327) also notes that grasshoppers were boiled in baskets.

Caterpillars and bee larvae were also gathered. Kutsavi or matsibabesha as the Washo called it was gathered from Mono Lake both as a food and as a powerful medicine/substance useful in bringing fishing luck.

Certain large lizards were killed and cooked,but most reptiles and amphibians were avoided as food (Downs 1966:35).

Washo Subsistence and Settlement

The Washo subsistence adaptation emphasized frequent movement by independent family groups similar to the family band pattern of Steward (1938a, 1955, 1970). The largest settlements were the winter camps along the eastern edge of the Sierras and the late spring to early summer encampments for fishing on the shores of Lake Tahoe. Winter occupation with the Miwok and Maidu by some families occurred. These winter camps were broken in the spring as individual families or kin cliques began the spring-summer-fall cycle of successive short term occupations at the scattered temporary camps necessary to exploit the subsistence resources present in the Washo territory (cf. Downs 1966).

Springtime settlements focused on the lower foothills for the gathering of various early roots and greens. Early spring saw the movement of the younger people to Lake Tahoe for the beginning of the fishing season. By early June

almost the entire Washo population was at the lake for the fishing. As the summer progressed and the fishery yields dropped, some left for the higher elevations and individual families dispersed throughout the mountain country to set up their summer camps. The mountain meadows provided numerous gathering opportunities while the men hunted and fished. The late summer saw a drop in the productivity of the fish resources and a return to the valleys east of the Sierras to harvest the various ripening seed bearing grasses as well as other plant resources. As the summer waned and early fall approached the Washo started their movement towards the low hills where the pinyon groves were located.

The early fall was a time when the three phases of the Washo 'year' - fishing, gathering and hunting - coincided. Fish were still available in the lower streams and rivers, the various grass seeds and berries had been harvested, the animals were at their best and the pinyon harvest was ready. While game was taken whenever and wherever it was encountered, the hunting year was primarily restricted to the late summer and lasted until the first snowfall. Communal rabbit (and antelope) drives were the main hunting activity of the fall. Pinyon harvesting occurred in late fall with the hunting of deer as an ancillary activity. The major social events of the year, the gumshaba or pinyon dance also took place before the pinyon harvest.

By early October the pinyon harvest was over and the gathering 'year' nearly over with the people beginning to drift west again to the winter foothill camps. A summary of the "seasonal round" of the Washo is presented in Table 7.

Socio-political Organization

The Washo sociopolitical organization generally conforms to Steward's (1938a, 1955, 1970) band model. Steward (1938a, 1955, 1970) has postulated the 'nuclear family' or 'family household' as the basic socio-economic unit of the Great Basin (cf. Service 1962, Fowler 1966 for other viewpoints). Fowler (1966) has suggested that the term 'kin clique' be substituted for Steward's nuclear family as the basic socioeconomic unit. Relationships could be either affinal or consanguineal and particular relationsips could vary from place to place through time. The sociopolitical situation of the Washo can be considered as operating as kin cliques (cf. Price 1963b, Freed 1960, Downs 1966 among others) with its activities and decisions dictated by 'family interests' without reference to any larger groupings (e.g.,villages, bands, etc.). This, of necessity, made any large groupings, for example, winter villages, fluid in character as each kin clique determined its own pattern of movement. Band leaders had little, if any, authority (cf. Barrett 1917:9). Murdock (1955:91) has presented a general picture of Great Basin social organization (cf. Mono Lake Paiute, this report).

The Washo recognized three different areas by which local groups were recognized. These were called "northerners (wɛ̨lmɛ̨lti)," easterners (pauwalu)," and "southerners (hangɛ̨lɛ̨lti)" (Merriam 1904; Lowie 1939). The Washo had weak agamous moieties whose only apparent function was to oppose each other in games at the annual pinenut dance (Freed 1960:361).

Settlements were small with the typical one having from 2 to 4 houses with no village being more than 10 (Lowie 1939:303). Neighbors could be relatives

Table 7

Washo - Seasonal Round

Season	Area	Activity
Spring	Lower Foothills	Leave winter camps, collect early roots and greens. Hunt small game; large game if available.
Spring/Early Summer	Lake Tahoe	Fishing; gathering in surrounding areas; social activities after winter isolation.
Summer	Sierra High country, mountain meadows	Hunting, fishing and gathering of berries, roots, etc. in mountain meadows. Travel to gather/hunt to areas west of the Sierra. Waterfowl and upland bird hunting.
	Lowland valleys east of the Sierras	Harvesting of ripening seeds and other plant resources; hunting.
Fall	Lowland valleys	Fishing in streams and rivers; hunting of deer and other game; communal rabbit and antelope drives; gathering of seeds and berries; pinyon harvest; major social activities of the year.
Winter	Foothills east of the Sierras	Winter camps established; pinyon nut caches constructed and filled; some small game hunting; use of stored foods gathered during the spring, summer and fall.

but often were not (cf. Downs 1966). Freed (1960, 1963a) has presented a detailed picture of kinship terms and a schedule for the Washo.

Structures/Architecture

Traditional construction of huts, shelters and other protective and economic structures varied to some degree depending on the season, exposure and available materials. Shelters ranging from semi-circular brush shelters, temporary brush and rock enclosures to semi-permanent winter houses were among the common types of constructed shelters.

The 'permanent' structure of prime importance to the Washo was the galis dangal or 'winter house,' occupied either year round or left in the summer and returned to in the winter. The galis dangal was the only house constructed by the Washo that was used for more than a few months.

The main house frame was an interlocking framework of three to four poles approximately 18 feet long intersecting at 12-15 feet of their length. A number of poles (willow or pine) were leaned around this frame and covered with cedar bark, bundles of tule or grass, cedar boughs or other conveniently available local material. Portions of this outside covering of two layers were attached to the framework by cordage and a shingle or thatched effect was affected (Price 1962).

This house was usually built during the beginning of the pinyon harvest and required about a week's time to construct. Desirable locations were near a spring or on the sunny side of a hill. There was a great amount of variation in the construction and materials used in the galis dangal. Generally the galis dangal was round and ranged in diameter from 10 to 20 feet. The door opening (itpasua) was from 3 to 5 feet in height and from 2 to 3 feet in width. The door, facing east, was usually covered with a rabbitskin blanket and an entrance passageway about 4 feet long was attached to the house. A smokehole was in the center of the roof (Price 1962:Plate V-a).

Stewart (1941) reports on a gabled house, 10 feet high, 12 feet wide and 15 feet long with two upright poles, a ridgepole and a covering of some combination of brush, bark, sod and earth. A fireplace and smoke-hole in the roof along with a doorway flush with the inside wall were other features of the house. Steward also notes a tripod foundation house and a cone-shaped house with a basketry door.

Barrett (1917:10-11) has described an elliptical bark slab house in his research with the Washo. Recorded as 8 by 12 feet in diameter, with a ridge about 4 by 5 feet long and 8 feet tall, the house was constructed of slabs of cedar and conifer bark leaned on a pole framework (Barrett 1917:Plate ii). Barrett (1917) also noted that this house was similar in construction to those of the Miwok to the west.

The windbreak or gadu (Price 1962:Plate V-b) was made in a semi-circle about 8-10 feet across and 4-5 feet high of tree limbs placed in an arch and covered with any convenient brush or poles. Another type of windbreak or 'lean-

to' was made by placing a large pole in the fork of a convenient tree and then leaning wood poles or brush against the pole. Price (1962:33) notes that this windbreak could be used to drift snow away from the front of galis dangal. A ta?a was constructed as a sun shade. This consisted of four upright poles (or more) stuck in the ground in the form of a rectangle. The pole roof was covered with brush to act as a shade.

Summer houses could be either the windbreaks/shades described above or vary from low enclosures to a completely covered, dome-shaped house (cf. Barrett 1917:Plate iii:Fig. 1).

The Washo constructed sweathouses (itgumdosha or tashmangal) as did the surrounding groups but their use among the Washo was primarily for shamanistic purposes. One of Price's (1962:33) informants described the sweathouse as a small circular structure, about 3 feet high constructed of smooth flat rocks with a slightly sunken floor. A fire was built inside and the heat of the fire reflecting off the rock sides caused the person lying down inside to sweat (cf. Lowie 1939:324).

Earth covered dance houses (daya'limi), similar to those of California, were formerly used in the region but Barrett (1917) notes that none were found during his survey.

The Washo also built a covered fishing platform (ma?angal) usually located out over a quiet pool where a man could spear fish. Two or three large poles extended out over a river and a small blind was constructed on the poles. The floor was left open. Brush blinds were used in hunting waterfowl and rock pile hunting blinds were used in hunting woodchucks (cf. Downs 1966).

Other structures that may be present in the archeological record are the remains of house rings, rock windbreaks outside of rock shelters/caves and rock patterns associated with past pinyon nut caches (cf. Price 1962).

Material Culture

An extensive use of both coiled and twined basketry is known for the Washo. The most characteristic categories of baskets in use were:

1. Burden Baskets
2. Storage/Container Baskets
3. Seed Beaters
4. Winnowing Baskets
5. Cradles
6. Fish Basket Traps
7. Water Bottles
8. Basket Hats

Barrett (1917) presents an excellent and extremely detailed analysis of Washo basketry technology and designs. This should be consulted for additional data.

Cord for twine, nets, etc. was made of pounded and twisted fiber. Milkweed or Indian hemp (Apocynum cannabinum) was collected in the fall after the

first fruit for this purpose. Both the inner and outer bark were used (Price 1962:27).

Clothing

A minimum of clothing was ordinarily worn by the known ethnographic groups of the Great Basin and the Washo were no exception. A breechclout for the men and a front apron for the women was universal with individual variation great. Major Ingalls (1913:69) wrote:

> "Their dress, summer and winter, is a rabbitskin tunic or cape, which comes down to just below the knee; and seldom have they leggings or moccasins. The children at the breast were perfectly naked, and this at a time when overcoats were required by Captain Simpson's party. The women frequently appeared naked down to the waist, and seemed unconscious of any immodesty in thus exposing themselves."

The most common and important robe or blanket was made of rabbitskin (Price 1962:Plate IV-c). These ranged in size from small (dipi? ngaming - 6 or more skins) to large (ti ¢li dipi? - 30+ skins). Lowie (1939:327) and Price (1962: 24-26) have described the fabrication of the blankets in some detail and the reader is referred to their work for further data.

Deer skin (m¢mdewi ish) provided the majority of tailored clothing worn by the Washo. The hides were processed and prepared by the men with the end result being tanned deer hide (magu tau sufi). Ponchos (damu), leggings and other items of clothing were made from the hide. They were sewn with deer sinew (dideu or tashukido).

Moccasins (moko) were occasionally used. The most common moccasin was a single piece of untanned deerskin with a seam on the outer side of the front and up the heel to the ankle. Another type had a hard sole, soft upper part, a seam up the heel and ankle flaps and a tongue added (Price 1962:27). Snowshoes were also manufactured (cf. Price 1962:28; Lowie 1939:329).

Milling Equipment

Seeds were ground on a portable metate (d¢mg¢) with a muller or mano (gamum) (Barrett 1917:Plate IV, Fig. 5 and 4 respectively). A stone mortar, hollowed in the middle, was used with a basketry hopper. Acorns, as well as, other seeds, were ground in a bedrock mortar (lam) with either rough or finely worked stone pestles (bits¢k) (Price 1962:Plate III; Barrett 1917:15, Plates IV, Figs. 1-3).

Weapons

Specific data on the bow and arrows used by the Washo are sparse. Straight bows (balo'hat) of juniper (Lowie 1939:328) or pine (Price 1962:22) are known (cf. Barrett 1917:Plate VI, Fig. 2) as well as sinew-backed bows. The bowstring was either of deer sinew (Lowie 1939:328) or fiber (dumbays¢gi).

Arrows were of rosewood, reed or willow (Price 1962:22) and approximately 32 inches in length (Barrett 1917:16). A grooved arrowshaft smoother (mashoni) of sandstone or pumice was used (Price 1962:22). Arrows were usually provided with a foreshaft bound to the main shaft with sinew. The shallowly notched end of the shaft had 3 large carefully trimmed feathers present bound to the shaft with sinew (Barrett 1917:16).

Chipped stone arrow points, of both flint and obsidian, were used for hunting large game and for war purposes. These arrows usually had foreshafts with the projectile point bound to the shaft with sinew (Barrett 1917:16). Several special arrows were made. Blunt tipped or sharpened wood arrows were used for small game especially rabbit. For waterfowl hunting an arrow similar to the crossed stick bird arrow noted for the Owens Valley Paiute (Steward 1933:261-262) was used. Poisoning of arrows was practiced. A poison (muçe'gau nu'çi) was taken from a dead rattlesnake and mixed with pitch. This poison supposedly worked with some rapidity when smeared on a projectile point. Curtis (1926: 92-93) notes that a deer liver repeatedly bitten by a rattlesnake was dried and pulverized and then reconstituted for use as an arrow poison.

Other weapons utilized were wooden clubs, obsidian and cane blade knives among others (Price 1962).

Musical Instruments

Few data are available on Washo musical instruments. Split-stick batons of elder or willow were used in marking rhythm (Curtis 1926:93). Coccoon rattles (diyu angal) were used by shamans while drums and flutes were not made by the Washo (cf. Curtis 1926:93; Price 1962:23).

Non-Material Traits

Mythology

A moderate body of material is available on the mythology of the Washo. Dangberg (1927, 1968), Lowie (1939), Downs (1961) among others have presented both transcriptions of various myths as well as detailed analyses (cf. esp. Downs 1961). The creation myth occurs in two versions. One accounting for the creation of the Paiute, Washo and Diggers from the seeds of the cattail by the Creator Woman and the other dealing withthe creation of the Indians by Creation Man who formed the three groups from among his sons to keep them from quarrelling (Downs 1961:366). Lowie (1939) also notes the common theme of several previous inhabitations of the earth. Favorite myths among the Washo deal with the adventures and misadventures of Damalali (short-tailed weasel) and Pewetseli (long-tailed weasel) who are responsible for many of the natural features of the Washo territory (cf. Dangberg 1927, 1968; Lowie 1939). Both the coyote (portrayed as a trickster) and the wolf (a partiarchal and protective figure) as well as cannabalistic giants and a giant man-eating bird (cf. Lowie 1939) are known in the mythology. Of importance to the Coleville unit in the vicinity of Topaz Lake is that Coyote, in one of the creation myths, carried the jug in which people were growing from Walker Lake via a pass into the "middle of Washo's Valley." Dangberg (1968:21) notes that this pass is

probably the long pass between Carson Valley and Topaz Lake crossed by U.S. Highway 395. The Weasel Brothers in their travels to "their uncle's lands" also crossed this pass (cf. Dangberg 1968:22).

The Water Babies, mythical creatures responsible for the many lakes of the eastern Sierra, are among the other figures appearing in the mythology. Downs (1961:366-367) has presented additional details on the role of these creatures in Washo mythology.

Singing

Singing was an integral part of various dances and activities. Lowie (1939:306) notes that at the girl's puberty dance the song leader was compared to a fiddler at a white people's dance. There are different songs but no instrumental music. For the puberty dance Lowie (1939:306) reports that the words of the song are meaningless. It is regrettable that little information exists for the ethnomusicologist to analyze.

Dances

A number of dances are known for the Washo and were held in conjunction with specific ceremonies. The pinenut dance (gum saba?ai) was held in the fall among the pinyon groves before the harvest and lasted for 4 nights. During the dancing various games of skill and chance took place (cf. Freed and Freed 1963a). Dancing was confined to the evening hours with both the men and women dancing a modified circle or 'round' dance. During the dancing the people carried the tools of the pinenut harvest and a leader moved about talking and praying for pinenuts and other collected resources (cf. Curtis 1926:95; Lowie 1939:303; Downs 1966; Freed and Freed 1963a:36-37). After the dancing on the fourth night the women prayed over pinenuts and other foods to insure a good harvest. Various other rituals were performed during the four day period and it is apparent that this assemblage of Washo had both a secular (recreation) and serious purpose (cf. Park 1941). Prior to this dance, communal rabbit drives were held as the people assembled. The other dance, te?we?we?, the girl's puberty dance was celebrated at her first menses and is discussed in a following section. Curtis (1926:97) mentions several other dances, among them the acorn dance (mallun-las) and the jackrabbit dance (peleu-las) performed for the purposes of enhancing the food supply. A war dance lasting 4-8 nights was performed prior to leaving and engaging the enemy (Freed 1960:353).

Games

A number of games are known to have been played by the Washo. Athletic games included foorball (palo'yapiteli'liwa palo'yap), the hoop-and-pole game, archery and the women's shinny (tsigai'yaga). Gambling games included the hand game (hinai'yaya, hinaiya' ukia), a hiding game (tso'tsoy') and a women's dice game. Lowie (1939:315-317) and Culin (1907:199, 265, 322, 335, 396, 523, 664, 704) have presented detailed descriptions of the various games (also see Freed and Freed 1963b).

Facial and Body Decoration

The Washo used both face and body paints as well as tattooing for body ornamentation. Both sexes participated with the boys at age 9 and the girls about age 14 or 15 being given decorative tattoos. The designs consisted mainly of dots, lines or circles pricked into the skin using a black pigment (ts¢hit) mixed with grease. Red, yellow, black and white face and body paints were used by both sexes for social gatherings, in shamanistic practices, for bad dreams or to protect the skin from darkening during the summer. No pigments were applied to the hair (Price 1962:29).

Ornamentation

Personal ornamentation took a number of paths. The ear lobe of both sexes was often pierced to receive an ornament of bone or shell. The nasal septum of many shamans was often pierced to receive a bone pin. Shell beads or pendants made from various imported and local shellfish were often worn. Necklaces, bracelets and other jewelry were made from shell, bone tubes, a red berry, animal claws, seeds, plant stems, rose buds and other natural materials (cf. Price 1962:29). Feathers, with magpie and eagle favored, were worn by both men and women.

Birth and Childhood

A number of customs and rituals were observed by the Washo as part of the childbirth ceremony (cf. Stewart 1941, Downs 1961). No particular rituals or taboos were observed by a woman during her pregnancy as she was expected to carry her share of the daily burden. The birth took place in the galesdangal or g[illegible] with the mother attended by older female relatives or friends. When the [illegible]oy was born it was bathed, wrapped in a soft material and placed in a winnowing basket. The afterbirth was buried. The mother was confined for a period of time after birth and observed a number of rituals. The father followed a similar set of rituals and restrictions. Various ceremonies occurred during the initial months of birth primarily to insure that the child would fit the Washo role model (e.g. industrious, able to endure discomfort and hardship, etc.) in his coming life (cf. Price 1963b, Downs 1966 for details on birth).

Washo children were taught four principal lessons of behaviour: to respect their elders, to avoid fighting among themselves, to play quietly and to refrain from boasting, lying or stealing (Leis 1963). Both boys and girls were taught their respective life roles (e.g. hunting and gathering) by various members of the tribe as they progressed to adulthood (cf. Puberty Rites).

Puberty Rites

The girl's puberty dance (te?we?we?) was celebrated at her first menses. An elaborate ceremony including a series of rituals occurring over four days was held culminating in a dance (cf. Downs 1961, 1966; Freed and Freed 1963a; Lowie 1939; Cartwright 1952; Price 1963b; Freed 1960). The rationale behind the ceremony and dance was that at the time of her first menses a girl was

malleable and that her entire life would be shaped by the way she behaved at this time. The ceremony tried to achieve the development of a woman devoted to the business of collecting food energetically throughout her life (Downs 1966:24, 36).

The boy's puberty rite was not an elaborate ceremony or social ritual as was the girl's entrance into womanhood. Traditionally, the boy's first deer kill marked his entrance into manhood. Prior to this kill, any fish or game that a boy killed was given to non-family members. After the kill and ritual, a brief ceremony in which the boy attempted to crawl under the horns of his first deer without knocking the horns over, the boy or rather man, could eat his own kill(s), and share them with his family. At this stage in life he could also marry if he so desired (cf. Price 1963b; Downs 1961, 1966:36).

Marriage

Marriages were usually arranged by the parents of the bride and groom and took place with a minimum of ceremony. An exchange of presents preceded an arranged marriage with rejection of the gifts indicating rejection of the prospective partner. Following the exchange of presents, the couple usually began to live together (Lowie 1939:308; Curtis 1926:97; Price 1963b), although occasionally a man and woman would live together without the "usual arrangements" (Barrett 1917:9; Lowie 1939:308). Residence appears to have been bilocal with matrilocal residence favored (cf. Price 1963b). Divorce was said to have been rare and occurred when economic cooperation, common residence and exclusive sexual rights no longer prevailed (Price 1963b:110; Lowie 1939:309). Polyandry and polygyny were occasionally practiced. The sororate and levirate were not compulsory (Price 1963b: Lowie 1939:310; cf. Curtis 1926:97).

Death

Funerary customs varied. Extended burial in a shallow grave was the preferred method. Various grave goods were included and a pile of rocks was placed on the completed grave. The personal property and house of the deceased were hidden or buried. The old men and women cut their hair and mourned for three months (Lowie 1939:310; cf. Downs 1961:377). There was a permanent taboo against speaking the name of the deceased in front of his close relatives (Price 1963b). Cremation was occasionally practiced with the remains of the deceased being placed in a creek after cremation. Various rituals were performed to insure that the ghost of the dead person did not return to trouble the living (Price 1963b; cf. Downs 1961:378).

Shamans and Powers

A Washo shaman's special powers set him apart from the group but he or she was also expected to share in the burden of daily living. The shaman's special power was the ability to diagnose and cure illness. The Washo believed that sickness came from three sources - a ghost angry at the living for using a piece of his former property might cause illness; a sorcerer might cause illness by using magic to 'shoot' a foreign body into the victim; or a person might become ill because he had violated some taboo. The cure of an illness

was effected not because of the shaman's skill but by his 'power' which used the shaman as a medium (Downs 1966:55-57). Various curing 'ceremonies' were performed to use this 'power' (cf. Downs 1966:56; Freed 1961:369-370).

Power was not deliberately sought but came to a potential shaman through a spirit being (wegaleyo). The Washo feared power since it was dangerous but were often forced to accept it since the wegaleyo often could not be ignored. Often another shaman was employed to rid one of a persistent spirit. Usually the person would accept and succumb to the power and undergo 'training' by the wegaleyo. He would learn songs and collect ritual, sacred equipment. In addition to the direct instructions from the spirit, a prospective shaman would apprentice to an established practitioner (Downs 1966:57-58; Freed and Freed 1963a; cf. Handleman 1967).

Shamans were always considered to be potential sorcerers and were often feared (cf. Lowie 1939; also Freed and Freed 1963a). Contests were held among the shamans on a regular basis and it has been suggested (Freed and Freed 1963a: 49) that they were a means by which shamans publicized their powers. Both the threat of sorcery and the fear of accusation of sorcery were important patterns of social control among the Washo (Freed and Freed 1963a:49; cf. Leis 1963).

In general, everyone was considered to have some power by the Washo as the act of living alone required some supernatural power. Successful survival was a sign of some power and thus old people demonstrated that they were powerful. This in turn assured them of some old-age support as they might retaliate with their power if not taken care of (Downs 1966:59).

Dreams and Dreamers

Dreamers were viewed as distinct from shamans. Members of this category included the antelope shaman and the rabbit boss. People known as dreamers were considered to be gifted with a power to foretell special classes of events in life. Dreamers publicly reported individual dreams while the visitation of spirits to prospective shamans were kept secret. Being a dreamer appears to have been one of the factors in obtaining an informal position of leadership among the Washo. Dreams among the present Washo are still believed to provide important insights on which one can base decisions (Freed 1961:374).

Relations With Other Groups

Warfare

The Washo had contact with three other groups - the Maidu, Miwok and Northern Paiute (including the Mono Lake Paiute). Hostilities occasionally took place between the Maidu and Paiute (cf. Kroeber 1925:570 for a Washo defeat of the Paiute). The relationshp between the Washo and Miwok was friendly with the Miwok recognizing Washo hunting rights on the Stanislaus River (cf. Kroeber 1925:570; Barrett 1908:347-348) although periodic hostilities did occur (Lowie 1939:301). Hostile actions usually revolved around the exclusion of the Maidu and Paiute from Lake Tahoe and the Maidu taking game away from the Washo, thus precipitating a fight (Lowie 1939:301, 329-330; cf. Curtis 1926:90).

Warfare apparently was waged under the leadership of a respected warrior who by virtue of his reputation collected a group of warriors for battle. Raids were both defensive and offensive/retaliatory. A war dance was held preparatory to battle with several ritual taboos observed to insure success (cf. Freed 1960: 353). Shamans accompanied all war parties and served two functions. They called on their supernatural power to keep the enemy and his dogs asleep during the assault and they served as 'doctors' to treat any wounded (Freed and Freed 1963a:48). Shamans also selected the night of the attack.

The most common tactic was an ambush of the enemy camp at night. The preferred weapon was usually the bow, using special large arrows which may have been poisoned (Downs 1966:52). Everyone was killed in an attack including the babies (Freed 1960:353). Clubs were also used as prime weapons (Lowie 1939). Downs (1966:52) notes that crude breastworks of stone were used in more 'formal' battles by the Washo to fire at their attackers.

A 'victory' dance lasting two to four nights was held when the war party returned. Lowie (1939) reports that men and women danced over the capture of the scalp of the enemy regarded as the best fighter. The scalp was later burned and the people disbanded after this public display. The Washo were apparently militarily superior to the Miwok and Maidu but not to the Paiute (Freed 1960: 353).

Trade

The Washo apparently had little trade with the surrounding groups. Several factors apparently contributed to this situation. Topography, linguistic difficulties, an abundance of needed raw materials/resources within the Washo sphere of influence and their sociopolitical organization among other factors have been suggested as accounting for the lack of active trade as compared to the Eastern Mono groups. Davis (1961:42) lists items traded by and received by the Washo to and from 'foreign sources.' The principal items exported to the Miwok and Maidu were salt (ungabi), pinenuts, obsidian, skins, rabbitskin blankets and basketry. The Washo received acorns, soaproot, a variety of medicinal plants and occasional manufactures such as baskets, bows and shell beads. Trade with the Northern Paiute groups encompassed a range of similar goods with the Washo supplying deerskins as a main item.

Summary

The aboriginal Washo were a group of Hokan speakers occupying and utilizing portions of eastern California and western Nevada with their 'geographical center' situated at Lake Tahoe. The group had contact with the neighboring Maidu, Miwok and Northern Paiute. Relations with these groups were generally friendly although limited hostilities occasionally occurred due to territorial disputes. Population estimates are in disagreement on the aboriginal population with pre-contact estimates ranging from 800 to 2000/3000 individuals with most authorities tending to agree on 1500 or one person for every 2.7 square miles of Washo 'territory.'

Washo economics involved a combination of gathering, hunting, fishing and trade. Vegetal foods were obtained from the exploitation of a wide variety of seasonally available wild plants with pinenuts (Pinus monophylla) being an important staple. Individual and communal hunting of jackrabbit, deer, mountain sheep, antelope and the cottontail rabbit contributed to the supply of meat. A well developed fishing industry, utilizing a wide variety of techniques and centered at Lake Tahoe and the nearby rivers and streams, provided an important source of protein.

The basic level of Washo sociopolitical organization was the kin clique or nuclear family. Washo economic activities and decisions were directed by family interests without reference to any larger groupings. This group generally moved as a unit between the various resource areas.

The Washo, as were the Mono Lake Paiute, were adapted to a system of environmentally and culturally controlled movements through time and space. Their seasonal round followed a series of moves to resource areas based on the current availability of certain seeds, roots, greens, pinenuts, fish, game and other economic subsistence items as well as access to the hunting and fishing areas.

Due to factors of topography, linguistic differences and an abundance of 'native' raw materials and resources within Washo territory, trade relations with the surrounding groups were very limited. Limited exchanges occurred with the Northern Paiute, Miwok and Maidu for a number of items.

Owens Valley Paiute

Published ethnographic data pertaining to the Owens Valley Paiute are somewhat scanty. The main ethnographic accounts are those of Julian H. Steward (1929, 1933, 1934, 1936, 1938a,b), who provides most of the reliable information on the aboriginal inhabitants of Owens Valley. Other reports concerned with the Owens Valley Paiute are the observations and references in Driver (1937), Kroeber (1925, 1939, 1959), Davis (1961), Merriam (1955), Heizer (1966), Horr (1974), Lawton, Wilke, De Decker and Mason (1976), Campbell (1974), Chalfant (1922, 1933), Bosak (1975), Gifford (1916), Gould (1963), Intertribal Council of Nevada (1974a,b), King (1947), Parcher (1930), Powers (1877a, 1970), Roberts (1965), Sherwin (1963), Rose (1979), and James and Graziani (1975) among many others.

Unpublished material, primarily dealing with the mythology of the various Owens Valley groups, is available in the field notes of F. Hulse and F. Essene collected in the mid-1930's as part of a government sponsored research project (cf. Appendix A, this report and Iroquois Research Institute 1979).

The ethnographic material presented in the following section will attempt to portray the aboriginal inhabitants of Owens Valley prior to white contact based mainly on Steward's and others' data. Service (1962) has criticized much of Steward's research on the grounds that it depicts a situation disrupted by white contact. While this criticism may have some validity when applied to Great Basin ethnography in general, a strong case from this viewpoint cannot readily be applied to Steward's Owens Valley information. Steward's informants were already adolescents when the area was opened to 'white settlement' (cf. Historical Overview, this report). Ethnographic material gathered by Hulse and Essene in the mid-1930's (Appendix A) recounts several tales of the first white man in Owens Valley. The data collected from the various informants, while it may reflect some distortion, is probably an accurate representation/recollection of the aboriginal lifeways and practices prior to the white intrusion and destruction of the Native American culture.

Subsistence Pattern

The Owens Valley Paiute groups relied on a variety of seasonally available plant and animal resources for subsistence. Bettinger (1979a) has presented a rank ordering of subsistence categories listed more or less in order of importance for the Inyo-Mono region (cf. Bettinger 1973a, 1977c) as derived from his analyses of the available ethnographic data (Table 5 , this report). As is typical of most hunter/gatherer groups, plant foods comprise the bulk of the exploited resources (cf. Steward 1933). The aboriginal procurement of these subsistence resources is discussed in some detail for the Owens Valley Paiute. (See Figure 30, Ethnogeographical Map of Owens Valley.)

Gathering

Steward's (1933) ethnographic report provides a wealth of information on gathering in terms of specific species utilized, seasonality, etc., although he fails to include specific data on amounts collected, consumed, etc. as a num-

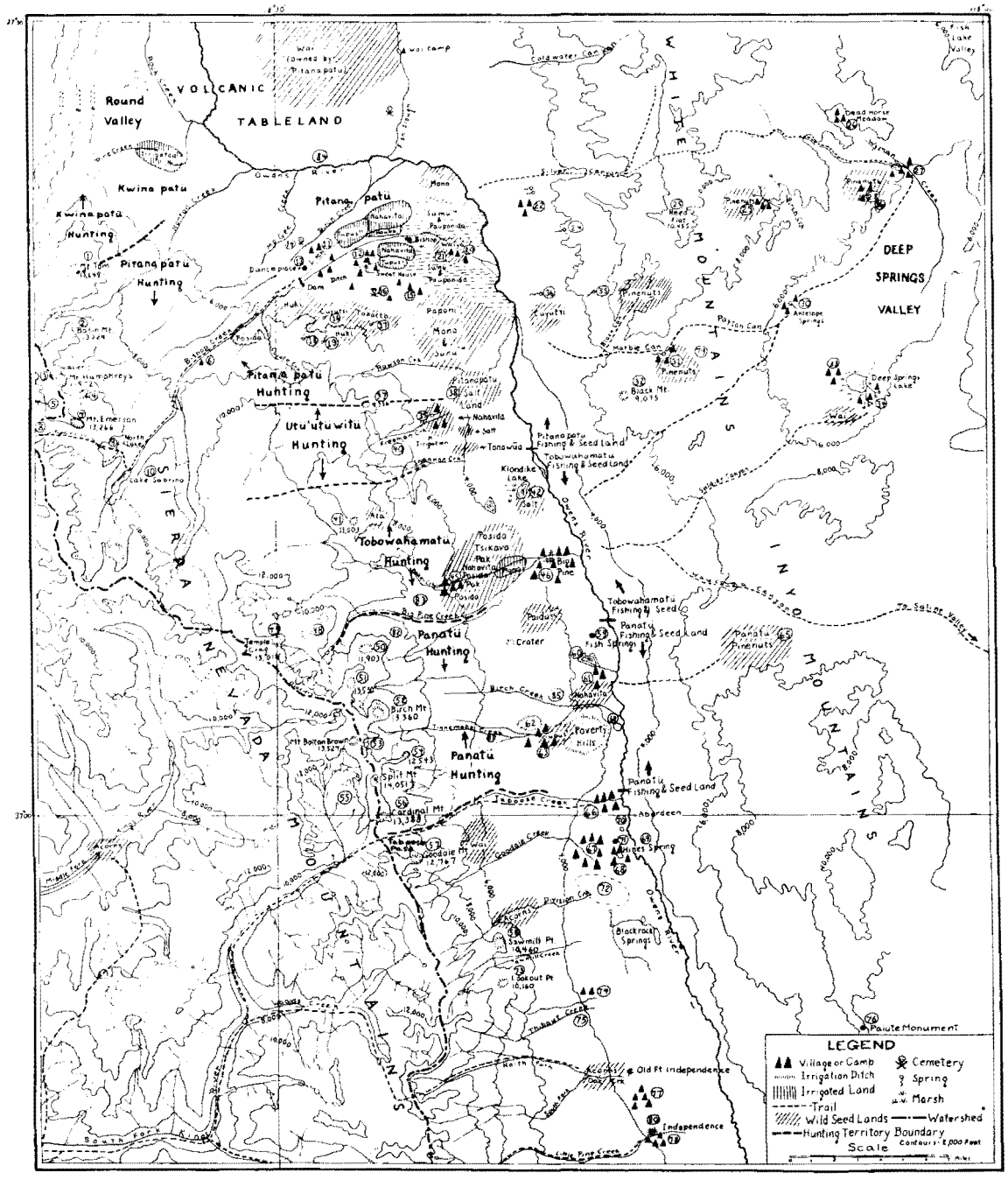


Figure 30: Ethnogeographical Map of Owens Valley (Steward 1933).

ber of modern ethnographic reports do. However, while his report can be criticized by modern standards, it is an excellent and thorough report for its era.

The gathering of seed plants (especially various grasses) occurred from late spring through the fall (Steward 1933, 1938a). Seed bearing plants were usually collected on a daily basis in the vicinity of either base or temporary camps. The seeds were either used immediately or stored in grass lined pit caches and covered with earth for future use. The number of species in the area (cf. Steward 1933:242-246) along with their ecological situation (riparian, desert scrub, marsh, riverine) (cf. Bettinger 1979a for a discussion on seasonality of seed plants in the region) allowed for the almost continuous collection of this resource by movement from locality to locality over the 'harvesting' season.

The seeds were collected by women (Steward 1933:239) working in groups who beat the seeds free of the stalks with seed beaters (tanugu) into conical carrying baskets (cudusi). The seeds were later winnowed, ground, re-winnowed, toasted or roasted in the coals, and then ground into a flour for dry consumption or boiled into a mush. Generally several species were mixed with pine nuts usually being the main base (Steward 1933:239-240).

Among the important species of harvested seed plants were Indian rice grass (Oryzopsis hymenoides), wild rye (Elymus cinerus, E. triticoides), love grass (Eragrostis sp.) and several others (cf. Steward 1933:242-246). The heads or infloresences of some plants - e.g., sunflowers, were picked and processed for use at a base camp (Steward 1933:239).

Roots and greens, although minor constituents in terms of subsistence importance (cf. Bettinger 1979a) were collected in early spring to fall with their being of critical importance in the early spring owing to their immediate availability at a time when the winter food stores were nearly exhausted. Available on both the valley floors and foothills, greens and roots were frequently found in either a riparian or riverine setting. The following roots, tubers or bulbs were dug with either mountain mahogany or buckbush digging sticks:

Spiranthes sp.
Lillium parvum (small tiger lily)
Eleocharis sp. (spike rush)
Brodiaea capitata (grassnut)

Steward (1933:244) notes that tomcat clover (Trifolium tridentatum), cow clover (Trifolium involucratum) and wild onion (Allium sp.) were eaten as uncooked greens. Tubers and greens were also boiled for consumption. Storage of greens and tubers for future use was in grass lined pits covered with grass and dirt. Tubers and roots were occasionally robbed from convenient rodent stores (Steward 1933).

Pinenuts (Pinus monophylla) were collected on the slopes of the Inyo and White Mountains when the crop matured in late September/early October. Good crops occurred irregularly (cf. Thomas 1971). The harvest was under the control of the district headman, each district owning discrete pinenut territory,

who organized and led the harvesters at the time he had set for the collecting. Various authors, including Steward (1933:241-242) have detailed the harvest process and these are available in Busby (1974). When crops were good, most Owens Valley people wintered in the groves to be near the nut caches rather than moving down into the lowland valley villages.

Full cones were cached in rock-lined bins (unagaun') covered with needles, boughs and rocks. The nuts were stored in grass lined and covered pits (huki'va). Nut preparation was by roasting in a basketry tray with shells then removed by rubbing on a metate. The nuts were eaten whole; boiled in water; dry as a flour; as a paste of water and flour; or as a soup or mush cooked in a clay pot (Steward 1933:242).

Acorns were obtained through the Western Mono or gathered locally on Division and Oak Creeks. Two species were utilized - Quercus kelloggii and Q. palmeri. Acorns were prepared by pounding with pestles in bedrock mortars and leached by pouring hot water through the flour in a pit until they were mushy. They were then boiled into a mush in clay pots with rabbit meat usually added. The Lone Pine group's treatment was similar except a metate was used and the leaching pit was lined with bark (Steward 1933:246).

Several species of berries were utilized. These were usually sun dried and stored for future use if they could not be used immediately. Elderberry (Sambucus mexicana), golden currant (Ribes aureum), coffee berry (Rhamnus californica) and manzanita (Arctostaphylos sp.) were some of the collected and traded species. A list of minor gathered plants is given in Steward (1933).

Deliberate irrigation was used by the Owens Valley Paiute to increase the natural yield of several root and seed plants through the construction and maintenance of communally owned diversion dams and ditches (Steward 1930, 1933, 1938a, 1970). Two irrigated plots on both sides of Bishop Creek measuring 4.0 by 1.0-1.5 miles for the northern one and ca. 2.0 miles square for the southern one, have been described by Steward (1930:151, 157, 1933) for pitana patü near the present town of Bishop. Other localities noted as using irrigation are Freeman and Baker Creeks, and the area from Pine Creek in Round Valley to Independence Creek in Owens Valley (cf. Lawton et al. 1976, Fig. 30).

The honorary position of head irrigator (tuvaija) was filled each spring by election at a popular assembly. The time of irrigation was announced by the district headman and approved by the people. Irrigation was a communal effort at pitana patü but once the water was diverted into the main ditch the head irrigator was solely responsible for its distribution via a series of small subsidiary ditches throughout the plot. A pole (pavado) 8 feet long and 4 inches in diameter was the sole tool employed. The overflow water was allowed to flow on to the Owens River. Fish gathering occurred both at the time of stream diversion in the spring and at dam destruction in the fall. Steward (1933) notes that the two plots were alternated for irrigation annually and suggests several reasons for the practice.

Irrigation was primarily directed towards two plants, tupusi and nahavita, in the irrigated plots,although the overflow water also irrigated other wild seeds and tubers (Steward 1933:247) below the two main plots. Plants harves-

ted as food on the irrigation overflow area have been identified as mono (love grass, Eragrostis sp.); sinu (wheat grass, Agropyron sp.); pauponiva (?); waiya (Great Basin wild rye, Elymus sp.); pak (sunflower, Helianthus sp.); atsa (western yellow cress, Rorippa curvisiliqua); siguv and wocava (unidentified grasses); pawai (water grass, Echinochloa crusgalli) and wata (white pigwee, Chenopodium berlandieri) (cf. Steward 1933:242-245; Lawton et al. 1976:20).

Nahavita and tupusi have recently been classified as the wild hyacinth (Dichelostemma pulchella) and yellow nut grass (Cyperus esculentus) by Lawton et al. (1976:33-36) after an intensive investigation of irrigation among the Owens Valley Paiute. Harvesting of the plants was on a communal basis by the women through the use of standard gathering methods. Seasonality of harvest was not discussed by Steward (1933), but he does note that tupusi and pak were harvested in the fall.

Lawton et al. (1976) have presented an excellent and thorough report on the actual irrigation practices, Paiute vegeculture and the theoretical aspects of the origin of irrigation among the Owens Valley Paiute. They concluded that a well developed agricultural system existed in Owens Valley at the time of white contact focused on the irrigation of 'root crops' rather than the traditionally grown species of other Native American conventional agricultural systems as in the rest of North America. Operating as an adjunct to the hunting and gathering of wild food items, the system was probably of an independent origin. This article must be consulted for a complete understanding of agriculture among the Owens Valley Paiute as well as to provide locational details of the irrigation systems for cultural resource management purposes.

Hunting

Hunting was either on an individual or communal basis usually by the male members of the group (cf. Willoughby 1963). Individuals could hunt anywhere, but communal groups were restricted to their districts (cf. Steward 1933:252). Resources provided from this source probably provided ca. 15% of the group's total subsistence base.

Small game, comprising both cottontail rabbit (Sylvilagus nuttalii) and small rodents, was an important source of hunted protein. Both the cottontail rabbit and various rodents were taken by individual hunters using wooden pointed arrows or through the use of several traps and snares (Steward 1933:255-256). Burrowing animals were dug or smudged out of their holes. Porcupines (muhu), ground squirrels (anwa), woodrats (cawa), mice (punaji), large mountain ground hogs (yaha), short tailed ground squirrels (kupa), gophers (muiya), badgers (hu'na), chipmunks (tavaya) and possibly wildcats (tu'kuvitci) among other species were hunted (Steward 1933:255). These were roasted buried in the coals after the entrails were removed and the skin sewn up with a stick. Small game provided a reasonably consistent supply of meat throughout the year (especially the lagomorphs - rabbit family) due to its year round availability.

The jackrabbit (Lepus californicus and L. townsendii), medium game animals and the antelope (Antilocapra americana), a large game animal, are most common in the desert scrub and upper sagebrush meadows (Upper Sonoran and Transition

Life Zones). Both were commonly taken by communally organized drives during the late summer and fall usually prior to or during the pinyon 'harvest.' Antelope were hunted mainly in the White and Inyo Mountains. The drives were commonly regarded as social events. Steward (1938a:34-35) offers an excellent description of a drive with the antelope being driven/herded into a 'V' shaped brush corral, trapped and then selectively killed as needed over a period of several days. Drives usually occurred every 10-15 years as the antelope population suffered a considerable loss from this hunting method (Steward 1938a:35).

Rabbit drives involved a communal effort with the animals being driven by lines of men, women and children directed by a district headman into a net strung in a large semi-circle. Clubs and bow and arrows were used to kill the rabbits caught in the net (cf. Steward 1933, 1934). A celebration was held the last night of a successful drive. As part of the ceremony the men traded their rabbits for seeds gathered by the women (cf. Steward 1933:254).

Deer were available at high elevations in the Inyo-White Mountains during the summer and in the foothills during the winter. These were hunted either individually or communally. One technique was for several men to drive deer towards a waiting member of the hunting party hidden behind a blind. Constructed blinds were also used by individual hunters positioned along game trails or near water sources. Large communal hunts were occasionally employed in which a large number of men, under the direction of a headman, used fire and noise to drive the deer toward waiting hunters. The kill was equally divided with the meat either consumed immediately or cured for future use (Steward 1933:252-253). A trap or snare was occasionally used for both deer and sheep (cf. Osborne and Riddell 1978).

Mountain sheep were usually hunted in large communal groups under a headman. The sheep, found in the Inyo-White Mountains at high elevations, were hunted utilizing techniques similar to those employed for antelope. Like deer and antelope kills, the sheep were divided equally among the hunters. Steward (1933:253) notes that no shamanistic activities or magic were recorded.

Large game was boiled in pots (ceramic?) or broiled on the coals in the mountains. For preservation small strips were dried (over a fire?) and left hanging or wrapped in buckskin.

Birds, both water and land, were hunted by the Owens Valley Paiute. Water fowl were killed in the early morning by shore based hunters concealed in blinds. No decoys or nets are known and communal hunting was not practiced. A 10 foot long shapeless, tule 'balsa' or crude raft was occasionally used for both duck hunting and some fishing (Steward 1933:258). Geese, mallard, canvas back, brown head, pintail, spoonbill, teal and other unidentified ducks (pu'yu) were hunted. Quail, sage hen, grouse and bluejays were either shot or trapped in the surrounding uplands and forest areas. Waterfowl were boiled in pots (ceramic?) while the other birds were broiled on coals or boiled in pots.

Fishing

Fishing was conducted on an individual or communal basis in the sections of the river or sloughs owned by the various districts. Several species were

fished for including chub, sucker, dace and Owens pupfish (cf. Wilke and Lawton 1977:47-48). A number of fishing methods were employed by the Owens Valley Paiute. Stranded fish were collected from the stream beds after stream diversion for irrigation. A plant-derived fish poison (Smilacina sessilfolia) was added to standing ponds of water and the stupefied fish collected in baskets by both the men and women. Featherless, hard pointed arrows shot from a bow were also utilized. Short cane spears with two wooden prongs along with deer bone hooks were also used with hook and line, a popular fishing method. Baskets were either dragged through the water or placed below a dam to catch fish (cf. Wilke and Lawton 1977:47-48). Nets, similar to those used in the rabbit drives, were used by several people in a 'fish drive.' Grasshoppers and worms were often used for bait. Fish preparation methods apparently varied with both baking under hot ashes and smoking for storage recorded (Steward 1933:250-253). No information is available regarding seasonality although it is probable that fishing occurred on a year round basis. Davidson (Wilke and Lawton 1977:30, 47-48) noted that the Owens Valley pupfish formed an important food item and was stored for winter use.

Insects

A number of insect species were utilized by the Owens Valley Paiute. Brine fly larvae (Cutzavi - Ephydra hians) were obtained in trade from the Mono Lake Paiute; Steward (1933:256) notes that the same species was gathered at Owens Lake at the southern end of the valley but was less relished than the Mono Lake species. Davidson (Wilke and Lawton 1977) mentions "hundreds of buckets" of larvae drying in the sun near Owens Lake, and it is highly likely that cutzavi was of importance to the aborigines of the lower Owens Valley.

Piuga, the caterpillar of Coloradia pandora, an important subsistence resource of the Mono Lake Paiute, was also gathered by the Owens Valley Paiute (cf. Davis 1965, Steward 1933) in July around Mono Mills (cf. Mono Lake Paiute, this report for details). This food resource was also widely traded. Both Cutzavi and Piuga were either added in a dried state to various foods or boiled alone into a mush.

No other insect foods were eaten. Steward's (1933:255) informants deny consuming grasshoppers and crickets, Driver's (1937) informants indicate the eating of several other insect species.

Shellfish

A species of shellfish, coyodo, was gathered from the Owens River and boiled in the shell for consumption.

Owens Valley Subsistence and Settlement

The Owens Valley Paiute subsistence-settlement adaptation emphasized a more-or-less permanent year round village occupation with short-term utilization of temporary camps for hunting and the gathering of seasonally available plant resources (e.g., pinyon nuts) by members of the village.

The population of the villages varied in size from 100 to 250 individuals (cf. Steward 1933, Bettinger 1979a) each with a headman to direct the few communal activities (cf. Steward 1933:304-305).

The lowland villages and the surrounding district territory (ca. 15-20 miles average radius) were the primary foci of hunting and gathering activity in the spring, summer and early fall. Resource procurement was directed at the collecting, processing and storage of seeds and roots as well as the hunting of small animals. Harvesting of the irrigated plots of roots and seeds occurred in the fall. Fishing was an ancillary activity in the spring. Trips were made to the north for pinyon and to the east for seed gathering. Large game animals were hunted in the foothill and mountain regions.

Communal rabbit (and antelope) drives were the main hunting activity of the fall along with deer and mountain sheep hunting. Pinyon harvesting in the fall and the establishment of family camps in the groves for this gathering purpose occurred. If the crop was good winter was spent in the pinyon areas; otherwise the winter was passed in the lowland villages. Fall also saw the assembling of people at certain district villages for communal celebrating and rabbit hunting (Steward 1933:238; cf. also Bettinger and King 1971).

In summary, the Owens Valley Paiute subsistence-settlement pattern reflects a distinct adaptation to the unique environmental setting of Owens Valley, in contrast to the 'transhumant' pattern (cf. Davis 1963) of their Mono Lake neighbors to the north.

Sociopolitical Organization

The Owens Valley Paiute aboriginal sociopolitical system represents a distinct and fundamental contrast to the Mono Lake and Washo groups. In contrast to the nuclear family or kin clique (cf. Fowler 1966) of the other groups, the nuclear family of the Owens Valley groups can be viewed as subordinate and circumscribed in regards to its economic and political independence from outside controlling forces. The controlling force or political unit in Owens Valley was the district, a political entity comprising a single large autonomous village or a cluster of several smaller allied villages. Each district owned and defended against trespass a core territory which included seed plots, pinyon groves, irrigated land and hunting and fishing territories (cf. Steward 1933:Map 2). Band ownership of hunting territories was apparently strongly focused in the north with a gradual fading as one moved to the south (cf. Steward 1938a:54). Within the district certain pinyon groves, seed plots, etc. were subdivided into family plots which, depending on the district, could be passed on through either matrilineal or patrilineal inheritance (Steward 1938a:52).

Villages were generally composed of related families, although unrelated families were also present, with marriage usually exogamous to the village. Permanent residence after marriage tended to be matrilocal especially in southern Owens Valley where small villages often approximated exogamous matrilineal bands. Strong intra-village relations usually resulted in a coherent social group.

The position of district chief or headman (pogina'vi) was of some importance in the regulation of communal village activities. These hereditary chiefs inherited their position generally patrilineally,although the people could choose a successor if they disapproved of the chief's choice of succession. The duties of a chief included the directing of: the irrigation or appointing of a special irrigator; rabbit, antelope and deer drives; fall festivals and mourning ceremonies; erection of the sweat house; communal gathering activities (e.g. the pinyon harvest); and inter-village cooperation in various ventures. The chief also had the power to approve or veto the execution of witches.

The social organization and subsistence-settlement system of the Owens Valley Paiute has been described by Bettinger (1978a)as a Desert Village strategy which is characterized by permanent villages, relatively specialized subsistence patterns and stable social groupings. This is in contrast to the Mono Lake pattern which has been characterized as a Desert Culture strategy with an emphasis on shifting settlements, unspecialized subsistence patterns and fluid social groupings.

Structures/Architecture

The construction of huts, shelters and other protective features varied widely depending on the season, exposure and available materials. Semi-circular brush shelters, low brush and rock pile windbreaks, and conical pole and brush houses were among the several common types of constructed shelters for the Owens Valley Paiute. The male members of the group did the majority of house building but the women kept the houses in divorce or separation. A single family usually occupied a shelter.

Dome shaped willow sun shades, 8 to 15 feet in diameter (havatoni), were favored for summer use. Willows were set in the ground, bent and lashed together and then strengthened by horizontal runners of other materials. Another type of sun shade for summer use was a light roof of willows supported by four posts (Steward 1933:265; cf. Curtis 1926:58 for a slightly different description).

Several different house types could be constructed for winter use. The mountain house (wogani) was used above 6000 feet elevation during the fall and winter after the pinyon harvest. This tent shaped house was of pole and brush construction and had a central ridge pole with the side coverings of poles and pine boughs. The smokehole was situated in the center of the roof and the door faced to the east. Segregation of the sexes was practiced with the men occupying one house and the women another (Steward 1933:263).

The winter valley house (toni or siwanopi) was used in the lowland areas by families not wintering in the pinyon groves. This cone shaped house was of pole construction, 9-10 feet high, 15-20 feet in diameter and was built around a two-foot deep pit. A covering of woven grasses or brush covered the poles and this was occasionally covered with several inches of earth. The smoke hole was in the center and a doorway with an inclined ramp faced to the east. Cooking, eating and sleeping were done outside behind a willow windscreen which may have encircled the house (Steward 1933:264).

Several special purpose structures are known for the Owens Valley Paiute. The hava toni (winter cookhouse) was similar to the toni but lacked an earth covering (Steward 1933:265). The sweathouse (musa) was a large, substantial construction. This structure was circular in plan with an excavated pit two feet deep and 25 feet in diameter. The construction was primarily of poles resting on a center ridge pole supported by two main posts. The outside pole walls were grass-covered and then covered with several inches of earth. The smoke-hole was in the center and the doorway, approximately 4 feet high, faced to the east. The sweathouse was used primarily as a men's club house and dormitory and occasionally as a community meeting house. Sweating, for cleansing and physiological benefit, was done monthly in the winter usually after hunting or strenuous work (Steward 1933:265-266, Fig. 4).

Bettinger (1975b) has recently presented a discussion on the archaeological remains of several 'living structures' discovered in the pinyon areas within the Owens Valley Paiute boundaries. A search of the existing ethnographic data by Bettinger has not resulted in the placement of these structures into the formal house categories proposed by Steward (1933). It would appear that a number of other structures were built by the Owens Valley Paiute but data on them are simply not available in the current ethnographic record.

Material Culture

A number of material culture items have been described by various ethnographers and observers of the Owens Valley Paiute groups. A series of brief descriptions and uses of selected items are presented below. Julian Steward's (1933) ethnography should be consulted for additional items and detailed descriptions.

Basketry

An extensive use of basketry was made among the Owens Valley Paiute in their everyday living activities. Both coiled and twined baskets were made and used. A technical description of basket technology has been presented by Steward (1933:270-274) along with a list of raw materials. The most characteristic categories of basketry items in use by the Owens Valley Paiute were:

1. Storage/Container baskets
2. Burden baskets
3. Seed beaters
4. Winnowing trays
5. Water bottles
6. Hats
7. Cradleboards

Women made the baskets having learned the techniques from either their mother or grandmother.

Cord for twine, nets, etc. was of a two-ply construction made of pounded/chewed and twisted fiber. Steward (1933:270) notes that wicivi (Amsonia brevifolia) and avanava (Asclepiaes speciosa) and possibly A. mexicana were the plant species used. A twined tule mat was used on house floors (Steward 1933: 270).

Clothing

A minimum of clothing was the rule rather than the exception for most Great Basin aboriginal groups. The Owens Valley Paiute were typical in regards to dress. The women wore a skirt from knees to hip occasionally painted with vertical red stripes and hung with deer hoofs or dew claws. The men wore buckskin breechclouts and short-sleeved buckskin shirts. They made their own clothes. Rabbitskin capes or blankets were worn by both sexes in cold weather. These were usually made by the men and consisted of the fur of 50-75 jackrabbits killed in the fall during the communal drives. The fur strips were twisted together into a rope and were then 'woven' into a blanket via a weaving frame and cord warp (Steward 1933:270, 1939:Plate 18). They also served as a blanket or bedding and a large one could cover a small family.

Moccasins (tapa'tsa) are known to have been worn by the men while the women sometimes wore sack-like, woven sagebrush socks tied around their ankles for snow protection (Steward 1933:274).

Milling Equipment

Seeds were ground on a 'portable' metate (mata) with a muller or mano (tusu). Bedrock mortars with cobble pestles of natural, unshaped stones are known to have been used for acorn processing and undoubtedly seed processing as well (Steward 1933:246; Meighan 1955). Steward (1933:246) reports a wooden mortar 15 inches deep by 15 inches in diameter from near Benton although no data is available on its exact function.

Pottery

Pottery use and manufacture is known for the Owens Valley Paiute. This special art was limited to a few women in the Big Pine area with trade accounting for the distribution throughout the valley. Two shapes were manufactured - a large round-bottom vessel known from archaeological sites and a small flat-bottom vessel made by Steward's informants similar to the pots described in Gayton (1929) for the Western Mono and Yokuts. Riddell (1951) has described Owens Valley Brownware from an archaeological context while Steward (1933:266-269) has noted the manufacture/use of current Owens Valley pottery in some detail. Ceramic vessels were used for cooking as substitute basketry containers

Weapons

The Owens Valley Paiute used a short to medium length (up to 5 feet) sinew backed bow made from seasoned juniper wood (Steward 1933:259-260). Manufactured by "professional makers" these bows were strung with either some form of twisted cord or deer sinew. Self bows are also known for the Owens Valley Paiute (maximum of 6 feet in length). Large game bows were sinew backed while small game bows were simple, of black willow or oak. Painted decoration of bows was practiced (cf. Steward 1933:259-260).

Arrows were of cane or willow and approximately 3 feet in length. The shafts were straightened on heated stone shaft straighteners. Three six-inch

half feathers, of hawk or eagle, were used and these were bound to the notched end by sinew. Cane arrows had willow foreshafts six inches long (Steward 1933: 260).

Chipped stone arrow points, primarily of obsidian, were used. Game and war arrows were of cane with wooden foreshafts and obsidian points. A plain blunt greasewood foreshaft was used for rabbit. Duck arrows were similar but the foreshafts were wrapped with sinew to form a bulge making the arrow skip on the water. The striking surface of an arrow was enlarged with two pairs of sticks about 2 inches long tied at right angles across the end for birds. The arrow for fish had a willow shaft, no feathers, and was tipped with two hard wooden points. Projectile points were attached to the shaft with sinew and a sage shellac (Steward 1933:261-262).

Poisoning of the arrow point was practiced. A yellow mineral from Koso Springs and several animal/vegetable derived concoctions were utilized (Steward 1933:263).

Spears of some kind were utilized in fishing and may have been used for rabbit hunting. Buckskin strap slings were used to throw rocks in brawls over use of pinenut lands (Steward 1933:263).

Musical Instruments

Flutes (woina) were of elderberry, 8 to 9 inches long with several holes (Steward 1933:Fig. 9). Split stick rattles (tsavaiya), deer ear rattles (tsavaiya) and cocoon rattles (tuvo tsavaiya) were utilized for special purposes including dancing and shamanistic curing. Drums were unknown for the Owens Valley Paiute, although the Mono Lake group used them. The musical bow may or may not have been used in Owens Valley. The bullroarer was used (cf. Steward 1933: 278 for detailed information.)

Non-Material Traits

Mythology

A moderate body of published material is available on the mythology or folklore of the Owens Valley Paiute (Steward 1933, 1934, 1936) with much data still unpublished but available through archival sources (Appendix A, this report). Steward (1936) has presented a brief analysis of the myths:

> The pattern of the Owens Valley Paiute myths is similar to that of the myths of other Great Basin peoples. The stories are developed by direct narrative, with characterization subordinate to action except in the Coyote cycle. The action is presented through description. Dialogue is used as in the European novel and in a myth told by a skillful narrator, contributes greatly to characterization and somewhat to the action. . . .
>
> Demonstration of magic is the favored theme and scarcely a myth, irrespective of type, is without it. Magic is used in the creation of things, appears in Coyote's inglorious failures, and is exhibited

> in the clashes of great men who have supernatural powers.
>
> The concrete situations are generally those of hunting and gambling, both favorite occupations of these people. Half the Coyote stories, for example, relate hunting incidents . . . . Accounts of lust, however, are very common, Coyote usually being connected with libidinous adventures. Tales of war are rare, for the Owens Valley Indians were on the whole a peaceful people.
>
> The characters are generally animals. Coyote, the inveterate trickster of Western mythology, is the most important figure.

The myths can be divided into three general categories. The first category contains stories designed to "explain the origin of the earth, people, natural phenomena and culture" (Steward 1936:358). The second category, the Coyote cycle, is a series of unified tales revolving around Coyote the 'inveterate trickster.' Steward's third category, epics and miscellaneous myths, deals with stories in which plot rather than characterization dominates and often lacks narrative coherence (cf. Steward 1936:361).

Steward notes (1936) that the mythology of the Owens Valley Paiute shows affinities with both the California and Basin Shoshone groups. He specifically notes, "Fellow Shoshoneans supplied them with a large number of plots, episodes, and other characters, whereas the tribes of California exercised comparatively little influence" (Steward 1936:356).

Additional analytical details on myths of the Owens Valley Paiute can be found in Iroquois Research Institute (1979).

Singing

Singing was an important part of dances, ceremonies and various activities. Songs are known for the Owens Valley Paiute for the circle dance, hand game, funerals (cry dance) and shamanistic activities (Steward 1933:278-285, 1936; Pietroforte 1965).

Dancing

After the pinyon and seed harvests and before or after the fall communal rabbit hunts, the districts held dances at Bishop, Big Pine, Benton, Oasis and Mono Lake. The district head men organized and directed these annual 'fandangoes' which usually lasted five days to a week. The popular circle dance was held in a specially constructed dance corral with the people camped either outside or inside of the corral. The men and women formed a circle holding hands and side stepped/hopped to the left or clockwise to the music and/or songs. An intermission followed 5-10 minutes of dancing (Steward 1933:321). These annual festivals have been suggested by Bettinger and King (1971) to have occasioned extensive intervillage trade resulting in the redistribution and regional movement of resources rather than people, thus permitting the stable settlement pattern and higher population density found in Owens Valley,

in contrast to the surrounding groups. Other dances that were performed on occasion were the 'War Dance' and 'Bear Dance' (cf. Steward 1933:321-322 for specific details).

Games

A number of games are known for the Owens Valley groups (cf. Steward 1933; Culin 1907). The games can be loosely separated into gambling and athletic games although the two categories are not mutually exclusive. Gambling was a favorite pastime especially at the communal gatherings. The hand game, basket hiding game, and stick dice were all popular games of chance. Athletic games included hoop and pole, hockey, 'football,' arrow game, wrestling, races and so on. These all involved physical activity although gambling was often involved in some of the games or contests. Steward (1933:285-288) presents several detailed descriptions of the various games.

Facial and Body Decoration

Face paint was used on the face and body for festivals. Red, black and yellow lines along with a design of white dots were used in various configurations. A series of 'designs' are presented in Steward (1933:275; cf. Sherwin 1963). Tattooing was not practiced (cf. Rose 1979; Steward 1933:275).

Birth and Childhood

A number of customs and rituals were observed by the Owens Valley Paiute as part of the childbirth act (Steward 1933:289-291). No particular rituals or taboos were observed by a woman during her pregnancy. During labor the woman was placed in a heated pit, steamed, and had a midwife in attendance. When the baby was born it was bathed and placed in its first cradle after the seventh day. The mother and father were confined for 5 days after the birth and observed a set of rituals and restrictions. Women often had 8 or 10 children, many dying in infancy. Twins were rare. Nursing lasted 1.5 to 2 years and walking usually began at 14 or 15 months.

Children were taught to be clean, neat, quiet, to respect elders and not to boast. Whipping was the favored punishment usually meted out for fighting with other children and disrespectful behavior toward elders. The mother and grandmother raised the children but any family member cared for and punished them (Steward 1933:291).

Their fathers taught the boys hunting around 10 years of age, making bows and arrows for them to practice on small game. At 14 they accompanied their fathers deer hunting. Seed gathering and woman's work were taught to the girls at 12-14 years of age (Steward 1933:291).

Puberty Rites

For a girl the ceremony occurred after her first menstruation and was essentially a physiological treatment for health, preparation for childbirth and an industrious life. The rite lasted five days with the young woman being

bathed by her parents in cold water and steamed in a pit for the first three days. The girl ran westward daily and carried wood and water baskets as well. She stayed indoors and observed a series of rituals including the use of a head scratcher. On the fifth day she was bathed before dawn and the ceremony ended. An abbreviated ritual was observed at subsequent menses (cf. Steward 1933:293).

The boy's rite occurred only once and can be considered as a hunting ritual. Awakened each morning when the morning star rose he was sung to; bathed himself; ran several miles; and was taught about nature and the habits of game and various dangers. At his first deer kill his grandfather lowered a portion of the deer's flesh over him and 'talked' that the boy might be a great hunter. At this ceremony the boy or now man smoked for the first time and began to sleep in the sweat house (cf. Steward 1933:293-294).

Marriage

Marriages were usually arranged with blood relationships observed as the only barrier. A series of exchanges of presents by either parents and their acceptance constituted an agreement. Marriages could be arranged by parents between infants. The marriage was considered consummated when the couple slept together. Divorce was rare. Residence was matrilocal for a year, then patrilocal and finally was followed by independent residence, usually matrilocally-centered. Polygyny was rare and polyandry was unknown. Both the sororate and levirate were practiced (cf. Steward 1933).

Death

Interment was by primary burial although cremation was used in several cases (cf. Steward 1933:297-298; Gould 1963). Funeral customs varied, but usually consisted of a burial ceremony and prayers with several hired singers singing funeral songs with the mourners dancing a slow half dance stopping at intervals to wail. The deceased's property, including his house, was burned at midnight after the 'funeral' so the survivors could forget their grief. Burials were either flexed or extended with various orientations observed. A mourning ceremony ('cry dance') was held annually in the spring or fall (cf. Steward 1938a:55) with various items of property burned on the grave of the deceased after the ceremonies. If the mourning had ended for the deceased, the grave was smoothed. A spouse's death required one year of mourning, avoiding dancing, gambling, pleasure, visiting and observing meat and grease taboos (Steward 1933:296-298). The names of the deceased were only used in speaking to a person not acquainted with him (Steward 1933:298) although Curtis (1926: 65) notes that the name must either be spoken of indirectly or not at all.

Religion

Religion in the western sense of organized churches, sects, cults, etc. did not exist among the aboriginal ethnographic peoples of Owens Valley. A core of native dualism did exist with Wolf (unupi) viewed as a beneficient culture hero while Coyote (ica'a) was seen as always introducing evil. Prayers were made to both a 'great spirit,' identified with good, and to a person's guardian spirit. Good deeds or thoughts helped nature while bad thoughts,

dreams or deeds brought evil. Belief in the supernatural was expressed through vague generalized fears and hopes with personified spirits lacking (Steward 1933:306-307).

A person was believed to have a soul (mugua) and a ghost (takawahuva). This soul is responsible for life and goes to the land of the dead at death while the ghost remains in the land of the living after death, visiting people and serving witches. The ghosts of the dead were feared as to see or talk to one forecast misfortune or death (Steward 133:307).

A number of superstitions were known and practiced (cf. Steward 1933:307-308 for a detailed list). Private charms were used by various individuals for one purpose or another (cf. Steward 1933:308).

Shamans and Powers

Powers came unsought in dreams, a pattern similar to that known for the Washo. The power in a dream promised help and certain abilities to the individual. He could later be called on for assistance, if needed, through a humble request. Powers were used for doctoring, gambling, hunting, dancing, warfare, etc. or several things at once with the power utilized for individual rather than communal ends. Individuals' powers embraced most things in nature among them the eagle, fox, bat, snow, obsidian and the blue haze sometimes present over the valley (Steward 1933:308). Steward's informants identified both Birch Mountain and Mount Dana in the Sierra Nevada as powers (cf. Steward 1933: Map 2). It should be noted that most powers were animatistic rather than animistic or clear cut spirits. Steward forcefully notes that his informants' power was Birch Mountain, not a spirit in it (Steward 1933:308). The list of powers given by Steward (1933:309-310) includes a number of distinct powers and their uses. This list should be consulted by interested readers for details.

Shamans (puha'ga, puhagu, puhuku, pu'nagai) were primarily non-specialized doctors who could be of either sex. Doctors' power ran in families and usually the calling was semi-inherited although it must be noted that a doctor's power came early in life, 5-6 years, in recurring dreams with the songs in the dreams gradually taking form until comprehension and recognition occurred by puberty. The doctor's songs were considered to be his most important possession and by age 20 or 25 he had a number of songs. Until age 30 or 40 his 'power' was usually unknown to the other members of his village except for a select few. At this age he would call a gathering and sing his songs to the people to let them know of his availability as a doctor.

Refusal of shamanistic power was dangerous with a potential for causing great harm to others. A ritual ceremony is described by Steward (1933:312) to ask the powers to withdraw their offer of power.

A typical treatment of a patient is described in some detail by Steward (1933:313). Treatment for illness (or bewitchment) involved a variety of techniques including but not limited to dancing by the shaman, touching of the patient with the hands and ritual paraphernalia, sucking of the afflicted body part to remove the object causing the illness, smoking, etc. over a period of one night, although occasional cases required several nights of treatment. A

fee was charged with payment made through a third party to avoid insulting the power (Steward 1933:313).

Witches were naturally evil or resulted from misuse or improper development of doctor's powers. A witch causing death was murdered (Steward 1933: 314) although if found out he would be asked to remove the curse or spell causing the illness.

Doctors were killed not for losing patients but because their failure to cure indicated that their power had gone bad. Steward (1933:314) quotes Chalfant as noting that a doctor was killed after the death of three patients. A list of 'case histories' of doctoring is given by Steward (1933:314-316).

Relations With Other Groups

Warfare

The Owens Valley Paiute groups had contact both with other Owens Valley districts and with 'foreign' bands. Hostilities were extremely rare and tribal relations usually peaceful according to the information presented by Steward.

> "AC thought all Indians had formerly been at peace with one another. GR had heard only of wars with Indians west of the Sierra and thought the battles had been fought by Paiute who crossed the mountains. TS recounted only a single minor local engagement with a small party of invaders from the south. Paiute bands did not fight with one another or with Shoshoni. Conflict over pinenut areas were brief and never involved weapons more dangerous than the sling, which did little damage" (Steward 1938a: 55).

> "Fights between Paiute bands were rare, amounting only to rock throwing -- slings sometimes used -- during squabbles over food territory. Relations with Shoshoni were generally peaceful. Chalfant recounts a foray against 'Diggers." District headmen were war leaders upon occasion. War paint and dances were denied. Scalping was not usual. T.S. says the scalp - i.e. all of the hair - of a 'Digger' Chief, Pohoiwic, was brought back by a war party for exhibition, then thrown away" (Steward 1933:306).

Hostilities are known to have taken place between the Yokuts and Tubatulabal (cf. Fig. 22). Panatubiji (cf. Steward 1938b), an Owens Valley informant, tells of a conflict between the South Fork Indians, Tubatulabal, who came to raid Paiute villages. A war party from various Northern villages was recruited by a Paiute from the southern part of the valley and the warriors moved to somewhere below Owens Lake to avenge themselves on two of the Tubatulabal invaders who had stopped to trap rabbits. One invader left, having been warned by supernatural powers, but the other was killed and scalped (Steward 1938b:188).

Curtis (1926:57) relates a brief account of warfare between the Yokuts and Eastern Mono. The hostilities started when the Yokuts began to steal the

wives and children of the Western Mono at North Fork. The North Fork Mono appealed to a district chief south of Mono Lake for help and he assembled a war party of young men who crossed the mountains via the Mammoth Lake trail. No mention of the outcome is made by Curtis (1926).

Gayton (1948:159-160) has likewise recorded an account of Eastern Mono and Yokuts warfare:

> "Long ago (before EM was born) a number of Yokuts people from the Chukchansa, Kechayi, and Gahowu tribes were camping east of Friant. They had all gone there for acorn gathering. It was the general practice that the men, immediately after the morning meal, went out to shake down the acorns. Leaving these to be collected by the women, they then went off for the day to hunt or fish. Toward sundown they returned and helped the women crack the nuts. Now some Monachi (Eastern Mono) had come over the mountains; their chief had told them to 'go over and kill those people like birds.' While the Yokuts men were away, the Monachi surrounded the women's camp. One man came closer to spy. They saw the women cracking the acorns with their teeth and thought they were eating. He went back and reported this. Several times he came close to spy and each time saw the women putting the nuts to their mouths: he 'thought they just ate all day long.'
>
> Next morning the Yokuts men went out very early to knock down more acorns. They found a series of stakes, with feather bunches (so nil) tied to their tops, which had been set up by the Monachi. They know the Monachi were near by, so they returned to camp and sent the women off. The women fled across the river (San Joaquin), leaving everything behind. The men went in pursuit of the Monachi. Their camp was located, and the Monachi were asleep. Rushing in, the Yokuts killed all of them, save one man who smeared himself with his comrades' blood and pretended he was dead. Later on this man went back to his village and reported events to his chief. The chief was very angry; he determined on revenge.
>
> Soon after that a Yokuts was working for a white man and was sent up into the mountains with some hogs. Some Monachi lurking about on this side of the ridge saw him; they came down to him and asked him who he was. When it was time for the Yokuts man to return to the valley, his employer warned him not to make the trip alone. But the man was anxious to get back home and went anyway. The Monachi were ambushed along the way and killed the man and his horse" (Gayton 1948: 159-160).

Other than the above accounts, little detailed information is available in the ethnographic literature on aboriginal warfare in the region (cf. Driver 1937).

Indian-Anglo hostilities, the best known of which is the Owens Valley Indian War, have been reviewed in the History Section of this report. This

section (cf. Chapter 3) should be referred to, along with the appropriate references, for detailed data.

Trade

A moderate amount of trade was carried on between the Owens Valley Paiute both internally and externally. External-trade was primarily with the Western Mono, Mono Lake Paiute and the Miwok of the eastern Sierras. The Owens Valley people traded salt, pinenuts and other seeds, obsidian, rabbitskin blankets, tobacco, baskets, buckskins and other miscellaneous items (cf. Davis 1961 for a list of known traded items) for shell money, glass beads (after White contact had made them available), acorns, manzanita berries, baskets and other assorted trade goods (cf. Bettinger and King 1971 for an adaptation through exchange model to explain the development of social ranking in Owens Valley). The main trade routes (mountain passes) are shown in Steward (1933:Map 1, Fig. 26 , this report) with trade restricted to the summer and fall. Several salt trading expeditions are described in Steward's collection of autobiographies from Owens Valley (1934:423-438, 1938b).

Summary

The Owens Valley Paiute were a group of Northern Paiute who spoke a Shoshonean dialect of Uto-Aztecan and occupied the Owens Valley region from just south of Mono Lake to the area near the present town of Olancha south of Owens Dry Lake. The group had contact with the Mono Lake Paiute to the north, the Tubatulabal to the south and the Yokuts and Miwok of the western Sierras. Relations both within the Owens Valley and with neighboring groups were generally friendly although limited hostilities occasionally occurred for a number of reasons. Population estimates for the Owens Valley groups are in some disagreement on the aboriginal population with precontact estimates ranging from ca. 1000 to 2000 individuals. Steward (1938a) has calculated an area population density ranging from between 0.50 to 2.50 persons per square mile.

Owens Valley Paiute economics involved a combination of gathering, hunting, fishing, "vegeculture," and trade. Vegetal foods were obtained from the exploitation of a wide variety of seasonally available wild plants with pinenuts (Pinus monophylla) being an important staple although there is some considerable debate as to when and why they became a favored resource. Deliberate irrigation was used by the Owens Valley Paiute to increase the natural yield of several root and seed plants through the construction and maintenance of communally owned diversion dams and ditches. Several researchers have concluded, based on extensive study, that a well developed agricultural system existed in the Owens Valley focused on the irrigation of "root crops" rather than on the traditionally grown species known for other Native American agricultural systems. This 'vegeculture' operated as an adjunct to the hunting and gathering of wild food items and was probably independently invented by the Owens Valley Paiute. Individual and communal hunting of jackrabbit, deer, mountain sheep, and the cottontail rabbit contributed to the supply of meat. A fishing industry, utilizing a wide variety of capture methods, exploited the Owens River and its nearby tributaries.

The Owens Valley Paiute aboriginal sociopolitical system represents a

distinct and fundamental contrast to the Mono Lake and Washo groups. In contrast to the nuclear family or kin cliques described previously for the other groups, the nuclear family of the Owens Valley groups can be viewed as subordinate and circumscribed in regards to its economic and political independence from outside controlling forces. The controlling force or political unit in Owens Valley was the district, a political entity comprising a single large autonomous village or a cluster of several smaller allied villages. Villages were generally composed of related families, although unrelated families were also present, with marriage usually exogamous to the village. Village populations varied in size from 100-250 individuals each with a headman to direct the few communal activities. Each district owned and defended against trespass a core territory which included seed plots, pinyon groves, irrigated land and hunting and fishing territories. Band ownership of hunting territories was apparently strongly focused in the north with a gradual fading as one moved to the south. Within the district certain pinyon groves, seed plots, etc. were subdivided into family plots which, depending on the district, could be passed on through either matrilineal or patrilineal inheritance.

The Owens Valley Paiute subsistence-settlement adaptation emphasized a more-or-less permanent year round village occupation with short-term utilization of temporary camps for hunting and the gathering of seasonally available plant resources (e.g.,pinyon nuts) by members of the village. This system reflects a distinct adaptation to the unique environmental setting of Owens Valley in contrast to the 'transhumant' pattern of their Mono Lake neighbors to the north.

A moderate amount of trade was carried on between the various Owens Valley districts. External trade was primarily with the Western Mono, Mono Lake Paiute and the Miwok of the western Sierras. A number of items were traded among them salt, pinenuts, baskets, obsidian and rabbitskin blankets. Shell money, glass trade beads, acorns, and other assorted goods were received in return. Trading expeditions were usually restricted to the summer and fall when the trans-Sierran trade routes were open.

Contemporary Native Americans - Background Information

A substantial number of Native Americans belonging to the Paiute/Shoshone or Washo tribes are resident within the Owens Valley/Mono Lake/Coleville region. Five reservations (4 in Inyo County, 1 in Mono County) and one Indian Colony (Mono County) are present within the study area with an approximate population of 1450 Native Americans listed as resident or as members of these entities (Bureau of Indian Affairs (BIA) 1978, cf. Table 8). Each of the Owens Valley reservations (and Benton) has an independent leadership with a chairperson at each. The Bishop reservation has an Executive Director as well. The Owens Valley Board of Trustees of the Board of Trustees of the Owens Valley Paiute-Shoshone Band of Indians is an administrative unit with representatives from Bishop, Big Pine, and Lone Pine. Fort Independence is included if a quorum is needed. The Board of Trustees helps to administer funds and programs available on a valley-wide basis through various grants and other funding sources. Each reservation, however, maintains autonomy over its local funds, programs and other matters. A General Council governs the Bridgeport Indian Colony. Additional details may be found in the Tribal Information and Directory published by the Bureau of Indian Affairs (1978) or obtained through the various

Native American governing bodies.

Table 8

Indian Reservations and Colonies

MONO COUNTY

Benton Paiute Reservation

Tribe: Utu Utu Gwaitu Paiute Tribe

Tribal Affiliation: Paiute

Population: Resident - 0 Adjacent - 6 Membership - 80

Gross Acreage: 160 acres

Bridgeport Indian Colony

Tribe: Paiute

Tribal Affiliation: Paiute

Population: 69 living adjacent

Gross Acreage: 40 acres

INYO COUNTY

Big Pine Reservation

Tribe: Big Pine Band of Owens Valley Paiute-Shoshone Indians

Tribal Affiliation: Paiute-Shoshone Tribe

Population: Resident - 186

Gross Acreage: 279 acres

Bishop Reservation

Tribe: Paiute-Shoshone Indians of the Bishop Community

Tribal Affiliation: Paiute-Shoshone Tribes

Population: Resident - 821 Membership - 891

Gross Acreage: 875 acres

Fort Independence Reservation

Tribe: Not listed

Tribal Affiliation: Northern Paiute

Population: Resident - 45

Gross Acreage: 356 acres

Lone Pine Reservation

Tribe: Paiute-Shoshone Indians of Lone Pine Community

Tribal Affiliation: Paiute-Shoshone

Population: 250 (166 resident)

Gross Acreage: 237 acres

The contemporary Native American residents of the region have to one degree or another adapted to the social and economic conditions imposed by the white settlement and occupation of the area. Permanent or seasonal wage labor in a number of professions and occupations, by both males and females, occasionally coupled with various government benefits, provide the main form of subsistence for the majority of the Native Americans. The traditional round of hunting, gathering and collecting has almost been totally abandoned due to the pressures and necessities of white contact (cf. Warren 1975 for a brief discussion of acculturation; also cf. Davis 1965 for a view of the Mono Basin groups and Price 1963a and Downs 1963a-c, among others for a view of the Washo). Hunting, gathering and collecting of personal quantities of plant and animal foods still continues but usually only as a supplement to the now largely Anglo diet (cf. Cook 1941 for a brief discussion of food preferences and acculturation). This personal gathering and hunting helps maintain a close tie with the practices of their past lifeways as well as maintaining their bond with Nature on a personal level (cf. Steward 1933:306-311; Davis 1965).

Traditional areas of culture, behavior (e.g.,mythology, folklore, crafts, etc.) and language appear to be undergoing a revival as the Native Americans develop an interest in preserving their ethnic heritage. This resurgence can be attributed in part to the growing awareness of both young and old that their heritage represents an asset and tie to the past as well as a foundation for future growth and enrichment of their lives within the 'mainstream' of "white" America.

Contemporary Native American Concerns - Owens Valley/Mono Lake[1,2]

The following Native American concerns were discussed during several meetings with the Owens Valley Paiute-Shoshone Band of Indians in Bishop. While not a complete listing they do represent a general sample of concerns that will be of considerable value to the Bureau of Land Management (BLM) in formulating land use policy that may affect Native American use of the public

lands (cf. transcript, Bishop Indian Elders' Meeting at BLM Bishop, on file (8100 (C-015.0)) Bakersfield, June 29, 1978 for a view of general concerns).

Overall Concerns

The Native Americans are concerned about restricted access and use of government (i.e. public) lands. From their viewpoint there is very little differentiation between the various government agencies - Bureau of Land Management, US Forest Service, Los Angeles Water and Power - viewing government as a monolithic whole rather than as a conglomeration of state, federal and municipal agencies often with conflicting goals and aims. They feel that they have a right to land use: "It was all ours before the Whites took it away" - but realize that the white governmental power structure is firmly entrenched. The Native Americans are increasingly concerned with the free, open, non-restricted access to public lands for their personal gathering, hunting and spiritual purposes. Specific concerns are directed at the gathering of pinyon nuts, medicinal and ritual herbs, materials for native crafts, and so on. They are especially indignant at having to compete with commercial pinyon nut pickers - "They damage and destroy the trees with their methods."; cattle - "They often eat the shoots or young plants that are to be gathered for basketry use or medicine."; and other commercial and private 'multiple resource' uses of the land (e.g.,dune buggy use, motorcycle racing, gathering of various plants for "health food" stores, etc.). They would like to see non-restricted, open use of the public lands (and all lands for that matter) for Native Americans with special concern paid to their needs in any future policy decisions (cf. Sutton 1975 for a discussion of Indian land tenure on a country-wide basis). The Native Americans have a deep feeling for the land which cannot be adequately expressed here in this brief report. They feel that as the former occupants and users (cf. Steward 1933) of the region prior to White "confiscation" they should have a prominent voice in the 'multiple use' planning of the various government agencies.

Specific Concerns

The following address specific concerns felt to be of importance to the Native American peoples residing within the study area boundaries.

"Free Access"

As discussed above, the Native Americans would like to have non-restricted access to the public lands for gathering (and hunting) personal quantities of traditional foods (especially pinyon nuts), raw materials for craft use and various herbs for medicinal and ritual purposes. They feel that an effort on the part of the government agencies should be made as the government is now in control of much of the land that was formerly controlled and used by Native American groups prior to White "confiscation."

Protection of Traditional Food Sources

kutsavi ('koot-saw-by, cf. Heizer 1950 for a discussion): The distribution of the brine fly larvae (Ephydra hians) is limited to the shallow waters near the shore on Mono Lake (littoral zone) among fragments of the hard rock tufa substrate. The larvae are seldom found in open water, on soft substrate,

or below a depth of a few meters. Present densities are about 15-30 per square inch and represent a healthy population (Herbst and Dana 1977). This traditional food source (cf. Heizer 1950 for a summary of its use as noted by early and contemporary sources; also Davis 1965) is still utilized by 'traditionals' of the various groups in the Mono Basin and Owens Valley region. However, Herbst and Dana (1977:69) in their study of salinity tolerances at Mono Lake indicate that " . . . although the possibility exists that the brine shrimp and fly larvae of Mono Lake may be able to adapt themselves physiologically to a slowly increasing salinity or to evolve a genetic tolerance enabling survival, the weight of evidence examined here indicates that the present populations of these animals will not be able to withstand the increasing salinity predicted for Mono Lake."

The predicted extinction of a portion of the traditional Native American subsistence base must be taken into any future account when dealing with the ecological and cultural impacts associated with the continuing water withdrawals by Los Angeles Water and Power from the Mono Lake area. This resource, now used only by a small number of Native Americans as a supplement to a largely Anglo-based diet, can and must be considered as a spiritual and significant link with their past. Its disappearance from the Native American food chain should be considered as a significant cultural factor in any future planning concerning Mono Lake.

piuga: Caterpillars of this moth (Coloradia pandora) were used as a traditional food source by both the Mono Lake Paiute (Davis 1965) and the Owens Valley Paiute (Steward 1933:256). Gathered in the Jeffrey Pine forest to the south of Mono Lake, the caterpillars were collected in alternate years during the month of July when they descend to pupate (cf. Aldrich 1921). Various personal communications from Native Americans who still gather this traditional food indicate that the U.S. Forest Service has carried on a chemical spraying program in the Jeffrey Pine area to rid the trees of the caterpillars for timber management purposes. The U.S. Forest Service has indicated that they have not conducted a spraying program in the Inyo National Forest to control the pandora moth (Helen Castillo, personal communication, 1979). This concern does not deal with BLM controlled lands although BLM cultural resource management personnel should be aware of this problem/concern as part of the "white" government structure.

tuva'a - pinyon nuts (Pinus monophylla): Concerns dealing with this still important food resource have been covered in some detail in the General Concerns section of this paper. This food source is considered to be both a necessity and "treat" by almost all members of the Native American communities within the study area and was discussed most often as an overiding concern.

Physical Features of Natural Resources Important to the Maintenance of Traditional Culture

The only item discussed in regards to this category was the use of 'traditional' hot springs. Various Native American discussants, well aware of the Coso Hot Springs controversy (cf. Theodoratus 1977; Iroquois Research Institute 1979) to the south, expressed some concern about the several hot springs located in the Owens Valley area. Specifically Casa Diablo Hot Springs (cf. Ritter 1978a) and Keough Hot Springs (cf. Ritter 1978b) were mentioned as being sacred.

These two springs are not located on BLM controlled land although other springs not mentioned at our meeting may be located on BLM lands.

Places of Spiritual or Social Importance (prayer sites; ceremonial sites; and shrines; areas important in myth and folklore; areas attributed with special power or sacredness)

A concern mentioned at our meeting in December with the Native Americans was related to the location and definition of "sacred places" for BLM planning purposes. The Native American community does not and will not allow a listing of "sacred places" to be published or otherwise generally dessiminated to any government agencies. They feel that the determination of any "sacred locality" must be made on a case by case basis with the appropriate officials conferring with the Native American community prior to any planning. The community will cooperate, if at all possible, on this basis to insure that proper Native American input is generated for each case. They feel that an all inclusive listing would be both detrimental to themselves and the planning policy as numerous individuals must be consulted to determine the location/existence of all "sacred" places located on government (in this case, Bureau of Land Management) land. As well, they feel that many of their people with this information would not allow it to be made public or released to the government on a general basis. In brief, they prefer consultation and cooperation on an individual case-by-case basis.

Archaeological Remains of Significance

All archaeological remains are of significance to the Native American community in that they represent the material remnants of their past history. Of special concern to the Native Americans are the operations of archaeologists and cultural resource contractors who fail to consult with or confer with the community on their research projects in the region. They feel that both groups, the archaeologists and Native Americans, can learn much from each other and further good working relations in an area of concern to both parties - the explanation and preservation of a portion of America's aboriginal cultural heritage.

Of special concern to many members of the Native American community are the numerous petroglyph or "rock art" sites in the area (cf. von Werlhof 1965 for an overview of Owens Valley rock art; Appendix E of this report; Los Angeles Times 4/19/77, 11/15/77; BLM correspondence on file C8140 (C-012.7 and others), Bishop Office). The Native Americans have strong feelings about the petroglyphs,

> "How would you like someone to go into your church and start hacking up the altar? That's how we Indians feel about people coming in and desecrating or removing ancient Indian rock carvings. For us, the petroglyphs are sacred. They have a deep religious significance. They're similar to pages out of the Christian Bible . . ." (Blanche Shippentower, quoted in the Los Angeles Times 4/19/77).

and their protection (correspondence, various to the BLM, 1978, on file at the BLM Bakersfield Office; cf. Appendix E, this report).

Another specific concern of some importance to the Native Americans is the protection of Native American cemeteries and isolated burials from disturbance by natural and cultural causes. A burial protection committee has been formed (Ta Numuna Anagoona) and a known burial location, the village of Pawona witu (cf. Steward 1933; Wildesen and Mortlund 1973; Peak 1974c) has been nominated and accepted on the National Register of Historic Places.

Notes

1. Basin Research Associates personnel attended two meetings in December of 1978 after several exchanges of correspondence with the Owens Valley Band of Paiute-Shoshone Indians. The first meeting involved addressing the Tribal Elders and other interested members of the community on the project and then fielding a question and answer session. The second meeting involved an informal meeting with Mr. Delfino Sanchez, Intertribal Chairperson, Mrs. Blanche Shippentower, Native American Heritage Commission Commissioner, Mrs. Ruth Brown, Native American Ad-Hoc Gathering Committee, and several other Tribal Elders to answer specific questions concerning the project.

2. Several letters outlining the project and our wish to involve the Native American communities in the Coleville area were sent to appropriate members and the Washo Tribal Council in Gardnerville, Nevada but no responses were ever received.

ARCHAELOGICAL OVERVIEW

A History of Archaeological Research in the Coleville/ Bodie/Benton and Owens Valley Planning Units.

The study area has enormous archaeological research potential but has been the subject of only a relatively few research investigations. Early exploration journals and military reports for the initial contact period contain both anthropological and archaeological observations of limited utility (cf. Loew 1876, Gatschet 1876, Kern 1876, Wilke and Lawton 1976, Chalfant 1922, 1933, War of Rebellion Records, various, Bureau of Indian Affairs Reports, various among many others). The first serious scholarly archaeological investigation of record is the report and analysis written by Dr. O. Loew of the Wheeler Survey (1876) on the "hieroglyphical writing upon rocks" in Mono County near Benton. The petroglyphs or rock art of the area apparently attracted the major interest and scholarly efforts of various researchers for the next 60 years to the apparent exclusion of other 'archaeological research. (cf. Appendix E)

Stephen Power's (1877a, Fowler and Fowler 1970) visit to the Bishop area during the American Centennial resulted in a short note on the petroglyphs and aboriginal use of pottery. Garrick Mallery's two monumental studies on American rock art (1886, 1893) treated both Inyo and Mono Counties in some detail relying in main on previously published or archival material. Subsequently Julian H. Steward (1929) reviewed and added to the known sites as well as presented a brief attempt at element analysis of the rock art. Heizer and Baumhoff (1962) and Heizer and Clewlow (1973) have consolidated much of the present information on rock art in the study area (cf. von Werlhof below and Appendix E).

S. Dron's (1925) brief survey/compilation of sites listed on several USGS quadrangles apparently represents an initial attempt at an archaeological inventory while Scherer (1930) recounts the growing interest concerning Owens Valley by the Southwestern Archaeological Federation. However, aside from tours to view the, by now well known, petroglyphs no notable research was conducted by the SWAF. Apparently the research potential of the area was beginning to be realized during the period 1930-1950 by various scholars and institutions (e.g. The Southwest Museum, cf. Harrington 1932). Julian Steward's well known and widely read ethnographic studies among the Owens Valley Paiute in the late 1920's and 1930's (1930, 1933, 1934, 1936, 1938b) as well as his attempt at synthesizing the Great Basin culture pattern (1938a) undoubtedly did much to make this 'unknown region' attractive to the scholarly world for further research.

Elizabeth and William Campbells' work at Owens Lake in the 1930's (E. Campbell 1949, Antevs 1952:28, Harrington 1957:5, Warren 1967) marks the beginning of systematic, although sporadic and seldom reported, archaeological research in the planning units. Lake Mohave, Pinto, Folsom and modern Indian artifacts were noted on the various beach terraces surrounding the lake periphery inferring some antiquity for the area.

The research at the Cottonwood Site (Iny-2) by H.S. Riddell in 1951 defined the historic Paiute occupation of Owens Valley. Cottonwood, Desert Side-Notched and Rose Spring projectile points along with Owens Valley Brownware (cf. Steward 1933) were recovered. Further field survey and excavation in the Owens Valley area were subsequently undertaken by H.S. and F.A. Riddell (1956) (cf. also Osborne and Riddell 1978), and indicated an early occupation of the area (cf. F.A. Riddell 1958:42, 45-46). The Rose Spring Site (Iny 372) to the south of the planning units, excavated by F.A. Riddell and published by E.P. Lanning (1963), helped determine the temporal span of several projectile point series thus making them useful as 'time markers' in Great Basin prehistory. Lanning (1963:281) recognized eight periods of 'occupation' based on his artifact and stratigraphic analysis. Radiocarbon dates obtained by Clewlow, Heizer and Berger (1970) provided several actual temporal control points for Lanning's conclusions (Table 9).

Table 9

Chronology at the Rose Spring Site

Phase		Age	Projectile Point Types
COTTONWOOD	Late	A.D. 1840-1900	Cottonwood Triangular
	Early	A.D. 1300-1840	Cottonwood Triangular
	Late	A.D. 500-1300	Cottonwood Triangular Rose Spring CN Eastgate Expanding Stem
ROSE SPRING	Middle	500 B.C.-A.D. 500	Elko Series, Gypsum Cave
	Early	1500 B.C.-500 B.C.	Elko Series, Gypsum Cave, Humboldt Concave Base A
LITTLE LAKE		3000 B.C. - 1500 B.C.	Pinto, Lake Mohave (?)
HYPOTHETICAL	II.	(Lake Mohave, ca. 5000 B.C.)	
	I.	(Lanceolate points, ca. 7000 B.C.)	

(From Hester 1973:Table 2)

The Stahl Site, to the south of Owens Lake and the Rose Spring Site, while not within the boundaries of the planning units, was excavated by Harrington (1957) and yielded an assemblage dominated by Pinto Series projectile points with Silver Lake, Lake-Mohave and Rose Spring types present. Harrington estimated an age of 3000-4000 B.C. for the site but this appears to be too early in light of present data (cf. Hester 1973:71, Garfinkel 1976, Jennings 1958). Other sites have been reported in this vicinity (cf. Harrington 1951, 1952, 1955, Borden 1971) but are of minor importance to the prehistory of the planning units.

To the north of Owens Valley, a field reconnaissance was undertaken by C. Meighan (1955) with the sponsorship of the University of California Archaeological Survey of various portions of Mono County. Meighan was not able to define the cultural position of the sites in detail and noted that no clear evidence of 'early man' was found during the survey. However, he did note that the cultural affinities of Mono County, based in part on his collections, did lie with the Great Basin. His artifact illustrations show Pinto, Elko, Eastgate, Rose Spring, Desert Side Notched, Cottonwood, Humboldt Basal Notched and probable Northern Side Notched projectile points. Dixon (1953) reports on the possible presence of Sandia projectile points from Long Valley in the Mono Basin while E.L. Davis (1959) describes a child burial near Mono Lake (Mno 384) with Desert Side Notched, Pinto-like and lanceolate, parallel flaked projectile points among the cultural remains.

The 1960's saw the continuation and expansion of academic research within the planning unit boundaries. Numerous articles and monographs concerned with Mono Lake and Owens Valley ethnography and archaeology attest to the continuation of the research begun in the 1950's. The research of Emma Lou Davis in the Mono Basin area (1961, 1962, 1963, 1964, 1965) established a valuable data base for any future study in the region. While her presentations of the raw data are somewhat lacking, she did utilize known projectile point typologies to establish a formal chronological sequence for the Mono Basin (Davis 1964:271).

Table 10

Davis Chronology - Mono Basin Area

A. Generalized Paleolithic: Hunting-gathering culture, without stone points; hypothetical.

B. Hunting Tradition I and II: Begins with large lanceolate points and then large points with stems or concave base ("influence from Great Basin").

C. Modified Desert Culture I-IV: Begins with a sequence of large points with elaborate bases, Elko Series, smaller side notched points and finally, Desert Side-Notched and Cottonwood Series (during IV, the "true Desert Culture.")

(after Hester 1973:88)

Hester (1973:89) has presented his interpretation of Davis' (1964:Table 7) projectile points from the Sierra Piedmont as Sandia, Lake Mohave, Folsom and lanceolate types (bottom), to Pinto, Humboldt and Elko Series (middle), to

Rose Spring, Desert Side Notched and Cottonwood Series (end of sequence). Based on her research Davis believes that the human occupancy of the study area (e.g.,both the Mono Basin and Owens Valley) extends back to 8000 B.C. (cf. Bettinger 1975a).

To the south of the Mono Basin, Jay von Werlhof's study (1965) on the rock art of Owens Valley stands as a significant contribution to the prehistory of the region. Von Werlhof has assembled a large corpus of detailed data, described and mapped many of the petroglyph sites and has attempted an analysis and locational study of the rock art's distribution and meaning (cf. Appendix E).

A series of projectile point workshops were sponsored by the Eastern California Museum under the supervision of Ruth Simpson (1961) to aid local collectors in point identification as well as to give the professional archaeological community an inventory of material culture in the area, establish/confirm local chronologies and a chance at data salvage. Nancy Peterson Walter (1970) completed a M.A. thesis utilizing the data gathered from this project. A small but deep rockshelter was also excavated by Ruth Simpson near Lake Crowley (Benton Planning Unit) in 1961 but no report has yet been published on the site as the analysis is still incomplete (R. Cook, A. Garfinkel, personal communications, 1978).

The Archaeological Survey of the University of California, Los Angeles under the direction of J.W. Michels (1964, 1965) and E. Sterud (1965) conducted a series of controlled excavations at the Mammoth Junction Site (Mno 382). Projectile point types recovered were Pinto Series, Elko Series, Gypsum, Eastgate Series, Humboldt Concave Base, Borax Lake, Desert Side Notched, Rose Spring Series and Cottonwood Triangular along with other chipped stone artifacts and Owens Valley Brownware. Michels' report (1965) compared the data from this site with Lanning's (1963) Rose Spring Site sequence for chronological purposes and to determine cultural similarities and dissimilarities. An occupation occurring from 5900 B.P. to historic times is suggested for the site (cf. Michels 1965:174, Appendix D this report for obsidian hydration details).

D.R. Tuohy (1969b) of the Nevada State Museum has reported on the presence of two winter houses near Masonic in Mono County attributable to historic Kuzedika Paiute occupation. The houses contained glass trade beads, Desert Side Notched, Cottonwood Triangular and Rose Spring Contracting Stem projectile points. Elko and Pinto Series points were reported collected in the near vicinity.

Grace and Rollin Enfield's (1964) detailed report on Mammoth Creek Cave in the Sierra Nevada of Mono County presents an unstratified, proto-historic/historic campsite including Desert Side Notched and Owens Valley Brownware among the material culture assemblage. An earlier occupation with expanding stem, triangular and Gypsum-like points is mentioned but not elaborated on. Comparisons are made with other surface collections from the surrounding areas.

G.R. Mead (1967) reports on an unique lithic artifact (an 'elongate triangular biface') from Owens Valley and Mead and J. Smith (1967) present a descriptive analysis of microtools from Iny 126 near Olancha. Price (1963b) discusses a number of archaeological reconnaissance surveys in the vicinity of the Cole-

ville Planning Unit as well as reporting on several amateur collector's collections from Topaz Lake.

Academic research or pure 'non-directed' research fades from interest in the 1970's with a few notable exceptions. Applied research or 'other directed studies' primarily concerned with environmental impact assessments and/or cultural resource management dominate the bulk of archaeological research within the planning unit boundaries and vicinity.

A number of reports of varying quality have been prepared for areas within or adjacent to the planning units by both academic institutions and private/government contractors. The California Department of Transportation (CALTRANS) is notable among the various public agencies for the number of reports it has commissioned. Ann S. Peak of Peak and Associates has completed a number of test surveys and test excavations both in Owens Valley (Peak 1974a-d, 1975a-d) and the Mono Basin (Peak 1975e, Peak and Gerry 1976). No significant findings have been realized from this 'research' although it has added to known data and may be valuable for locational analysis studies. Dr. C.N. Warren of the University of Nevada, Las Vegas, under contract to CALTRANS, has a preliminary report on a highway survey near Bishop with 28 sites identified and 14 investigated (Warren 1975). Several sites are extensive and stratified, possibly major village locations, but funding has not been allocated for the final analysis. Based on his preliminary data, Warren (1975) has defined 4 chronological phases for the sites.

Table 11

Warren Chronology - Bishop Area

I. Pre-Paiute: Elko, Humboldt Concave Base projectile points; ca. A.D. 1 - A.D. 500

II. Prehistoric Paiute: Small stemmed and triangular projectile points (Desert Side Notched, Cottonwood Triangular) and Owens Valley Brownware; A.D. 500 - A.D. 1840.

III. Historic Paiute: Addition of European material to prehistoric Paiute material; ca. 1840 A.D.??

IV. Acculturated Paiute: Late 1800's to ca. 1935.

Roger Cook (1976) of CALTRANS has conducted excavations at Mno 584, the Sherwin Grade Site and has reported on an artifact collection with no time sensitive artifacts present. A radiocarbon date of 455 $\pm$ 140 years is available from a possible pine roasting pit. Alan Garfinkel of CALTRANS is currently preparing a final report on the site (Garfinkel, personal communication, 1979). Additional excavation at the site yielded an artifact assemblage containing Desert Side Notched, Cottonwood Triangular, Rose Spring Corner Notched, Humboldt Basal Notched, Borax Lake, Humboldt Concave Base-B, and large side notched projectile points. This site has been interpreted as a late spring through fall occupation with typical base camp locality activities. A chronological time span of 5000 years has been postulated with the first 50 cm of deposit falling between A.D. 500 to historic times and material below 50 cm as

ca. 3000/1500 B.C. to A.D. 500. This site is typical of the Inyo-Mono region and the report adds a great deal to the prehistoric data base and interpretations available for the area.

Dr. L.E. Wildesen and C.A. Mortlund (1973) of the University of California, Riverside, have discussed the location of an ethnographic village (pawona-witu) and aboriginal cemetery site on the South Fork of Bishop Creek confirming Steward's (1933) location. This site is now on the National Register of Historic Places. Dr. Nelson H. Leonard (1974) has filed a brief report on an archaeological reconnaissance at Mammoth Development but offers no real data or interpretation for future information.

The University of Nevada has conducted some cultural resource assessments in the planning units. Richard Brooks (1977) of the Las Vegas campus completed a cultural inventory of the five Indian Reservations in Owens Valley while R. Elston and C. Covington (1977) of the Reno campus have reported on an archaeological sampling of the Bridgeport Indian reservation. M. Hall (1976) of the University of California, Riverside has described another archaeological assessment on the Fort Independence Indian reservation. None of the above are of importance to understanding the prehistory but are significant in at least completing an inventory of areas not previously surveyed.

On adjacent Forest Service land in the Mammoth Embayment (vicinity of Benton Planning Unit) Jersey and Kuhn (1976) have presented the results of their archeological assessment as it pertains to geothermal resource exploration. Their view/interpretation of the prehistory and ethnography of the region, while unique, is of little utility in the greater understanding of the prehistory.

While research primarily concerned with fulfilling environmental mandates and directives has dominated the archaeology of the 1970's in the study area, there have been several notable exceptions to the general sterility of the cultural resource oriented research. Ms. Karen Nissen, University of California, Berkeley, is currently completing a computer aided analysis of rock art elements at several petroglyph sites in the western Great Basin. One of the sites, Mno-8, located on the Bishop Petroglyph Loop Tour, has been partially subjected to a careful recordation for inclusion in the computer analysis. Other areas surveyed for rock art during the 1974 season include the Red Rock Canyon area; Deep Wells Canyon and Highway 167 to Cedar Hills area (Mono Basin); Cottonwood and Bridgeport Canyons (N of Mono Lake); Murphy Spring Road to Bodie; Big Alkali area north of Bodie; and an intermittent survey along Highway 182 along the East Walker River to just east of Sweetwater Ranch. The results of this research will be available in Ms. Nissen's forthcoming doctoral dissertation (Nissen, personal communication, 1979).

Members of the University of California, Riverside have made several substantive contributions, both theoretical and empirical to the planning unit's prehistory. Initially concerned with the academic research potential in the area (cf. Bettinger and King 1971), Robert Bettinger and others from UC Riverside undertook a series of contract operations in the region starting in 1972 as a alternate means of obtaining funding for archaeological research (Bettinger, personal communication, 1979). This directed research (cf. Bettinger 1973a,b, 1977a, Cowan and Wallof 1974) formed a base for Bettinger's doctoral dissertation (1975a) that represents the beginning of

renewed academic interest in the prehistory and ethnography of both Owens Valley and the surrounding region.

Bettinger (1973a, 1977a) and Cowan and Wallof (1974) were principally concerned with establishing and testing a predictive site density and type model for the Inyo-Mono region. The theoretical model was originally formulated and tested by Bettinger (1973a, 1977a). Cowan and Wallof (1974) presented a practical application/test of Bettinger's model utilizing data from both an intensive archaeological survey and excavation mitigation project performed for a transmission line clearance in an area just east of Long Valley. "The research appears to have produced generally reliable site density estimates for the Inyo-Mono region . . . " (Bettinger 1977b:10) but further research and testing of the model should continue to increase its 'reliability' (cf. Bettinger 1977a,b).

Bettinger's doctoral research (1975a) was primarily directed at testing the utility of ethnographic-settlement-subsistence models (e.g., the "Desert Culture," cf. Jennings 1957, 1964, 1968) in explaining the distribution of a set of archaeological assemblages collected in Owens Valley. His analysis was directed towards assemblage modeling - the statistical comparison of the actual distribution of several artifact categories and features against a hypothetical set of distributions derived from ethnographic data available for the Owens Valley Paiute, and site taxonomy - the delineation of a site typology based on the various parameters of the sites including material culture assemblages, size and ecological setting. His reconstruction (Bettinger 1975a, 1976, 1977c) of the prehistoric man-land relationships through time in the Owens River drainage suggests a highly variable, somewhat specialized, prehistoric subsistence-settlement system sensitive to the action of both natural (e.g. climatic change) and cultural (e.g., population pressure due to immigration and natural increase) factors. Bettinger (1975a,1976, 1977c) has interpreted his data as indicating:

a. a shift in the emphasis of plant exploitation from riverine to desert scrub species between 1500 B.C. and A.D. 600 is reflected by a change in the location of the lowland occupation sites from predominantly riverine settings to desert scrub localities;

b. the inception of pinyon exploitation on a regular basis for subsistence occurred between A.D. 600 and A.D. 1000 as shown by the appearance of pinyon camps;

c. a decrease in large game hunting after ca. A.D. 1000 is reflected in the disuse of upland and desert scrub temporary camps used as hunting stations after that date.

Furthermore, Bettinger's research appears to indicate that the area acted as a unified whole with conditions in one locality having a reciprocal effect on the others (cf. Bettinger and King 1971). Some of the research has provoked some comment (cf. McGuire and Garfinkel 1976, Garfinkel, personal communication, 1979) and further research is planned, both directed and pure by Bettinger to resolve some of the questions and refine the models (Bettinger, personal communication, 1978).

Other researchers have also shown an interest in the area. Singer and Ericson (1977) have presented a detailed analysis of a Bodie Hills obsidian quarry near Mono Lake in regards to manufacturing and trade patterns with their relationship to California west of the Sierra Nevadas stressed. Their analysis of a sample of obsidian artifacts indicated that the peak of quarry production occurred between ca. 2200 to 300 B.C. (as dated by obsidian hydration); that the primary products were partially finished bifaces and unmodified prismatic blades exported for final finishing elsewhere; and that the amount of production suggests no more than seasonal and casual use by small groups of workers.

J. Ericson's dissertation (1977, also cf. Ericson 1978), while not primarily confined to the study area, has reported on various aspects of prehistoric exchange systems in California based on obsidian dating and trace element analysis. A large portion of his research is devoted to showing trade patterns over time for the several obsidian sources located in Mono County with other areas in California (cf. Jackson 1974 for a discussion of the obsidian trade with Central California - also cf. Appendix C this report).

The existing data base of archaeological information available for the planning units covers a wide variety of topics with varying degrees of 'quality.' While each individual study has some information value to offer, systematic research utilizing a clearly defined research design, similar to Bettinger's research, and built upon the previous research efforts, will ultimately prove to be of the most value in further analytic studies of the area's prehistory.

Notes

1. We are aware of two other studies within the region that may be of value to the planning unit's prehistory. W.L. Tadlock (Long Beach State University) conducted research at the Fish Hatchery (possible excavation??) during the mid 1960's. This research is reportedly on file at Long Beach State University but we were unable to obtain a copy for research purposes. Clay Singer, UCLA, and a colleague also reportedly conducted an archaeological reconnaissance in the Alabama Hills (?) during 1961 with the report on file at UCLA. Again we have received no response to our request for a copy from UCLA.

2. The final report on the Sherwin Grade has since been issued by CALTRANS (Garfinkel and Cook 1979). Interested readers should consult this report for further detailed information on the site.

3. In reference to the Tadlocks' work at CA-Mno-611 (Tadlock and Tadlock 1972), the following communication has been received from Jean Tadlock (personal communication, 1979).

> "We are just now in the process of analyzing materials from the past two seasons work. By correlating geologic data with the strata, the site appears to date from the post-Pleistocene pluvial period to historic. Projectile points include those which resemble Cottonwood Triangular, Rose Spring, Eastgate, Desert Side Notched, Martis, Elko, Pinto, Humboldt, and "short and stubby" lanceolate projectile points above iron pan-blue glacial clay podsoils. The final analysis and report should be completed soon."

4. The U.S. Forest Service, Toyiabe National Forest, has recently made available a series of reports concerned with the archaeological inventory of several forest management units in the Sweetwater Mountains (between the Coleville and Bodie Planning Units). This inventory recorded a number of sites attributed to Great Basin Archaic to Historic times. The report should be consulted for additional data (Seelinger 1978).

A Cultural Sequence for the Coleville/Bodie/Benton/ Owens Valley Planning Units.

Introduction

The past twenty years or so have seen a re-examination and reorientation of the goals and aims of North American archaeology. These changes in direction, or more correctly emphasis, have been viewed by some practitioners in the field as "New Archaeology" (cf. Leone 1972) concerned mainly with a change from the more traditional or normative view of reconstructing culture history to a concentration on questions of a more processual nature. Anthropological archaeology is concerned with past cultures. Most, if not all archaeologists, would agree that they are striving to achieve three related ends:

(1) the reconstruction of culture history;
(2) the detailing of the daily lifeways of earlier cultures; and,
(3) the elucidation of cultural process in a broader sense with emphasis on the dynamic aspects of culture (Deetz 1970:115).

These three goals are in no sense mutually independent and all are in some way interrelated to a degree. That is to say, ". . . it would seem that the essential first step in achieving such an end (i.e., the precise and reliable description of the outlines of prehistoric societies) would be the development of techniques for generating reliable, synchronic cultural descriptions from the past. These in turn permit insights concerning process . . . and the understanding of process leads to sound and detailed cultural history (Deetz 1970: 116)."

As Deetz (1970) and others have pointed out (cf. Binford 1962, 1968; Longacre 1970; Redman 1973; Rouse 1973; Watson et al. 1971; among many others), these three aims of archeology are but steps in a mutually dependent process which must have accurate historical reconstructions (cf. Sabloff and Willey 1967; Flannery 1967; Thompson 1972) upon which to base any subsequent questions of a processual nature. If archaeologists are to accomplish their goal of presenting data on past societies or cultures as well as explaining prehistoric human behavior, an integrative combination of past techniques melded with recent innovations in method and theory must be brought into play for the most fruitful results.

The information presented below falls into the 'elementary data' category (cf. Thomas 1970:54) of culture history. This data is provided in order that further and future research questions can be formulated in the context of 'established' and 'reliable' cultural sequences for the area. The chronological context presented here can serve as a baseline for future work as well as offer further research possibilities and opportunities for archaeologists.

A number of archaeological cultural sequences for the study area have been proposed by various researchers (cf. Davis 1963, 1964; Bettinger 1975a; Warren 1975; Bettinger and Taylor 1974; Lanning 1963; Clewlow, Heizer and Berger 1970; Elston 1971; Borden 1971; Hester 1973; among others) with

the majority offering some correspondence in temporal overlap although often not in name. The sequences present a number of chronological periods with discrete attributes assigned to the cultures present. Some offer fine refinements of the temporal scale by dividing various periods into phases. Projectile points, occasionally supported by other temporally relevant evidence, serve as the main basis for the various researchers' postulated chronological periods since they have been shown by a number of archaeological researchers (cf. Heizer and Hester 1978) to have significant value as temporal indicators or 'fossil directeurs.'

Our cultural sequence(s) will essentially follow those proposed by Hester (1973) in his overview of Great Basin chronology. The study area's chronologies fall within the Western (Coleville and Bodie Planning Units) and Southwestern (Benton and Owens Valley Planning Units) Great Basin subareas as described by Hester (1973) (Figs. 31-33).

Pre-Projectile Point Culture(s)

The possibility exists, however remote, that archaeological materials predating the tenuous fluted point tradition (see below) have been or are being recovered (cf. Davis 1978) from within the study region and surrounding area although their definition and chronology have yet to be accepted by the professional archaeological community (cf. Meighan 1978). These materials, believed to occur before the established period of man's occupation of western North America (cf. Meighan 1978), have been assigned to the Pre-Projectile Point Stage, a hypothesis of some considerable controversy in New World prehistory (cf. Willey and Sabloff 1974 for an overview). It has been proposed by a number of researchers (Krieger 1962, 1964; Willey and Phillips 1955, 1958; MacNeish 1958, 1961, 1962, 1976; Jennings 1964; Irwin-Williams 1967, 1968; Cressman 1968, 1977; Rouse 1976; Bryan 1965, 1969, 1978 (ed.)) that there is a stage in New World prehistory which predates the production of projectile points or 'well-flaked' bifaces. This period is felt to have Old World late Paleolithic origins and to date sometime prior to 20,000 years B.P. Pre-projectile point proponents assume that points were not included in the tool kits of the people utilizing the Bering Land Bridge for movement to North America. At present, evidence of early cultures in the New World is questionable and undateable (cf. Haynes 1969a-b, Hester 1973, Wendorf 1966), although it remains a possibility that one of the claimed pre-projectile point sites may prove to be ancient. An excellent review of the sites and their assemblages is available in Glennan (1972) for southern California (cf. also Bryan 1978 (ed.)).

An early occupation of the Mono Basin has been alluded to by E.L. Davis (1964:271) who has postulated the existence of a hypothetical "Generalized Paleolithic, hunting/gathering culture, without stone points." No data are available either from or in the vicinity of the planning units to currently support the presence of a pre-projectile point stage in the cultural sequence.

The subsistence adapation of any groups present in the area during this period would have emphasized frequent movements by independent family groups oriented to an unspecialized hunting/gathering lifeway - an economy and social structure probably not dissimilar to that known for the ethnographic Mono Lake Paiute groups.

In summary, there are no real data on possible pre-projectile point materials in the planning units or nearby surrounding region (see Davis 1978). It is doubtful, based on the present archaeological knowledge of the region, that remains of this type will be recovered during any future research.

Fluted Point Tradition

Surface provenience finds of fluted projectile points, typologically similar to the Clovis and Folsom points of the Great Plains and Southwest, have been reported throughout the Great Basin with frequent finds occurring in western and southern Nevada and in southeastern California (Hester 1973: 123; Warren and Ranere 1968:9; Tuohy 1965, 1968, 1969a; Davis and Shutler 1969; among others). Fluted points have usually been found along post-Pleistocene lake shores and in their near vicinity often in association with crescents (Great Basin Transverse Points, cf. Heizer and Hester 1978), gravers, borers, and lanceolate stemmed projectile points (Tadlock 1966:664-665; Davis and Shutler 1969:156; Hester 1973).

Fluted points have been reported by Davis (1963, 1964) for the Mono Basin and the Bodie and Benton Planning Units (cf.Walter 1970). Davis (1964:Table 7) in her 'tentative sequence of weapon points from the Sierra Piedmont' presents a series of points which includes Sandia, Lake Mohave, Folsom and lanceolate styles at the bottom of the sequence (as interpreted by Hester 1973:89). These points have been combined into her "Hunting Tradition I and II"which 'shows influence from the Great Plains' (Davis 1964:274). Pinto, Silver Lake, "Folsom derived," and Gypsum points are mentioned as occurring at high altitude sites overlooking the Mono Lake basin (Davis 1963). Dixon (1953) has reported the possible presence of Sandia points as well for the Mono basin.

Fluted points in the Owens Valley Planning Unit are known from the beaches of pluvial Owens Lake (Amsden 1937; Campbell 1949; Davis 1963; Bryan 1965; and Walter 1970) with a tentative sequence of Lake Mohave-Fluted-Lake Mohave-Pinto being suggested for the point distribution of the area by Bryan (1965: 151-152). To the south of Owens Lake several fluted points have been noted by Warren and Ranere (1968) for the Little Lake area while a number of researchers (Campbell and Campbell 1940, Campbell 1949, Tuohy 1968) have reported on fluted points in the Tonopah area in the central Great Basin. No fluted points are known from the Coleville Planning Unit area as of this writing.

Temporal placement of these surface provenience projectile points has not been well documented. Their association with later materials is a definite possibility. The fluted points in the Great Basin are generally thought to be coeval with the Great Plains or Southwestern points dating to ca. 8000-10,000 B.C. (Meighan 1963; Haynes 1964, 1969a; Bryan 1965; Tuohy 1968; Meighan and Haynes 1968, 1970a-b; Davis and Shutler 1969; Davis 1970; cf. Rohn 1978 and Caldwell and Henning 1978). As noted previously, a number of the fluted points have been found in apparent association with assemblages attributed to the 'later' Western Pluvial Lakes Tradition dated at 9000-6000 B.C. by Hester (1973:62-65). In view of the chronological problems with the fluted points, future research must "firmly establish both their temporal span and cultural association in the Great Basin" (Hester 1973:62).

A problem with the interpretation of the various fluted point finds is

the ongoing controversy over whether or not these artifacts represent an early "big-game hunting complex" analogous to the big-game hunting tradition known for the Great Plains and Southwest. The argument of the various interpretations is centered around the degree of inferrable association of fluted points with the procurement of extinct megafauna, an association which has yet to be adequately demonstrated in a stratigraphic context, or for that matter, any context, for the Great Basin (Wallace 1962; Baumhoff and Heizer 1965; Heizer and Baumhoff 1970; Hester 1973:62; cf. Tuohy 1974; Wilke et al. 1974).

Heizer and Baumhoff (1970) see belief in a ". . . free-roaming, big-game hunting (Tuohy 1968:31) pattern as a 'statement of faith and not of fact" (1970:1) in contrast to Tuohy's view (1968) on the subject, who has proposed the appellation of Western Clovis Tradition (Tuohy 1974) in opposition to the Fluted Point Tradition of Hester (1973). While not dismissing the possibility of a big-game hunting pattern in the Great Basin, Heizer and Baumhoff (1970:7) note that ". . . the close association of transverse points and early projectile point forms such as noted by Clewlow (1968), Tuohy (1968) and Shutler and Shutler (1959) with lake basins seems to hint at a lacustrine rather than a big-game hunting economy in the western Great Basin about ten millennia ago." At present, no strong casecan be made for big-game hunting having occurred in the study region although research by E.L. Davis (1975, 1978) has suggested that surface evidence from China Lake to the southeast of the Owens Lake may indicate the association of both fluted points and extinct megafauna. The results of this research will be awaited with some interest.

Further controlled archaeological investigation, centered on the identification, distribution and assemblage analysis, in both the Mono basin and Owens Lake areas of the planning units, may provide analytical data that would aid in the interpretation and clarification of fluted point occurrences in the western and southwestern Great Basin.

Western Pluvial Lakes Tradition

The Western Pluvial Lakes Tradition was defined by Bedwell (1970:231) to refer to ". . . a general way of life directed toward the . . . exploitation of a lake environment." Using data from his research in the Fort Rock Valley, Oregon a temporal range of 9000-6000 B.C. was proposed for this lacustrine adapted tradition. A number of early assemblages in the Great Basin associated with pluvial lake shores have been included within this tradition including, "Lake Mohave," "San Dieguito," "Western Lithic Co-Tradition," "Hascomat," and "Fallon Phase" (cf. Hester 1973:62). In the southwestern and western Great Basin the Western Pluvial Lakes Tradition is represented by the Lake Mohave/ San Dieguito Complex (Owens Valley, Mohave Desert, Death Valley, Mono Lake) (Figs. 31-33).

Lake Mohave and Silver Lake projectile points have been recorded for the Mono Basin area (Davis 1963, 1964; cf. Walter 1970) and in the Little-Lake/ Owens Valley vicinity (Harrington 1948, 1957; Campbell 1940; Riddell and Riddell 1956; Lanning 1963; Davis 1964; Bryan 1965; Walter 1970).

The Lake Mohave complex was initially defined by the Campbells (1937) for an assemblage characterized by sand blasted projectile points and artifacts in the vicinity of Lake Mohave in the eastern Mohave Desert. Occurring on

the shore lines of fossil Lake Mohave and in an area essentially equivalent with the outlet channel of Silver Lake at its northern end, this complex is characterized by the absence of milling equipment and the presence/dominance of percussion flaked tools. Known best for its diagnostic Lake Mohave and Silver Lake projectile points (cf. Amsden 1937, Heizer and Hester 1978) the complex also contains hammerstones, unifacial and bifacial tools, choppers, scrapers, knives, crescentric stones, drills and leaf-like blades. The Lake Mohave complex has been interpreted as representing a subsistence pattern focused on hunting with little emphasis on seed gathering or fishing although this has yet to be demonstrated in a stratigraphic context (cf. Amsden 1937:90-92). While chronological interpretations of this complex have been seriously debated by a number of researchers (cf. Warren and DeCosta 1974; Warren and True 1961; Heizer 1965, 1970; Warren 1967; Warren and Ore 1978 among many others) the currently accepted time span is 8000-6000 B.C. (Warren and True 1961; Warren 1967; Wallace 1962; cf. Hester 1973) which corresponds with Bedwell's (1970) range of 9000-6000 B.C. for the Western Pluvial Lakes Tradition, thus indicating a probable occupation of the various planning units during this period (Figs. 31-33).

The "San Dieguito Complex" has been defined by Warren (1967) who has grouped a variety of sites, localities and complexes associated with pluvial lakes into this complex, among them materials from an ancient beach on Owens Lake (Antevs 1952; Campbell 1949) and Mono Lake (Davis 1963, 1964). San Dieguito type materials include "leaf-shaped knives of several varieties, small leaf-shaped points, stemmed and shouldered points generally termed 'Lake Mohave and Silver Lake, "ovid, large domed and rectangular end and side scrapers, engraving tools, and crescents" (Warren 1967:177). A generalized hunting tradition has been postulated as the economic pattern. Chronologically the San Dieguito complex ranges from between ca. 2000 B.C. for coastal sites to over 7000 B.C. for the Lake Mohave artifacts at Owens Lake (Warren 1967; cf. Irwin-Williams 1968:50).

The Western Pluvial Lakes Tradition has been offered as an 'umbrella' period for a number of regional cultural expressions localized along pluvial lakeshores in the Great Basin and California. Among these local expressions are the Lake Mohave and San Dieguito Complexes known to occur in both the Owens Valley and the Mono Basin of the four planning units. There is some debate on the degree of economic orientation of the Western Pluvial Lakes Tradition with some researchers advocating a lacustrine adaptation of seed gathering, hunting or a combination of these (cf. Jennings and Norbeck 1955; Jennings et al. 1956; Jennings 1957, 1964; Rozaire 1963; Heizer 1964, 1966; W. Davis 1966; Clewlow 1968; Heizer and Baumhoff 1970; Hester 1973) while other scholars suggest a hunting tradition basing their argument in part on the absence of artifacts attributable to lacustrine and/or seed gathering activities (cf. Amsden 1937, Rogers 1939, Wallace 1958, Hunt 1960, Warren and True 1961, Warren 1967, Warren and Ranere 1968, Tuohy 1968, 1970). Further archaeological research in the planning units can be oriented towards clarifying some of these problems associated with the Western Pluvial Lakes Tradition. Artifact distributions, geological (esp. stratigraphic) and archaeological associations and culture significance could be emphasized in any future problem oriented research in the region.

Great Basin Archaic

Hester (1973) in his discussion of cultural chronology in the Great Basin considered the possibility of an occupational hiatus (?) occurring in the southwestern Great Basin (the Altithermal in the western Great Basin) ca. 6000-4000 B.C. (1973:Fig. 25). This temporal span of ca. 2000 years falls between the end of the Western Pluvial Lakes Tradition (ca. 9000-6000 B.C.) and the period Hester has termed the Great Basin Archaic (ca. 4000 B.C. - A.D. 250). A number of researchers (Wallace 1962; Kowata 1969; Hilldebrand 1972; cf. Baumhoff and Heizer 1965) have suggested that this 'gap' in the archaeological record may be related to postglacial climatic change,specifically the Altithermal as perceived by Antevs (1948, 1953, 1955). The Altithermal, persisting from ca. 7500-4000 B.P. (Antevs 1955) has been characterized as a hot, dry period in the literature,although various lines of evidence now indicate that the climatic conditions of the Altithermal were not different from those of the present (Mehringer 1977, cf. Moratto et al. 1978). The change in temperature was not very great, but it represents a change in climate that was significant enough to cause the desiccation of most of the post pluvial lakes in the Great Basin and presumably had adverse effects on man-land relationships. As Jennings (1968:60) has noted, ". . . that there was heat is not debated, its significance for man is at issue" (cf. Baumhoff and Heizer 1965:706).

Various scholars have suggested that the gap may be a function of site discovery and that " . . . these apparent breaks in the sequence are of restricted and local significance and represent no significant period of regional abandonment (Jennings 1968:87)." For the southern planning units, Bettinger and Taylor (1974:14) feel that there is no "archaeological or chronological evidence" to substantiate an Altithermal derived abandonment of the southern California deserts (cf. Bettinger and Taylor 1974:Fig. 1). Data from the planning units to the north of Owens Valley is somewhat lacking,but apparently the sparse archaeological record has no real indication of an "occupational hiatus" although the presently known data base indicates a little utilization of the areas during the 'hiatus' (cf. Davis 1963, 1964, Elston 1971, Elston et al. 1977, cf. Moratto et al. 1978).

The term "Great Basin Archaic" as proposed by Shutler (1961:69, 1968:24) and modified by Hester (1973:125-26) represents the varied archaeological remains present in the Great Basin between ca. 5000/6000 B.C. and ca. A.D. 500/600. The Great Basin Archaic combines and emphasizes the contemporaneity of the "Desert Culture" (Jennings 1957; Jennings and Norbeck 1955; Jennings 1973) and "Lacustrine" (Heizer and Krieger 1956; Rozaire 1963; Cowan 1968; Napton 1969; Heizer and Napton 1970) subsistence adaptations. A number of local designations are known for the archaeological manifestations occurring in or in the near vicinity of the various planning units during this period. For the western Great Basin the Great Basin Archaic includes the Spooner Complex and the Martis Complex (both in the east central Sierra Nevada, cf. Elston 1971, Elston et al. 1977) and the Elko, Pinto and Humboldt materials from the Mono Basin (Davis 1963, 1964). In the southwestern Great Basin, the Little Lake Phase (Harrington 1957), the Mohave, Little Lake and Newberry Periods (Bettinger and Taylor 1974, cf. Bettinger 1975a) and the Early and Middle Rose Spring Phases (Lanning 1963) can be subsumed under the Great Basin Archaic (Figs.31-39).

East Central Sierra Nevada (Figs. 31, 33, 37, 38)

Severe problems exist with extending areal chronologies developed for small areas to larger regions in order to develop a chronological or cultural sequence. This is especially true for the Coleville Planning Unit as it remains almost totally unknown archaeologically. Some ethnographic evidence exists indicating either Northern Paiute or Washo, or both, occupation and use of the unit. Archaeological research in the east central Sierra Nevada has been centered on the areas bordering the Lake Tahoe region (cf. Heizer and Elsasser 1953, Elsasser 1960, Elston 1971, Elston et al. 1977 among others). This research has seen the development of a local regional chronological sequence.

One of the major problems in the archaeology of the eastern Sierra and western Great Basin has been the inability to obtain a cultural sequence with fine structure. The general sequence is 'reasonably known',but the internal details of many of the major phases have remained indistinct and open to some speculation. For example, we have tried to present a brief outline of the various phases proposed for the general region in the vicinity of the Coleville unit and by extension have indicated that these phases may be found within the study area boundaries if any archaeological research is ever conducted. It must be stressed that the Coleville unit is archaeologically unknown, at least in the published literature available for our research. At present, a cultural sequence cannot be constructed for the unit. We can only speculate and make informed guesses. As well, the phases proposed for the surrounding region are still in the process of being refined (and redefined) by various researchers. R. Elston and his colleagues at the University of Nevada, Reno have contributed an impressive body of data on the possible phases that may apply to the Coleville unit (Elston 1971, Elston et al. n.d., Davis, Elston and Townsend 1974, Elston and Townsend 1974, Elston et al. 1977, cf. Moratto et al. 1978) but even this material is in a state of flux, especially in regards to chronological boundaries (cf. Elston 1971 versus Elston et al. 1977 on the chronology and descriptions of the Spooner, Martis and King's Beach complexes). In view of the problems with the data, we have elected to describe only general data on the phases/complexes and their chronological boundaries that may be found in the Coleville unit rather than neglecting it entirely. We must caution that these conclusions are only tentative and based not on direct archaeological evidence from the unit but from extensions of data from other others. The reader is referred to the specific data and arguments presented in Elston (1971) and Elston et al. (1977, and the references contained therein) for a review of the problems concerning the cultural sequence of the east central Sierra Nevada.

The Spooner Complex

The "Spooner Complex" has been defined by Elston (1971, cf. Elston et al. 1977) as an early cultural manifestation dated at ca. 5000/3000 B.C. to ca. 2000 B.C. based on his excavations at the Spooner Lake and Daphne Creek sites in the east central Sierra Nevada region. This "extremely hypothetical" complex (Elston 1971:135, cf. Elston et al. 1977:20) is noted for the presence of Humboldt Concave Base and Pinto projectile points as well as the occurrence of manos and metates. Evidence of the complex is currently confined or covers the area containing the headwaters and upper courses of a number of rivers. Elston (1971:136) originally theorized that the Spooner Complex represented a period of colonization in an Altithermal refuge area by peoples who formerly

occupied the more interior region of the Great Basin. Further research has indicated that this conclusion may be premature as there is no conclusive evidence that the interior Great Basin was abandoned during the Altithermal (cf. Elston 1976). This complex is viewed by Elston (1971:137) as a Great Basin population starting to exploit a new environment - the Sierran Transition Zone. At present, concrete cultural differences between the Spooner Complex and the succeeding Martis Complex still remain to be demonstrated with the only documented differences known for the projectile point morphologies.

Martis Complex

The Martis Complex, originally defined by Heizer and Elsasser (1953) and refined by Elsasser (1960), is characterized by a basalt working industry dominated by large heavy projectile points noted for their wide range in form. Elston (1971) originally divided the Martis Complex into two phases based on his excavations at the Spooner Lake and Daphne Creek sites. Further research in the Tahoe Reach (Elston et al. 1977) has lead to a division into the Early (1500 B.C. - 2000 B.C.), Middle (500 B.C. ? - 1500 B.C.) and Late (A.D. 500-500 B.C.?) Martis. All phases are dominated by Elko and Martis series projectile points along with the Sierra Stemmed Triangular type. This complex marks the first intensive occupation of the central Sierra Nevada and is seen by Elston (1971) as being derived from a similar Basin oriented culture as the Spooner Complex. However, Elston (1971:137) also notes that the Martis Complex represents a specialization in the exploitation of the Transition Zone with the possible development of some of the transhumant patterns known for the ethnographic Washo. Other diagnostic artifacts known for the Martis Complex are key-shaped drills of basalt and chert, obsidian flake knives and scrapers, shaped biface manos, large basalt bifaces, and basin metates (sometimes in bedrock). The associated assemblages of the various phases are fairly homogeneous while, as noted previously, the point styles are highly varied (cf. Elston 1971, Elston et al. 1977). Recent data on the Martis Complex is presented in Elston et al. (1977).

Mono Basin (Fig. 31)

The Great Basin Archaic is well represented in the Mono Basin area (Davis 1963; 1964, Enfield and Enfield 1964; cf. Walter 1970). A number of phases have been recognized by Davis (1964) although these are not really adequately defined in her report nor are any chronological boundaries given.

> "We do not know the relative periods during which these traditions spread from area to area or bloomed locally. We also do not know the amounts of time lag involved (Davis 1964:272)."

A review of the sequence (Davis 1964:271 and Table 7) indicates that the following phases can be placed into the Great Basin Archaic period as defined by Hester (1973).

Hunting Tradition I	Large points, with simple forms principally foliate and lanceolate
Modified Desert Culture I (continued hunting, growing emphasis on milling complex)	Large points with elaborate bases. Beginning of side-notching. (Pinto, Humboldt series ???)

Modified Desert Culture II (gathering, less hunting, emphasis on small seeds)	Smaller dart points with developed barbs, tangs, corner notches (Elko Eared types)

Future archaeological research, especially from stratified rockshelters (e.g., the shelter excavated in the early 1960's at Lake Crowley) and controlled surface collections in the area, may allow a refined chronological/cultural sequence to be defined.

Owens Valley (Figs. 32, 33, 34, 35, 36, 39)

The Owens Valley has yielded excellent chronological data for the southwestern Great Basin based in part on a number of archaeological research projects. A number of periods and phases are described in the literature for the Great Basin Archaic in this region. Lanning's (1963) report and analysis of the Rose Spring site to the south of the Owens Valley Planning Unit helped define the temporal niches of several widespread projectile points,thus making them useful as temporal markers both in the Owens Valley and elsewhere in the Great Basin (cf. Heizer and Hester 1978, Hester 1973). A number of phases, including the Lake Mohave (classified as hypothetical by Lanning (1963)), Little Lake and Early and Middle Rose Spring phases are included within the Great Basin Archaic (cf. Fig. 33) as defined by Hester (1973). The Rose Spring site report should be referred to for specifics on Lanning's periods. Michels'(1965) report on the Mammoth Junction site (see History of Archaeological Research, this report) presents an application of 'fitting' Lanning's (1963) periods to a site in Owens Valley.

Bettinger and Taylor (1974) have recently proposed to divide the Great Basin Archaic of interior southern California as presented by Hester (1973) into a number of periods subsumed under the rubric of Southern Great Basin Series. These periods are based solely on chronological significance and imply no social or cultural significance. Three of these periods, the Mohave, Little Lake and Newberry, fall within Hester's (1973) Great Basin Archaic Division (Fig. 33).

The Mohave Period is marked by the presence of Lake Mohave and Silver Lake projectile points. The quality of the presently available chronological data for these two point types does not allow for their utilization as time markers, and Bettinger and Taylor (1974) have assumed the Mohave Period to have begun before 6000 B.C. based on the available information (cf. Heizer and Hester 1978 for a chronological overview of Great Basin projectile points).

The Little Lake Period is characterized by "Pinto" projectile points and dates from ca. 4000 B.C. to 1200 B.C. although some students of Great Basin prehistory have noted that the term "Pinto" is rather loosely applied and broadly defined (cf. Layton 1970, O'Connell 1971, Heizer and Hester 1978).

The Newberry Period is characterized by the Gypsum Cave and Elko projectile point forms,and Bettinger and Taylor (1974) have set the chronological boundaries for this period at 1200 B.C. to A.D. 600.

Within these broad general periods Bettinger (1975a)has noted two phases

based on his research in the Owens Valley. These phases currently apply only to the Owens Valley area, although with future research they may be extended and applied to other areas. The Clyde-Cowhorn Phase has been proposed as occurring between 4500 B.C. and A.D. 600. It represents an early phase of prehistoric occupation of the Owens Valley with a wide range of settlement types occurring (Bettinger 1975a). The archaeological evidence from this phase in Owens Valley indicates a shift in the location of occupation sites from typically riverine localities to predominantly desert scrub zones during the latter half of the Clyde-Cowhorn Phase (1500 B.C. - A.D. 600) (Bettinger 1975a). Data from the Stahl Site at Little Lake (Harrington 1957) apparently indicates an early use of riparian resources similar to the riverine occupation sites from Owens Valley, while the later dated Rose Spring site appears to be more representative of the use of desert scrub resources. This change in resource emphasis apparently conforms to the land use pattern interpreted for the Owens Valley. Bettinger (1975a) sees these region wide changes as occurring between the Clyde Phase (4500 B.C. - 1500 B.C.) and Cowhorn Phase (1500 B.C. - A.D. 600).[1]

In summary, the Great Basin Archaic has been characterized in general as an assortment of relatively similar material culture traits, especially in lithic artifacts, occurring between 5000/6000 B.C. and A.D. 500/600. Characteristic projectile points are Silver Lake, Humboldt, Pinto, Gypsum or Elko series points (Hester 1973:126). Previous research has indicated the presence of several economic patterns with the aboriginal inhabitants utilizing both desert and lacustrine resources as well as mountain environments. Future archaeological research in the planning units might possibly improve the definition of Great Basin Archaic sites in regards to chronology and related assemblages especially in the northern planning units where the record is poorly known. Detailed research may also indicate site elevational and ecological relationships during the early Great Basin Archaic that may be different when compared to information from its later stages.

Rose Spring-Eastgate Complex

The Rose Spring-Eastgate Complex is set apart from previous complexes on the premise that projectile points of the Rose Spring and Eastgate series (cf. Heizer and Hester 1978) represent the introduction of the bow and arrow into the Great Basin (cf. Lanning 1963:268). Hester (1973:126) notes, "With the appearance of these two points, the larger dart point forms previously in use appear to have subsided in popularity, and in some instances, disappeared altogether." With respect to subsistence patterns during this period, Hester (1973:126) states that there is no conclusive evidence that the introduction of the bow and arrow brought about any significant economic changes. This statement may be open to some question as Grant et al. (1968:112-115) have hypothesized that the bow and arrow increased the efficiency of bighorn sheep hunters in the Coso Mountains and ultimately caused the decimation of the sheep in this area. The increased technological advantage offered by the bow and arrow in hunting the existing game may correlate with lexicostatistical data (cf. Lamb 1958) indicating a population shift from the northern Mohave desert, ca. A.D. 900/1000, to other regions.

Local phases that may be included under the Rose Spring-Eastgate Complex are the Early Kings Beach (Elston 1971, Elston et al. 1977), materials from sites in the Mono Basin (Davis 1963, 1964, Enfield and Enfield 1964, cf. Walter 1970), and the late Rose Springs phase (Lanning 1963) in Owens Valley

as well as the Haiwee Period of Bettinger and Taylor (1974) for interior southern California and the Baker Phase recognized by Bettinger (1975a) for Owens Valley. Hester (1973) dates this complex as occurring between A.D. 500 to A.D. 1000/1200 (Fig. 33).

East Central Sierra Nevada

Early Kings Beach Complex

The Kings Beach Complex, as originally defined by Heizer and Elsasser (1953), has been refined by Elston et al. (1977) into two phases spanning the period from ca. A.D. 500 to the ethnographic present. The complex is characterized by a preference for chert and obsidian as raw materials in contrast to the Martis Complex use of basalt. The use of the bow and arrow is inferred from the small projectile points present. Formal or specialized chipped stone tools are rare while the use of modified flakes for general purpose cutting and scraping tools is common. Manos and metates were used with the bedrock mortar (Heizer and Elsasser 1953) and the hopper mortar (Elston 1971) thought to be diagnostic. Elston et al. (1977) remark that the paucity of Kings Beach artifacts in comparison to those of the Martis Complex, as well as their technological simplicity, may reflect both smaller populations and a simpler social structure. Permanent base camps and winter villages are not as intensively or regularly used as are similar Martis sites,perhaps implying a different land-use pattern. This change in subsistence strategy has tentatively been linked by Elston et al. (1977) to climatic change (cf. Moratto et al. 1978).

The Early Kings Beach Complex is separated from the Washo-Late Kings Beach Complex by the presence of Rose Spring and Eastgate projectile points. The Early Kings Beach complex has been tentatively dated from ca. A.D. 500 to A.D. 1200.

Mono Basin

The Rose Spring-Eastgate Complex can be recognized in the Mono Basin area (Davis 1963, 1964; Enfield and Enfield 1964; cf. Bettinger 1976; Walter 1970). A review of the sequence presented by Davis (1964:271 and Table 7) indicates that the following phase can be placed in the Rose Spring-Eastgate Complex as defined by Hester (1973).

Modified Desert Culture III (advanced plant exploitation, beginning agriculture, some areas? Introduction of bow.)	Points are smaller, long and delicate with side notches and expanding tangs. (Rose Spring series??)

Owens Valley

Lanning's (1963) Late Rose Spring Phase (A.D. 500 - A.D. 1300) from the Rose Spring site is included in the Rose Spring-Eastgate Complex and is marked by the presence of Cottonwood Triangular, Rose Spring Corner Notched and Eastgate Expanding Stem projectile points.

The Haiwee Period of Bettinger and Taylor's (1974) interior southern California sequence can be included as well in Hester's (1973) Rose Spring-Eastgate Complex. This period, dated between A.D. 600 to A.D. 1300, is marked by the appearance of Rose Spring and Eastgate Expanding Stem projectile points. Within the Haiwee Period, Bettinger (1975a, 1976) has recognized the Baker

Phase for the Owens Valley. The Baker Phase, dating from A.D. 600 - A.D. 1300, saw the introduction of pinyon exploitation as a major subsistence strategy before A.D. 1000 and a marked decrease in the importance of big game as a subsistence resource after A.D. 1000 (Bettinger 1975a, 1976). A number of arguements have been advanced by Bettinger (1975a, 1976) to account for these changes with climatic change, population increase through either natural increase or migration (cf. Lamb 1958) and conflict with the scheduling of irrigation activities as foremost. Man-land relationships during the Baker Phase were similar to those described for the known ethnographic groups of Owens Valley (cf. Ethnography Section, this report).

Late Prehistoric Complex

The Late Prehistoric Complex has been defined by Hester (1973:127) as "the introduction of brownware ceramics and Desert Side-Notched and Cottonwood series projectile points ca. A.D. 1000 or somewhat later" with these materials marking the ". . . advent of the Paiute and Shoshonean peoples, ancestors of tribes found in the Great Basin at the time of historic contact." Linguistic data (cf. Lamb 1958) suggests that these Numic speaking groups migrated from southeastern California (in the Death Valley vicinity) into the Great Basin ca. A.D. 950. This theorized migration, based primarily on lexicostatistical and glottochronological analysis, is currently under review and revision (cf. Goss 1977 for an overview of the problem; also Linguistic section, this report).

Late Prehistoric material is present within the boundaries of all planning units (cf. Elston 1971; Elston et al. 1977; Elsasser 1960; Davis 1963, 1964; Enfield and Enfield 1974; Riddell 1951; Harrington 1957; Riddell and Riddell 1956; Meighan 1955; Michels 1965; Lanning 1963; Walter 1970; Bettinger 1973, 1975a, 1977b; Cowan and Wallof 1974 among many others). Designations for Late Prehistoric Complex material are many: Late Kings Beach-Washo (Elston 1971, Elston et al. 1977); True Desert Culture IV (Davis 1964); Early and Late Cottonwood Phases (Lanning 1963); Marana Period (Bettinger and Taylor 1974); and the Klondike Phase (Bettinger 1975a).

East Central Sierra Nevada (Figs. 37-38)

Washo-Late Kings Beach

The Late Kings Beach-Washo Phase is typical of the general Kings Beach Phase. It is characterized by the presence of Desert Side-Notched and Cottonwood projectile points. Elston et al. (1977) date this phase from ca. A.D. 1200 to Historic Contact; it is typical of the ethnographic Washo.

Mono Basin

E.L. Davis (1964) has described a phase typical of the Late Prehistoric Complex of Hester (1973) in her sequence for the area.

True Desert Culture IV (late collecting and Pueblo cultures.)	Small, Desert side-notched points. Small foliate or triangular points with no stems or notches. (Cottonwood ?)

Owens Valley

The Early (A.D. 1300 - A.D. 1840) and Late (A.D. 1840 - A.D. 1900) Cottonwood Phases from the Rose Spring site (Lanning 1963) are defined by the presence of Cottonwood Triangular projectile points.

The Marana Period of Bettinger and Taylor's (1974) interior southern California sequence can be included as well in Hester's (1973) Late Prehistoric Complex. This period, dated between A.D. 1300 and the Historic, is marked by the appearance of Desert Side Notched and Cottonwood Triangular projectile points. Further Marana Period indicators appearing in the study area include Owens Valley Brownware pottery and trade beads. Within the Marana Period, Bettinger (1975a, 1977b) has recognized the Klondike Phase for the Owens Valley. The Klondike Phase, dating from A.D. 1300 - A.D. 1850, probably followed ethnographic settlement-subsistence patterns recorded for the region, varying only in minor details.

Summary

From the various archaeological accounts available for the study area and from data in the surrounding regions, an occupational history for man in the various planning units has been tentatively developed. It is unlikely, after a review of the extant data base, that man was in the region prior to 10,000 B.C. (Pre-Projectile Point Horizon), although evidence from areas further to the southeast may indicate the presence of 'early man' in western North America. Man probably initially occupied the planning units ca. 10,000-9000 B.C., although the archaeological evidence for this early occupation (Fluted Point Tradition) is scant and subject to some interpretation. From ca. 9000-6000 B.C. cultural activities were probably confined to lakeshore adaptations with a generalized subsistence pattern emphasizing either lacustrine or megafaunal food resources (Western Pluvial Lakes Tradition). It is probable that neither resource was emphasized and that both were opportunistically exploited.

Between 6000 B.C. to 4000 B.C. a period of marginal exploitation has been postulated due to the effects of the Altithermal. This period of climatic change and hence environmental change is thought by some researchers to have been responsible for the partial abandonment of some lower elevation ecological zones. The exploitation of higher elevations is thought to have occurred at this time by the aboriginal inhabitants in search of alternative or other available food resources. Evidence for this 'hiatus' is sparse and additional data must be gathered before a definitive statement can be made.

By 4000 B.C. the basic hunting-gathering lifeway known from the ethnographic literature seems to have been established (Great Basin Archaic). Ground stone food processing implements (e.g., manos, metates) apparently became common inferring increased use of plant resources. Humboldt, Pinto, Silver Lake, Lake Mohave, Elko and Gypsum projectile points are characteristic of this period.

The introduction of the bow and arrow is indicated by the transition from the larger, heavier projectile points of the preceeding periods with the appearance of the smaller and lighter Rose Spring and Eastgate points ca. A.D. 500 - A.D. 1000/1200 (Rose Spring-Eastgate Complex). Cottonwood and

Desert Side Notched projectile points appearing ca. A.D. 1000 to Historic times along with pottery in some areas of the region mark the Late Prehistoric Phase. Irrigation in the Owens Valley apparently became common during this late period.

Note Added In Press

1. Munday and Lincoln (1979) and Lyneis (1978) have commented on and challenged some of Bettinger's (1975a, 1977c, 1978a) interpretations for the Owens Valley. Bettinger (1978b, 1979b) has replied to the comments and criticism essentially confirming his previous views as well as challenging his critics assertions and assumptions of his data.

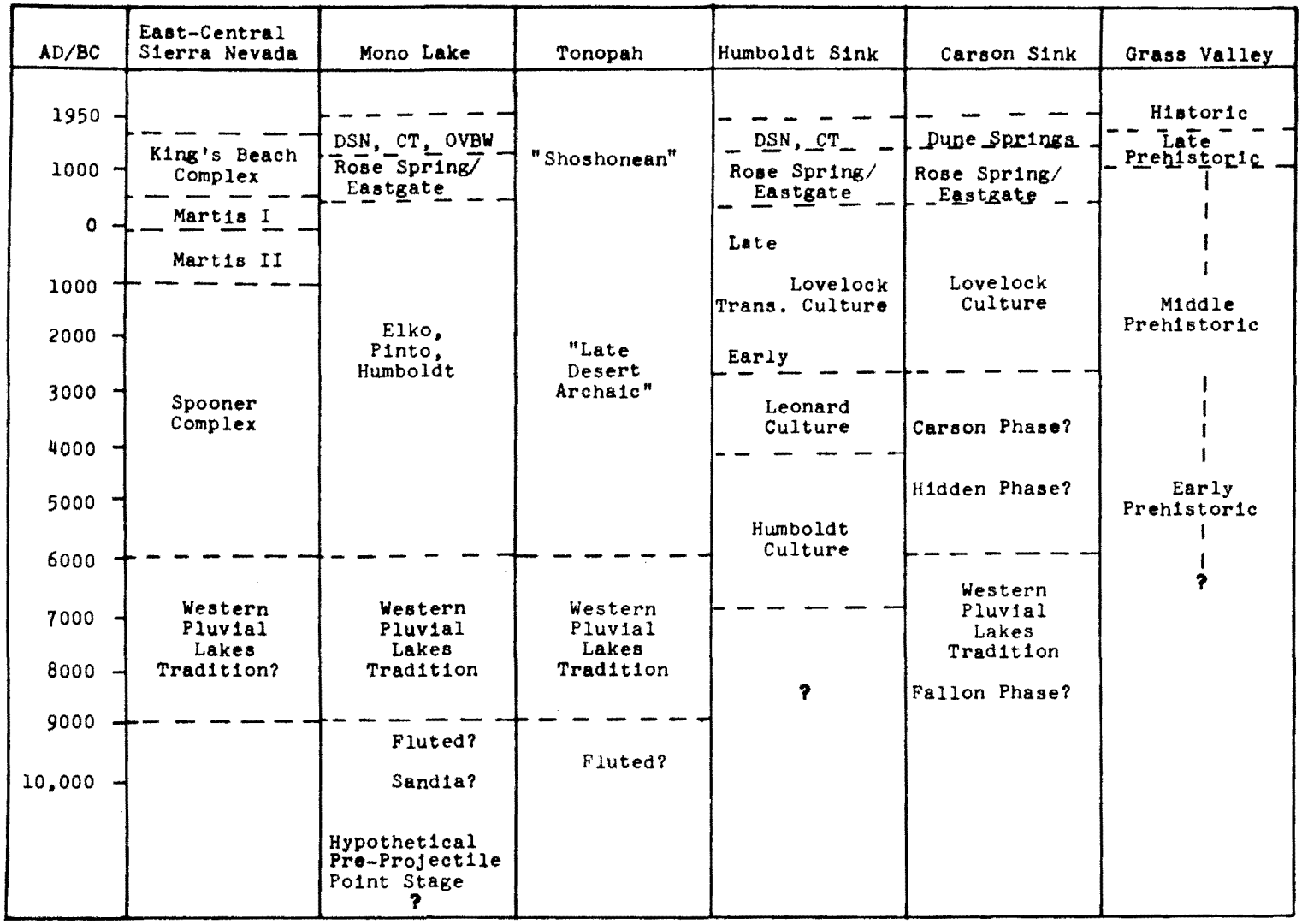


Figure 31: Prehistoric Chronological Sequence in the Western Great Basin (Hester 1973:Fig. 21).

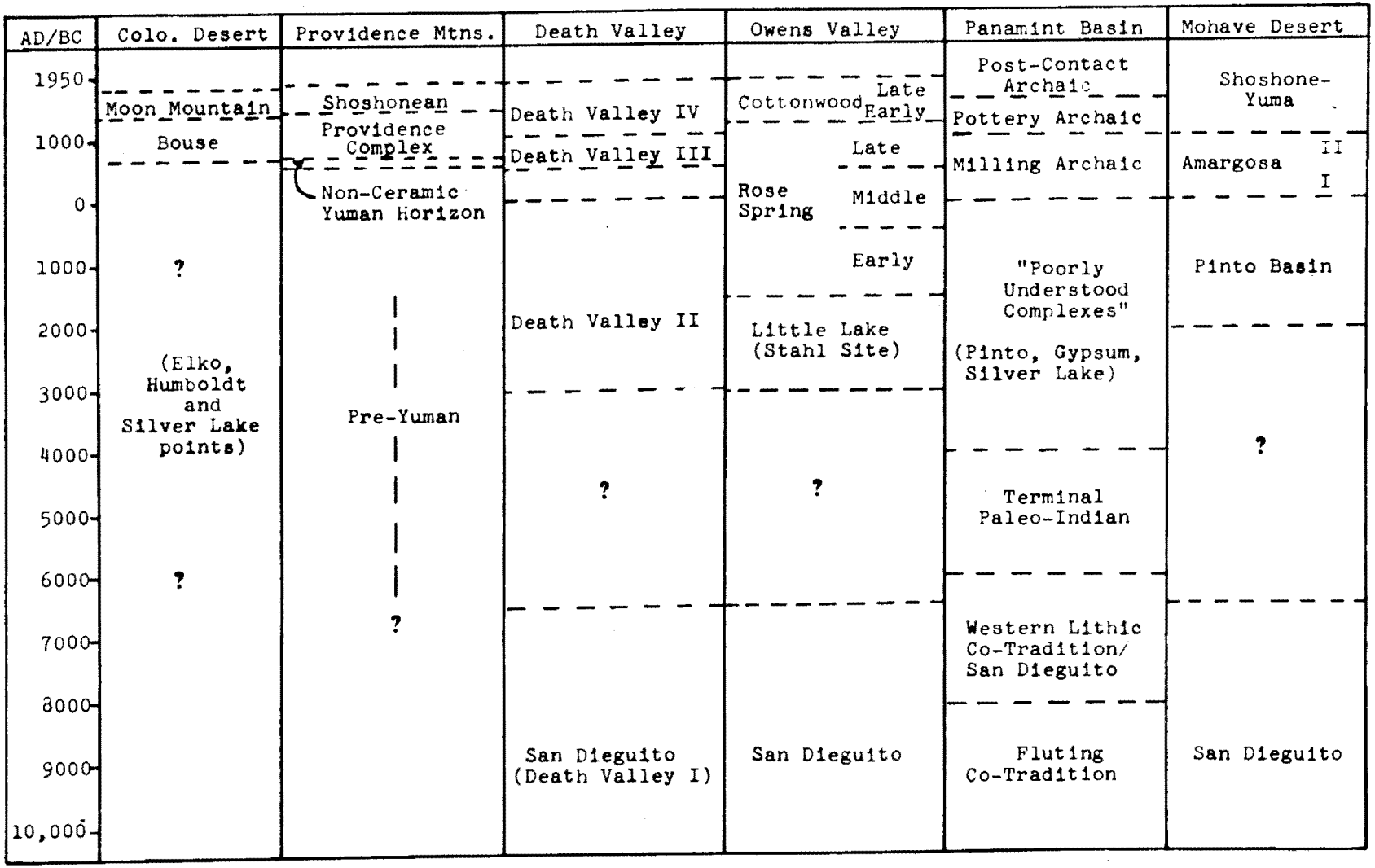


Figure 32: Prehistoric Chronological Sequence in the Southwestern Great Basin (Hester 1973:Fig. 17).

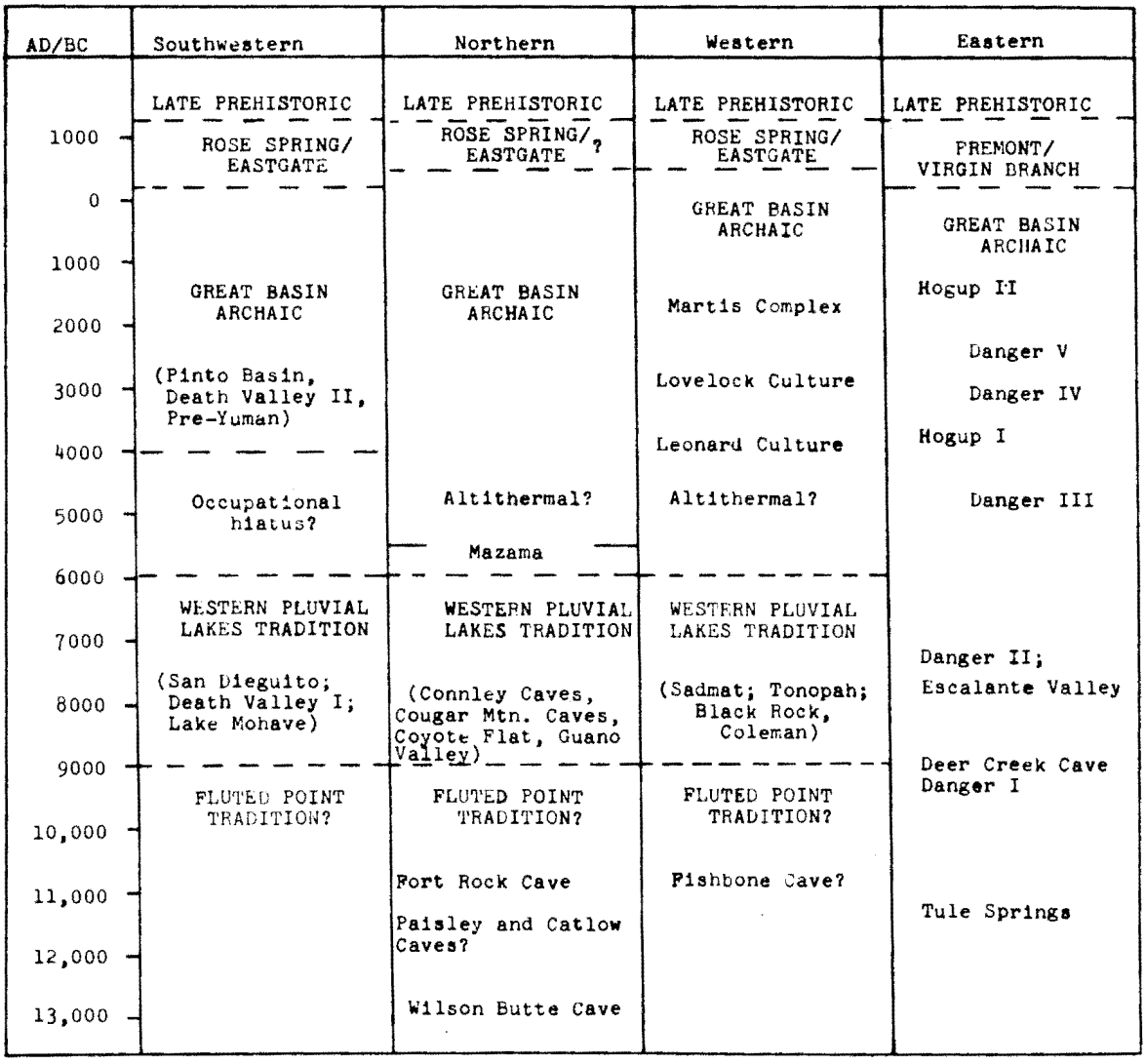


Figure 33: Chronological Ordering of the Prehistoric Great Basin Cultural Sequence (Hester 1973:Fig. 25).

Phase		Age	Projectile Point Types
COTTONWOOD	Late	A.D. 1840-1900	Cottonwood Triangular
	Early	A.D. 1300-1840	Cottonwood Triangular
ROSE SPRING	Late	A.D. 500-1300	Cottonwood Triangular, Rose Spring Corner Notched Eastgate Expanding Stem
	Middle	500 B.C. - A.D. 500	Elko Series, Gypsum Cave
	Early	1500 B.C. - 500 B.C.	Elko Series, Gypsum Cave, Humboldt Concave Base A
LITTLE LAKE		3000 B.C. - 1500 B.C.	Pinto, Lake Mohave (?)
HYPOTHETICAL	II. (Lake Mohave, ca. 5000 B.C.)		
	I. (Lanceolate points, ca. 7000 B.C.)		

Figure 34: Chronology at the Rose Spring Site, Southwestern Great Basin. After Lanning (1963), Clewlow, Berger and Heizer (1970).

Cultural Sequences for the Owens Valley and Adjacent Regions

Dates	Point Types	Southern Great Basin Series (Bettinger and Taylor 1974)	Owens Lake (Lanning 1963)	Owens Valley (Bettinger 1975)
Historic	Cottonwood Series and Desert Side Notched	Marana	Cottonwood	Klondike
A.D. 1300				
	Rose Spring Series and Eastgate Expanding Stem	Haiwee	Late Rose Spring	Baker
A.D. 600			Middle Rose Spring	
	Elko Series and Gypsum Cave	Newberry		Cowhorn
1200 B.C.			Early Rose Spring	
	Pinto Basin Series			
	Little Lake Series & Humboldt Series	Little Lake	Little Lake	Clyde
4000 B.C.				
	Silver Lake & Lake Mohave	Mohave	----------	-----

Figure 35

(Compiled from Bettinger and Taylor 1974; Lanning 1963; and Bettinger 1975)

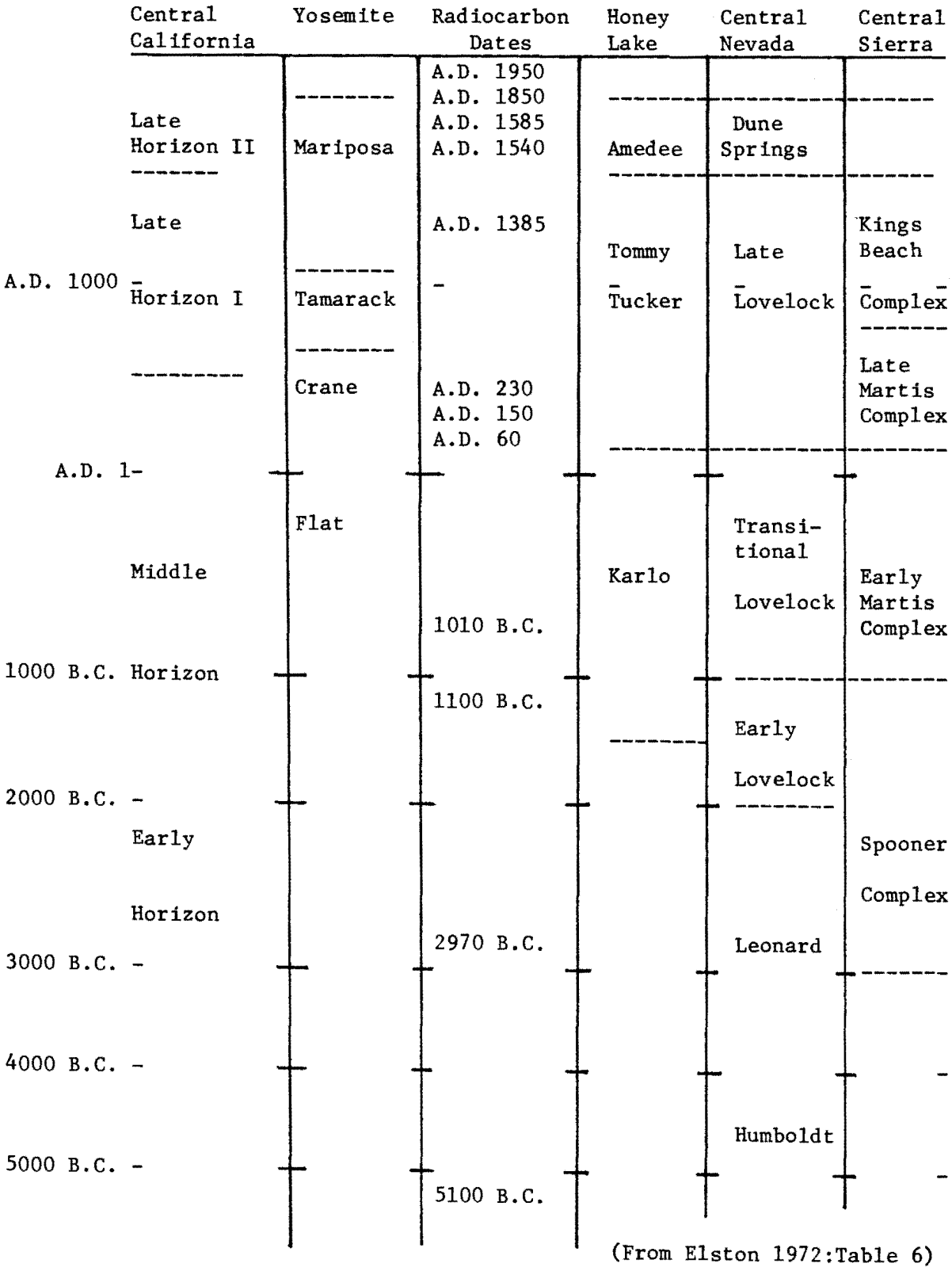
Fossil Falls/Little Lake Cultural Sequence

Antev's Climatic Stages		(after Bettinger and Taylor, 1974) Projectile Point Series Named Period	Lanning (1963)
Medithermal	ca 1850	Marana (Cottonwood and Desert Side-Notched)	Cottonwood
	1500		
	1000	Haiwee (Rose Spring and Eastgate)	Late Rose Spring
	AD 500		
	BC 500	Newberry (Elko and Gypsum)	Middle Rose Spring
	1000		Early Rose Spring
	1500		
	2000	Little Lake (Pinto)	Little Lake
	2500		
Altithermal	3000		
	3500		
	4000	Lake Mojave (Lake Mojave and Silver Lake)	Lake Mojave
	4500		
	5000		
Anathermal	6000		Lanceolate Points
	7000		
	8000		
	9000	Fluted Point Tradition (Clovis-like and Folsom-like)	
	10000		

(From Garfinkel 1976:Table 1)

Figure 36

Correlation of East Central Sierra Chronology With Adjacent Sequences (A.D. 1850 based on trade beads).



(From Elston 1972:Table 6)

Figure 37

CULTURAL PHASES OF THE TAHOE REACH

PHASE	TIME MARKERS	DEPOSITS	AGE	CLIMATE
Washo-Late Kings Beach	Desert Side-notched and Cottonwood Series points, chert cores, utilized flakes and other small chert tools.	Surface and upper portion of sandy pebbly loam	Historic Contact-AD 1200	Neoglacial; wet and cool, but with little summer precipitation.
Early Kings Beach	Eastgate and Rose Spring Series points, chert cores, utilized flakes and other small chert tools.	Surface and upper portion of sandy pebbly loam	AD 1200-AD 500	Nonglacial; dry, trees growing in former bogs, Tahoe may often not overflow.
Late Martis	Corner-notched and eared points of the Martis and Elko Series? Large side-notched points? Large basalt bifaces and other basalt tools.	Within the pebbly sandy loam	AD 500-500 BC?	Neoglacial; wet but not necessarily cooler, increased summer precipitation.
Middle Martis	Steamboat points, other types in Elko-Martis Series? Large basalt bifaces and other basalt tools.	Within the pebbly sandy loam and sandy cobbly loam	500 BC?-1500 BC	Possible warm, dry interval centered on 1500 BC.
Early Martis	Contracting Stem points of the Elko-Martis Series? Large basalt bifaces and other tools. Light colored basalt artifacts?	Lower portions of pebbly sandy loam; on contact with orange sand at Pla164	1500 BC-2000 BC	Beginning of Medithermal; Neoglacial, wet but not necessarily cooler, increased summer precipitation, Tahoe begins to overflow.
Spooner	Points in the Pinto and Humboldt Series, light colored basalt artifacts.	Orange sand at Pla164	2000 BC-5000 BC	Altithermal; generally hot and dry, Tahoe does not overflow for long periods of time.
Tahoe Reach	Parman Points	Mottled Silt at Pla164	6000 BC	Anathermal; warming trend, climate similar to later Neoglacial intervals.

Figure 38: Cultural Phases That May Be Applicable to the Coleville Planning Unit (tentative). From (Elston et al. 1977).

Tentative Chronology Correlation

Climatic Stage	DATE	OWENS LAKE	MOJAVE DESERT	DEATH VALLEY	WESTERN NEVADA	ROGER'S CENTRAL ASPECT	PACIFIC N. W.	ROSE VALLEY
	AD 1000	Cottonwood	"Desert Mojave"	DV IV	Dune Springs	PAIUTE-MOJ.		Sparse Camp. Site Use No Hunting ?
						Yuman & Shoshonean		
	BC-AD	Late Rose Spring		DV III	Late Lovelock	Pueblo II Basketmaker		CAT. I ?
	BC 1000	Middle Rose Spring	Amargosa	Late DV II	Trans-Lovelock	Amargosa III ?		CAT. II ?
	2000	Early Rose Spring		Early DV II	Early Lovelock			
Medithermal	3000	Little Lake	Pinto		Carson	Amargosa II (Pinto-Gypsum) ?		Hiatus
	4000	Owens Lake II	Lake Mojave	DV I	Leonard	Amargosa I?		Pinto Basin Lake Moj. Overlap
	5000				Fallon			
Altithemral	6000				Humboldt Hidden Cave	?	Old Cordilleran	CAT III ?
Anathermal	7000	Owens Lake I				San Dieguito II & III?		Hiatus
	8000							CAT IV ?
	9000					San Dieguito I ?		

Figure 39: Tentative Chronological Correlation of Rose Valley Material (Little Lake Area) With Other Regions of the Great Basin and Southern California (from Borden 1971:Table 5).

RECOMMENDATIONS AND RESEARCH DIRECTIONS

This existing data inventory has provided a comprehensive narrative overview of the Coleville, Bodie, Benton and Owens Valley Planning Units in regards to their history, ethnography and prehistory as derived from a study of the presently available data base. Our review of the available research materials, both published and unpublished, has resulted in a number of observations and recommendations that can provide a base for future research and management. These are in no way complete but represent some generalities and specifics that, if considered, can only add to the available research material and to the clarification and understanding of the region's cultural resources and cultural history.

Historically the area was the scene of early exploration and mining activities with a majority of these sites only poorly known from the historical records. Many of the early mining sites, for instance the Bodie State Park, are of historical, scientific and social value in interpreting and explaining the early history and subsequent social and economic development of the region. It is suggested, where possible, that the Bureau of Land Management (BLM) cooperate and participate with state, municipal, other federal agencies and private groups in preserving, promoting and interpreting the historical heritage of the area. This program could take the form of interpretive signs or markers and the active protection of any historical resources deemed to be of significance by local historical organizations, the California State Office of Historic Preservation and the Bureau of Land Management's own cultural resource managers. The BLM should actively encourage any local or professional historians to contribute research material or to archive the material in a suitable local or regional repository for future scholarly research. If at all possible, the BLM should encourage historical or industrial archaeological research at sites in accordance with an approved research design to illuminate the past human behavior of mining and settlement as well as past technology at historical sites. In terms of local preservation, the BLM should be prepared to offer expert professional assistance or be able to direct interested parties to both government and private sources able to offer preservation assistance and expertise not available through their field or district offices.

Our survey of the anthropological and archaeological literature has suggested several avenues of profitable research that could contribute to the understanding of the region. Regrettably the ethnographic record cannot be reliably added to, although oral history may prove to be of some value in recording contemporary Native American impressions of past lifeways as recalled from elder relatives or acquaintances. Contemporary viewpoints may also be of some value to both the social/cultural anthropologist and archaeologist in recording present day practices that may have their roots in either recorded or unrecorded ethnographic counterparts. Cultural change, acculturation, assimilation the coping behaviour of the present Native Americans may be of research interest to scholars concerned with native peoples and their experience with disrupting, dominant foreign cultures.

Archaeologically the planning units have been occupied and utilized by man for over 8000 years. This time depth would seem to offer the potential for the study of the interaction and adaptation of hunter-gatherers to a changing

regional environment. A general research aim of any archaeological program should be the determination and clarification of past subsistence-settlement patterns and the development of a model or models to explain any changes in technologies and resource exploitation through time. The present archaeological data base indicates gross differences in the subsistence-settlement patterns to one degree or another but further research in form of probablistic surveys is needed to gather additional information regarding the nature, number, distribution and chronology of archaeological sites outside of the intensively studied Owens Valley region (cf. Bettinger 1975a, 1977c). Bettinger's previously cited research has made an auspicious beginning towards the extraction and interpretation of a maximum amount of information from survey data and utilizing the data to test his subsistence-settlement pattern model.

Another major area of concern, apart from 'processual archaeology' is the refinement of the various regional archaeological chronologies and the definition of a major regional sequence. Chronology is especially important in regards to the proposed/supposed early occupation of the planning units. The definition, distribution and dating of early man in the region is a question of some importance to the length of human occupance and the man-land relationships that may be present. A structured research program directed at the survey, recordation and analysis of sites in the areas of proposed early occupation (e.g., the Mono Basin, southern Owens Valley) might generate data that could be used in a comparative analysis with other early complexes in western North America. Problems of interest to archaeologists would be the determination of economic patterns and the temporal/economic relationships between distinct artifact froms, especially the various projectile point types. The Mono Basin and Owens Valley Dry Lake areas might be appropriate localities to warrant further research as the archaeological record has indicated the presence of early lithic materials from these areas.

The period between ca. 6000 B.C. and 4000 B.C. needs to be further researched with special attention paid to the 'occupational hiatus' postulated by Hester (1973) for some areas due to changing climatic conditions. Man-land relationships need to be further defined and clarified especially in regards to the probable resource exploitation of the higher elevation ecological zones. Diagnostic assemblages and their significance to both the local and regional prehistory must be considered as well. Regional and local problems of 'recent' origin; the introduction of the bow and arrow (dating and diffusion); ceramics (correlation of the pottery with the spread/breakup/migration of various linguistic groups) and the Numic 'invasion/migration' (definition and delineation) from the southwestern Great Basin ca. A.D. 1000 (Lamb 1958) are also potential research problems to which data can be contributed from the planning units. For the Inyo-Mono area, Cowan and Wallof (1974) have commented on the scarcity of Elko Series projectile points during the period 2000 B.C. to A.D. 600. Future research in this area might be directed at intensive surveys and local analysis to determine if this observation is due to limited research or if it is an area-wide phenomenon and why it is lacking, especially during a time when favorable climatic conditions existed.

Radiocarbon dates from excavated sites and the wider application of obsidian hydration dating could provide important chronological information for the planning units. Preliminary hydration data is available for the area and further research could undoubtedly provide a reliable hydration scale.

An initial attempt has been made at testing the utility of an ethnographic settlement-subsistence model in explaining the distribution of a set of archaeological assemblages collected in Owens Valley (Bettinger 1975a, 1976, 1977c). The Mono Basin region would seem to offer a situation for a researcher interested in testing the validity of a similar subsistence-settlement pattern (cf. Davis 1965). The conclusions drawn from the Owens Valley data by Bettinger (1975a, 1977c) offer further testable hypotheses for the researcher as a number of his conclusions are either unresolved or ambiguous in the presentation. Bettinger's reconstruction of the prehistoric man-land relationships through time in the Owens River drainage suggests a highly variable, somewhat specialized, prehistoric subsistence-settlement system sensitive to the action of both natural and cultural factors. Further intensive problem oriented site survey in the region is suggested by Bettinger's interpretation (1975a, 1977c) of a "shift in the emphasis of plant exploitation from riverine to desert scrub species between 1500 B.C. and A.D. 600 which is reflected by a change in the location of the lowland occupation sites from predominantly riverine settings to desert scrub localities." Ideally any future intensive survey data, would in terms of type, distribution, function, density, seasonality, chronology and composition reflect the land use patterns of the aboriginal inhabitants and provide confirming material for Bettinger's interpretations. Another research problem of some importance due to the controversy it has generated (cf. McGuire and Garfinkel 1976) is Bettinger's conclusion that the inception of regular pinyon exploitation for subsistence occurred between A.D. 600 and A.D. 1000 as shown by the appearance of pinyon camps. Clearly additional survey data from the pinyon zones must be gathered to demonstrate the validity of this hypothesis in light of the present ethnographic and archaeological data which suggests a long term use of this resource in the Great Basin.

Future excavation and detailed faunal analyses may be able to provide data for Bettinger's contention that large game hunting decreased after ca. A.D. 1000 as reflected in his observation on the disuse of upland and desert scrub temporary camps after this date, although this interpretation of the archaeological evidence may remain unresolved for some time to come.

Rock art sites are noticeably present, both reported and unreported, within the planning units. While a number of sites have been recorded by professional archaeologists, the Bureau of Land Management should make the total recordation of petroglyph and pictograph sites a priority in view of the fragility of this resource. Intensive surveys in areas of known rock art concentrations should be undertaken to discover additional new sites or overlooked localities among the presently recorded sites. Known locations should be checked against past records and brought up to date. Potential rock art localities, determined on the basis of predictive polythetic models and intuitive study, should also be investigated for the presence of sites. An area of special concern should be the area between Aberdeen and Lone Pine where von Werlhof (1965, Appendix E, this report) reports no sites present.

Rock art sites are of high interpretive value to archaeologists, Native Americans and the general public in that they represent fragile, highly visible reminders of the aboriginal past of the planning units as well as important resources for the scholarly investigation of past societies. The BLM should be commended for its preliminary efforts to provide interpretive exhibits (e.g., Red Rock Canyon area petroglyphs), but a stronger effort is

needed both in regards to active/passive protection programs for these resources and towards the education of the general public as to rock art's value and significance to scholars and Native Americans (cf. Appendix E, this report). The regional Native American community should be consulted on any program concerned with rock art due to their special concern with this visible reminder of their past. Further studies of rock art concerned with distribution/location, stylistic analysis, chronological studies using new dating techniques (cf. Appendix E, this report) and computer aided comparative site analysis, combined with archaeological site survey and excavation data, offer an excellent opportunity to broaden our understanding of both regional and Great Basin prehistory.

A promising research opportunity in the planning units is the examination of the aboriginal network of trade relations as reflected in the archaeological record. The ethnographic data indicates that there was a recognized trading system between the planning units both across the Sierras into central California and with the neighboring local groups. Important questions to be asked regarding trade should be directed at its regularity, intensity, specialization, and efficiency through time as well as its effect on the structured and unstructured social patterns of the region. Singer and Ericson (1977) have presented a detailed analysis of the Bodie Hills obsidian quarry near Mono Lake in regards to manufacturing and trade patterns with central California (cf. also Ericson 1977, 1978). Bettinger and King (1971) have also presented an adaptation-through-exchange model to explain the development of social ranking in Owens Valley with a redistributive fiesta system (e.g., fandango) controlled by village headmen providing the exchange mechanism. Both approaches need to be developed further through additional research.

Two other areas of possible future research are a detailed review of the structure and character of the prehistoric irrigation system among the Owens Valley Paiute; and the reasonably complex social structure of the Owens Valley Paiute in contrast to the family band or kin clique organization of the typical Great Basin group. Aboriginal irrigation has been reviewed by Lawton et al. (1976) but we know very little of its development, time depth and effect on the subsistence-settlement patterns of the region, although Bettinger (1975, 1977c) had suggested that the decrease in large game hunting may be directly linked to an increase in the time needed to maintain the irrigation system as it became increasingly complex. In regards to the complex social organization known for the Owens Valley Paiute in contrast to the surrounding groups, future archaeological research could be directed at attempting to trace its development as well as social and economic differentiation through site excavation and distribution, the analysis of trade goods (especially obsidian and shell beads) and comparisons with other groups related to the Owens Valley Paiute (cf. Kroeber 1959).

One significant area of research that has been mentioned frequently but which has not yet been exploited to its fullest potential is environmental change, i.e., the nature and significance of postglacial climatic change on the human occupance of the region. Of importance is how the changing climatic conditions affected the settlement-subsistence patterns of the planning units. Future interdisciplinary research may be able to definitely link some of the change noted in the archaeological record to environmental factors.

A brief review of the distribution of recorded and mapped sites indicates

concentrations along both major and minor drainages, including those of a seasonal nature. Drainage zones can thus be considered as areas of high sensitivity for archaeological site locations and should be surveyed to locate any sites that may be present. The major mountain passes and trails, identified as ethnographic trade routes, should be surveyed as well for both archaeological and historical sites.

Minor areas of interest in future research should be the inventory and analysis of any locally available archaeological collections owned by relic collectors. The materials deposited/curated in the Eastern California Museum should be examined as well. A project similar to that undertaken by Simpson (1961) for projectile points should be sponsored by the BLM cultural resources personnel and other interested professionals to determine the depth and variety of material culture available for the area aside from materials collected by professional archaeologists/anthropologists. The new Native American Cultural Center in Bishop should be encouraged to curate local collections, both professional and amateur, for future study by interested researchers.

The Bureau of Land Management should have, for its own administrative purposes as well as to aid cultural resources personnel, a basic library of material on the history, ethnohistory, archaeology and ethnography of the region as well as copies of environmental impact reports, professional papers, site surveys, etc. to round out the collection for reference/research purposes.

Encouragement and perhaps financial support should be given to previous professionals who have excavated or collected within the boundaries of the planning units to analyze or re-analyze their materials in light of the current standards of archaeological science. For example, the shelter at Hot Creek (Enfield and Enfield 1964) did not have an adequate faunal analysis completed. A detailed analysis may provide data on the socioeconomic patterns of the shelter. The material excavated from the rockshelter at Lake Crowley in the early 1960's has not yet been fully reported on, and this site may yield significant data on the prehistory of this portion of the planning units.

Consultation with the Native American community in Bishop and with the State of California Native American Heritage Commission has resulted in a number of concerns being made known to Basin Research Associates. A number of recommendations and courses of action are presented in the following paragraphs for the consideration of the BLM and other interested parties.

First, the Bureau of Land Management should make a concerted effort to obtain Native American input in any future planning activities that may affect land use decisions. Native American views should be given a preference in the planning process because of their deep feeling for the land and their former extensive use of their now 'former territories', land essentially taken without recourse to treaty or compensation by government action.

Second, the BLM should consult with the Native American community in all instances where hot springs or 'geothermal resources' may be involved in planning activities. Many of these natural resources were or are still considered as spiritual and cultural areas sacred to the Native Americans (cf. Theodoratus 1978 for Coso Hot Springs).

Third, in regards to places of spiritual or social importance, it is Basin Research Associates' recommendation that the BLM should consult and cooperate to the fullest extent possible with the resident Native American community wherever and whenever possible in defining and delimiting 'sacred places or localities' on the public lands as mandated by federal law, regulation and policy.

Fourth, it is recommended that the BLM should inform the appropriate representatives of the Native American community when archaeological research is to be conducted by a holder of a Federal Antiquities Act Permit in the region. This would allow Native American input and comment to be utilized during the process of archaeological research to the benefit of both the scientific and ethnic communities.

Lastly, as noted previously, the rock art of the region is of special concern to both the Native American and archaeological communities. In view of the strong feelings expressed towards these highly visible reminders of their aboriginal past, Basin Research Associates' proposes that the BLM and the Native American community work closely together to design and execute a program that will protect, preserve and record the rock art within the planning unit boundaries for the benefit and understanding of both cultures.

In summary, the full research potential of the four planning units has yet to be realized and appreciated although several investigators have recognized its potential and are preparing comprehensive research programs. With careful planning and appropriate Native American consultation, the Bureau of Land Management should be able to direct and utilize the anthropological and historical potential of the region to the fullest for the benefit of science and society.

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AA	American Anthropologist
Am Ant	American Antiquity
C-UCARF	Contributions of the Archaeological Research Facility, Berkeley
NSM-AP	Nevada State Museum Anthropological Papers, Carson City
SWM	Southwest Museum
-M	Masterkey
-P	Papers
UC	University of California
-AR	Anthropological Records
-PAAE	Publications, American Archaeology and Ethnology
UCAS	University of California Archaeological Survey, Berkeley
-R	Reports
UUAP	University of Utah Anthropological Papers

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APPENDIX A

University of California, Berkeley
Ethnographic Archive Material

The following material represents unpublished material compiled by University of California ethnographers, F.S. Hulse and F.J. Essene, during WPA sponsored research in 1934 and 1935 in the Owens Valley and surrounding areas of California. This material has not previously been indexed except for a series of general entries in Valory (1971). It is hoped that this detailed listing of various items contained in this appendix will lead to a restudy of the data for the benefit of both the anthropological and Native American communities (cf. Iroquois Research Institute 1979 for a practical application of the material).

Mr. J.R.K. Kantor, University Archivist, University of California, Berkeley, should be consulted regarding availability and conditions for use of the material.

UNIVERSITY ARCHIVE MATERIAL

Barrett, S.A., 1906, #7

Misc. California Indian vocabularies. One short word list from Markeleeville area + misc. Washo and Paiute words (from Mono Lake).

85A. Essene - Independence Paiute

Key name vocabulary list.

Myths - The Coyote (Eshah) and the Cottontail (Ta-oo-chee) by John Symmes.

The Coyote and the Mouse (Pong-ah-g) by Emma Symmes.

The Beginning of the Land (Te-bope-egah Man-wa-pa-eipa) by Emma Symmes.

The Beginning of the Land with Eshah (Coyote) and Oon-oop (Brother of coyote Eshah) by Emma Symmes.

The Beginning of the Land (Te-bope-egah Ma-na-wa-po-eipa) by Emma Symmes.

85B.

Stories(Paute) by George Robins, Independence Paiute.

The Giantthat Gambled his Clothes.
Man and Bear.
Salt Trading - salt in vicinity of Independence, trade via Owens Valley.
Two Bears.
The Baby and the Water Baby.
The Giant and the Water Baby.
Two Hawks and the Moon.
Earthquake.
The Coyote and His Children.
The Wolf (Oon-oop) and the Coyote (Eshah).
The Race Between the Hawk and the Duck.
The Cricket (Thu-nu-toogie).
Adventures of Two Young Brothers.
The Beginning of the Earth.
How the Pinenuts Came into the Valley.
Origin of Fire in the Valley.

85C. Essene - Independence Paiute - Thirteen Stories by Maggie Earl.

Shanna-Whaa Dies with Fire.

The Murderer (Po-Hoi-Wish).
The Hawee.
The Old Man who Stays Underwater.
How the Stork Got his Long Neck.
How the Tuya-Yup Become Rock. (Tuya-yup - man dressed like a woman or king bee)
How the Three Families Formed into a Star.
How the Little Girl Killed the Coyote.
How a Little Rat Became a Stork.
How the Coyote Froze to Death.
The Boy Who Became Eagle.
How the Grandfather Became a Coyote.
The Giant and his Wife at Fish Springs.

85D. Essene - Three tales and four stories by Hank Hunter, Independence Paiute.

The Survivor - deals with massacre of Indians at Owens Lake after Owens Valley 'war.' Gives details of one survivor and his life.

Maasacre of the Indians of (Pah-hoo-mah-tuh) South Fork - Tells of a massacre of Indians in South Fork by soldiers for cattle stealing.
Strangers from the Sky Kidnap Hai-Wee.
Weatherman.
The Strangling of Eshah.
Final Rites and Ceremonials.
Killing of the Lone Indian.

85E. Essene - Nettie Lopez, Independence Paiute.

Hiwee and Toi-Yag-Hav (The Dove and the Lightning).
Coyote and Two Cottontails.

85F. Essene - Susie Westerville, Indpendence Paiute.

Revenge. (a myth)

86A-B. Essene - Early History of Indians (vocabularies) by William Piper; uses of plants, Paiute and Shoshone tribes by - ??

Data from Steward (1933) and local Fort Independence informants.

Data presented by common name, scientific name, Indian name, explanation of Indian name, use of plant and informant.

Paper - data from vicinity of Big Pine (Big Pine Creek to the County Farm) which would be 2 miles in width and length from the top of the northern Sierra Nevadas to the eastern foot of the White Mountains. Data on food gathering, hunting and fishing territory - common and Indian names listed.

86C. Essene, F.J., ca. 1935. Twenty Myths and Narratives Concerning Beliefs and Customs from Mary Harry - Big Pine Paiute.

This is the Story of Oa-chaubo, the Wolf.
The Story of Kia-honi.
The Story of E-sha the Coyote.
The Story of Chana-Howa (Volcano Woman).
The Story of E-sha, Ahma-gaga and their Son.
A Big Rabbit and Nutting Expedition.
A Short Story of E-Sha, the Coyote.
When the Coyote Played Dead.
The Mysterious Fish Lake.
When Mary was Bewitched.
Marriages of the Old Days.
The Indian Funeral - data from Fish Lake Valley compared to Owens Valley.
The Funeral Custom's of the Owens Valley People.
The Old Indian Beliefs.
Coyote and the Witch Doctor.
Ne-na-mish the Giant.
The Rabbit Kills the Sun.
The Toi (Tule) Gathering.
The Killing at an Indian Dance - pinon on mountain between Deep Springs and Oasis.

87A. Essene - Bishop Paiute, History and Material Culture by Mary Cornwall, informant.

Autobiography of Mary Cornwall, 91 - Bishop Paiute - born near Crooked Creek in Long Valley.

CuCha-Ve (fly) - gathered during the summer until early fall- hatched on an island in Mono Lake.
A Dance - dances held at Mono Lake after harvest.
Cu-Ha - gathering of an Indian Plant.
Battle Between the Tribes - Digger, Paiute and Washoe Indian fight. North Fork Indians seeking help from Bishop Paiute, Mono Lake Paiutes and Long Valley Paiutes against Digger and Washoe - trying to buy aid with money. Paiutes are victorious.
Indian Doctor.

87B. Essene,F.J., n.d. Bishop Paiute Ethnographic: Eight Stories from Edith Dewey, Mary Cornwall, Dave Yandell, George Brierly.

Edith Dewey

Ni-Ni-Mussie (a huge beast) - lived in a cave at Fish Springs, south of Big Pine. Story on his activities and how he was finally killed.
Names and their Uses - list of various Indian names for things and their use.
Stolen Pinenuts.

Autobiography of George Brierly.
The Deer and the Bears.
Ki-Nee (Prarie Falcon) and his Little Brother.

Mary Cornwall

The Hawk (Keoughe-ou)
Wolf (Tau-ope)

87C. Essene, F.J., ca. 1935. Bishop Paiute Ethnographic: 51 Stories and Narratives on Plant Gathering and Use from Jennie Newland.

Jennie Newland, age 65, Round Valley Paiute.

The Story of Mount Tom (Pow-ne-pui).
The Story of my Grandfather.
The Story of Creation.

*Que-na-ba - Round Valley.

The Story of the Beginning.
Brief Incidents about the Coyote.
Coyote Talks.
Story of the Trapper Woman.
The Tale of the Mosquito.
Cha-na-hor-wa ('the destroyer of people').
Coyote Goes Hunting and Fishing.
Incident While Gathering Cau-ta-we-ya (kind of acorn).
The Gathering of Qui-ja-ve (larvae of fly).
The Story of an Adventurous Indian.
Gathering Pinenuts. (good data on Bishop pinyon gathering)
Pe-ya-gu. (Caterpillar or Large worm).
Auk and Po-ku (both plants).
Cu-Ya (large bug).
Wy (arid plant).
Hooky (plant).
Taboose (ground nuts).
Pa-se-ta (seed plant).
Na-ha-ve-ta (underground bearing seed).
Sa-wa-voi-ha (sagebrush seed).
Ar-ne (ants, large).
Pana-die (sore mouth).
Caw-ta-voi-ha (wild currant)
Ho-voi-ha (elderberry).
Wo-goi-na (similar to ground cherry).
Wo-go-ni-voi-ha (similar to gooseberry).
Weya-poi-ha (red berry).
Si-vu (tule).
Tu-ho (similar to parsnip).
Ko-ke-ha (similar to onion).
How-ve-ha-ve (cane sugar).
Cir-hu-ve-ha-ve (willow sugar).
Tono-ve-ha-ve (tree sugar).

Pa-wa-ve-ha-ve (grass sugar or Indian soda water).
Wu-nu-pe-ha-ve (pinyon sugar).
Hu-na-ve-ha-ve (brush sugar).
Hu-ve-moi (bumble bee).
Pana (yellow bee).
Tu-qui-ta (arid plant).
Sa-wange (wild onion).
Mo-no (plant).
Pa-wy (water plant).
Na-na-nache (plant ?)
+ 10 additional pages on various plant types and their uses. All of the above have some story or use attached to them.

89. Bridgeport Paiute Ethnographic Materials ca. 1935.

A. From Silas B. Smith, 8 stories, some games.

B. From Susie Jim, 18 narratives (one myth), methods of hunting and gathering.

Susie Jim - Bridgeport Paiute, aged 85+ years.

The Way the Pine Nuts Came.
Gathering Pine Nuts.
Gathering Sun Flower Seed for Food.
Gathering Seeds for Food.
About the Porcupine.
The Caterpillar that Grew on the Bull Pine Tree.
The Sea Gulls.
Indian Hunters.
Making of Bows and Arrows.
Making Shoes and Blankets.
Making Mocassins and Suits.
Making Blankets out of Deer Hides.
Making Blankets out of Rabbit Skins.
Seed Food.
About the Cactus.
Gathering Oysters.
The Indian Doctor.
The (Kinejabi) Bugs of Mono Lake Water.

Silas B. Smith - Bridgeport Paiute, aged 76 years (?).

Hainanti (a creature like mermaid).
Jack Stones and other Games.
Coyote (Eja) and the Wolf (Esha).
The Fish Story
The Story of Paigateduh (the larger island in Mono Lake).
The Sage Hen.
The Sun.
(Haw-naw-pee) Bat.
The Sun.

89C. Hulse, F.S., 1935. Bridgeport Paiute ethnographic materials. Notes on two games from Silas B. Smith.

Jack Stone
Dice

91A-D. Bishop Paiute Ethnographic Materials, ca. 1935.

A. From Joe Lent, handgame description and one story.
B. From Jennie Cashbaugh, Autobiography and notes on foods.
C. From Mose Wayland, 5 stories.
D. From Edith Dewey, 2 stories.

Joe Lent, Bishop Paiute, aged 50.

Hand Game.
A Lost Indian Girl.

Jennie Cashbaugh, aged 80.

Indian Foods.
Biography of an Old Woman.

Mose Wayland, aged 80-85.

The Beginning - I. untitled; II. untitled; III. The Coyote and the Deer.
Meeting of Ta-la-mo-ga (Indian high priest).
Life of an Indian.
Creation of Man.
War Stories - discussion of Owens Valley Indian War and start of march to Fort Tejon.

Edith Dewey, aged 40.

Battle Between the Whites and Indians - rambling discussion of various Indian massacres, Los Angeles Water and Power Role in Valley, comments on racism in Bishop, etc..
The Girl Who Found Her Man.

91E-H.

E. Jake Shaw, 7 short stories.
F. George Brierly, story of a dance.
G. Mattie Bulpitt, 2 stories.
H. Tom Watterson, autobiography, 3 stories.

Jack Shaw, aged 80-85 years.

Travelling the Journey.
"Journey" Made Get Away.
Spring Time.
Mr. Fox, the Great.
Pretty Looking Girl Made and Hit.

Climbed the Mountains.
Played Different Games.

George Brierly, aged 80+.

The Story of a Dream.

Mattie Bulpitt, aged 85.

The First White Man - accounts of white settlers, soldiers in valley, attacks on Indians, incidents, etc..

Tom Watterson, aged 85+.

Biography - born at Pa-ku-wa-va-ti, 2 miles SW of Bishop.
Coyote Goes Duck Hunting.
The Story of Two Brothers.

91I. Hulse, F.S., 1935. Bishop Paiute Ethnographic Materials. Description of War Dance from Joe Lent.

The War Dance.

92. Hulse, F.S., ca. 1935. Big Pine ethnographic materials.

A. From Tom Stone, religion and traditions.
B. From William Piper, food gathering and technology.
C. From Mary Harry, 6 stories.

Tom Stone, aged 50-55.

Religion.
Traditions.

William Piper, aged 50.

Catching Ground Squirrels or Whistlers.
Tanning Hides.
The Making of Buckskin Clothes.
A Story of Some Kind of Wild Vegetable.

Mary Harry, aged 95.

A-na-givea (a lady).
Oo-nu-ja-a-van (the beginner of the Indian race).
Different Kinds of Food.
Indian Marriage.
One Experience Going to an Indian Dance.
Biography of Mary Harry.

92E-H. Hulse, F.S.

E. Autobiography of Ben Tibbits.
F. Earthquake Narrative from Mary Harry.
G. Indian Bear Story from William Piper.
H. The Fandango, described by Tom Stone.

E. Autobiography of Ben Tibbitts (Te-ve-givih). (Born at Big Pine - Tovowahumatu.) (Gives details of march to Fort Tejon.)

F. Earthquake.

G. Indian Bear Story.

H. The Fandango.

92D. Story and Notes on Cultivation Methods from William Piper.

The Early History of Indians.
Methods of Cultivation.
(both have lists of plants, misc. animals - how used, cleaned, cooked etc.).

93. Hulse, F.S., ca. 1935. Fort Independence Paiute Ethnographic Materials. Autobiography and one story from Mary Rooker.

Autobiography of Mary Rooker, aged 73 (?). (move to Fort Tejon).
Cho ka ha (Lion).

94. Hulse, F.S., ca. 1935. Benton Paiute Ethnographic Material. Mythology from Jakie Magee. (SERA Project 16-1F-35, 1935; 2. pp. unnumbered)

Story by Yads:la:saki: as told to me - Adaline L. Saulque. (All by Jakie Magee, Benton Paiute, aged 100.)

The Story of the Three Deer (Ta he da) and Three Bears (Pa ha vicky).

104. Hulse, F.S., 1935.

1-2. Bridgeport Paiute: Notebook originals of typed notes.

3-4. #24. Materials from Joe Lent interviews. Some previously cited.

#25. The Burial of the Old Indian by Joe Lent.

The Ah-nee-pee (nat) pur-we-he-ee by Susie Jim, aged 80-85, Bridgeport Paiute.
About Indians.
The Mellwawh Bear Story.
Another Story of an Indian Man and the Bear.

The Bear Taking and Indian Man.
Story of a Little Indian Girl.
Mellwawh Indian Dance.

Joe Lent

"Coyoote with Wings"
Baby Basket
The Mountain Lion Packing the Deer He Had Killed.
Deer Hunting.
Rain Maker/The Snow.
About Doctoring "pe-ya-kuh".
("pas-ya-ion") Eagle with White Strip around his Neck and hainanu.

152. 1-2. Hulse, F.S., 1935. Big Pine Paiute.

#40. Noted as typed (Mary Harry material).

#41. Material written by Issac Baker (obviously written as told by someone else).

Title: Names of the Mountains, Streams, Lakes and Springs on the Sierra Nevada and White Mountains as told by Jake Newland, Bishop Paiute, aged 83.

History of Susie Butcher Life - (by Thomas Stone, Ne-va-you-neh), Big Pine Paiute, aged 70.

The Method of Nursing Baby at Birth - written by Tom Stone by Wm. Piper (Big Pine Paiute, aged 55 (?))).

152. 3-4. Hulse, F.S., 1935. Big Pine Paiute.

#42. Typed - material duplicated previously.

#43. Water Old Man (Pa chu gui chi) by Susie Baker, aged 70.
The Story of Giant and Water Baby.
Explaining of Different Kinds of Baskets.
The Story of A-na-mo-wahsu (a mythical figure who preys on humans).
The Story of Pe-dogo-voice.
The Story of Rabbit Drive.
The Story of Chanahawa[a] and Mother and Dau-mihhawee (?).

Funeral Cry Dance by Tom Stone.

Becoming Indian Doctor

Choawinaedi - by Wm. Piper
Rabbit Drive or Hunting.

Story of a Deer Dance.
A Story of a Girl who Refuse to Marry.
The Story of the Rattlesnake and Frog.

The Indian Ways of Marrying and Ceremony - written by Tom Stone by Nattie Bulpitt.

History of Mary Harry's Life.

The Story of Otta-Sier-diem (Sugar Loaf Peak/Bad Women) by Susie Baker.
The Story of (Se-hu-pu-chou) (Willow Springs).
The Story of (ta-va-uchi) (abuser).
Story of a Rabbit Drive (Ona-yani) of Long Ago.
Story of Deer Hunting.

153. 1-2. Hulse, F.S., 1935. Fort Independence Paiute.

#44. Susie Westerville, Independence Paiute, aged 85±.

Autobiography of Susie Westerville.
Story of Pot Hole Lake.
Lion Story.

#45. Maggie Earl, Independence Paiute, aged 80.

Tu-wah-ta.

153. 3-4. Hulse, F.S., 1935. Fort Independence Paiute.

#46. Stories by George Robinson, Independence Paiute, aged 75.

The Coyote Children.
The Big Race.
The Fight Between the South Fork and The Coast Indians.
The Little Bird and his Two Sons.
Bear and Coyote Story

Story by Maggie Earl, Independence Paiute, aged 80.

#47. 1. Material previously typed (and cited).
2. The Big Race by George Robinson (not complete).

153.5. Hulse, F.S., 1935. Fort Independence Paiute.

#48. Autobiography of Hank Hunter, Independence Paiute, aged 100.

White Men - accounts of the surveyor, settlers, military and effects on the Indians.
The Driving of the Indians Out of the Valley.
Beginning of the Earth.

Marriage and Divorce Among the Indians.
The Indian Burial.
Child Birth Among the Indians.
Curing of Illness Among the Indians.
The Making of Bow and Arrow.
Homes of the Indians.
Pinenut Harvesting.
Making of Acorn Mush.
Basket Making.
The Deer Dance.
Tanning of the Deer Hide.
Making of the Moccasin.
The Rabbit Dance.
The Rabbit Blanket.
Fire Making and Matches.
Duck Hunting.
Bug Gathering at the Lake.
Taboose Gathering.
Daily Routine of the Indians.
Different Songs.

154. 1-2. Hulse, F.S., 1935. Bishop Paiute.

#31. Previously typed material.

#32. True Story by George Brierly, Bishop Paiute, aged 85.

Biography of Pag-ca-doo (George Brierly's father).
Name of the Place Eaton Ranch at Long Valley.
Experience of Buckskin Joe.
Fish Slew Springs.
Trouble Between the North Fork Indians and the Diggers.
New-uaha (a legend).
Buckskin Joe.

Family History by Edith Dewey.

154. 3-4. Hulse, F.S., 1935. Bishop Paiute.

#33. Previously typed material.

#34. By Jake Shaw, Bishop Paiute, aged 85.

The Story of Two Sisters and a Bear.
His Own Life.

154. 5-6. Hulse, F.S., 1935. Bishop Paiute.

#35. Previously typed material.

#37. By Dave Yandell, Bishop Paiute, aged 85-90.

The Mourning Dance of Yaw-ka nu-ga.
Events of the Early Days.
The Story of Hie na nu (myth - creation??).
The Story of the Little Old Man of the Water, Pa-ju-ko-che.

By George Turner, Bishop Paiute, aged 80.

The Story of the Coyote.
The Rudiments of Making Bows and Arrows.
Rabbit Blanket Making.
Short Story of Indian Fights.

By Mattie Bulpitt.

Old Marriage Custom.
Turning Back, Kou-nei-y-a very old custom.
The Indian Divorce, Na-ma-ta-te.
The Rudiments of Basket Making.

154. 7-8. Hulse, F.S., 1935. Bishop Paiute.

#38. As told by Tom Watterson, Bishop Paiute, aged 85 (?).

Autobiographical Details.
War.
Legend (deals with Coyote).
Tophec - Wolf.
Eash (Coyote).
To-who-ke-neh (Eagle ?).
Po-nho-ba (human like being).

#39. ("From all the old men of Bishop except Jake Newland, the witch doctor.")

Their Dances, their Religious and their Signficance.
Their War Dance.
Songs and Where they Originated.
Word Piaute was undoubtedly Pi-oty- meaning one who possesses a charmed life - somewhat necromancer.
(separate attached sheets)
Their Dances, their religious and their signficance.
War Dances and Origins.
Where and How These Dance Originates.
Songs.
Word Piaute (sic).

161. Gifford, E.W. Notes on the Comparative Ethnobiology of Western North America.

Essentially ethnohistorical material (botanical) from various groups. Includes some Owens Valley Paiute material.

196. Gifford, E.W.Owens Valley Paiute, Eastern Pomo Notes.

Mostly genealogy and kinship structure. Comparative word lists dealing with kinship from Bridgeport, Benton, Bishop and North Fork. Some biographical data on informants.

NOTES

All numbered references refer to material in the following publication. This should be referred to for complete data on obtaining the material.

Valory, Dale

1971 Guide to Ethnological Documents (1-203) of the Department and Museum of Anthropology, University of California , Berkeley, Now in the University Archives. Non-Serial Publication of the Archaeological Research Facility, University of California, Berkeley.

APPENDIX B

Collections

Introduction

A number of archival and museum data resources are available to researchers interested in the Mono Lake/Owens Valley region and the surrounding study areas. Recently Drs. Lowell Bean and Sylvia Vane have published a reasonably comprehensive reference guide (1977) to primary resources that may be of some value in the study of cultural materials (both historic and prehistoric) on California Indians.

The following list of sources, by no means complete, is drawn in part from Bean&Vane's (1977) publication and from numerous personal communications with interested scholars and researchers. For ease of presentation the listing has been divided into several categories. Each source has been placed in the category that best reflects its holdings. In several cases, various sources have been referenced several times due to the diversity of their holdings. In these cases the general descriptions are not repeated and the reader is urged to scan the list for its primary holdings.

Archives - Historical

1. The Bancroft Library, University of California, Berkeley: One of the finest libraries on the west coast devoted to the study of western North American history. Nonetheless, this library contains a large collection of materials pertaining to the the California Indian. Of major interest are the field notes of C. Hart Merriam, a biologist turned ethnologist. A catalogue of this collection has been prepared (Heizer, Bailey, Estis and Nissen 1969).

2. California State Library, Sacramento: This library contains an excellent selection of material pertaining to California history. It is especially good for materials on early mining and governmental history. A collection of early California newspapers is available for reference.

3. Mono County, Library, Bridgeport: Collections contain pamphlet files on the history of the county. The holdings on local history are otherwise quite thin. Has some works on the Mono Lake controversy.

4. Inyo County Library, Independence: This library contains virtually all significant and relatively modern works on the study units plus a number of environmental impact reports. A special room contains a collection of anthropological and historical works relating to eastern California.

5. California State Division of Parks and Recreation, Sacramento: This agency maintains the files for Bodie State Historic Park (and the small museum on the site) and has recently completed an assessment (and National Register Nomination) of the site of Manzanar, used for

the internment of Japanese-Americans during World War II. This agency also has overall responsibility for maintaining an up to date and accurate archaeological site file for the state. The material is open to qualified researchers.

6. State Historic Preservation Office, Sacramento: Advises on matters pertaining to both prehistoric and historic cultural resources. Maintains various files and inventories concerning both archaeological and historic sites.

7. Federal Records Centers at Bell and San Bruno: These repositories have historical material relevant to both Anglo and Native American history in the study area. Both maintain records of the Bureau of Indian Affairs. Preliminary inventories of the records are available on request.

8. Bureau of Land Management, California State Office: Archival records of the General Land Office, documents of the early survey parties, esp. Von Schmidt - the first surveyor in Owens Valley (cf. Lawton et al, 1976).

9. Los Angeles Water and Power, Los Angeles: Archival material on the acquisition and management of Owens Valley and surrounding area watershed etc.. This material if ever subjected to scholarly research may shed a lot more light on the 'takeover' of the area by LAW&P.

Archives - Anthropology/Archaeology

1. University of California Archives, Berkeley: The University Archives contain a vast collection of unpublished material including the personal papers of many professional anthropologists associated with the study of the California Indians. A guide to some of this material has been prepared by Valory (1971) and a compilation of some of this unpublished material pertaining to the study area is presented in Appendix A of this report.

2. The Bancroft Library, University of California, Berkeley.

3. Archaeological Research Facility, University of California, Berkeley: This research unit maintains a list of site files and maps (current until 1960) on archaeological research in Inyo and Mono Counties for use by qualified researchers. A manuscript file with numerous unpublished (and otherwise unavailable research) is also available (cf. Heizer 1976 for a listing of materials).

4. Archaeological Research Unit, University of California, Riverside: This research facility maintains a current site file and manuscript collection dealing with the study area. It is open to qualified researchers. A list of their materials is available on request.

5. The Nevada State Museum, Carson City: This institution has both manuscripts and material collections from the study area. No

listing is currently available.

6. Nevada Archaeological Survey, Reno: This research unit (University of Nevada) has materials on the study area (cf. Elston and Covington 1977).

7. Sacramento State University, Sacramento: This institution curates and archives the material salvaged by Peak and Associates.

8. CALTRANS, Sacramento: This office maintains Cultural Resource or Environmental Analysis files of cultural resource work undertaken for CALTRANS by either in-house personnel or private contractors. No major listing is available but all materials are available for review by qualified researchers.

9. United States Forest Service, Regional Office San Francisco and Bishop Area Office: Both offices maintain a file of reports on cultural resources located on Forest Service land. Files are open to qualified researchers.

10. California Indian Legal Services Office, Oakland and Bishop: Both have files on Native American concerns dealing with cultural (archaeological) resources and other matters of anthropological concern. Open with some restrictions.

11. Los Angeles Museum of Natural History: Some materials on the study area in the collections but primarily noted for its collection of A.A. Forbes photographs of the Paiutes (cf. Bosak 1975). Continuing work on the collection is being carried out by Nancy Peterson Walter (personal communication, 1978).

12. University of California, Los Angeles: The Archaeological Survey contains a number of manuscripts on the study area as well as a series of archaeological collections (cf. Michels 1964, 1965, Sterud 1965, Singer and Ericson 1977 among others). No catalogue is available of the research materials.

13. University of Illinois, Urbana-Champaign: The University Library is currently organizing (in conjunction with the Department of Anthropology) the personal papers of Dr. Julian H. Steward, the foremost ethnographer for the Great Basin. An index may be available in the future.

14. Long Beach State University, Long Beach: This institution (Department of Anthropology) may have some materials on the area by W.L. Tadlock but our inquiry was unanswered.

15. Clearwater Publishing Company, New York: This company publishes in microform the materials pertaining to the Indian Land Claims Commission Hearings as well as a general index to the same.

16. California State Division of Parks and Recreation, Sacramento.

17. State Historic Preservation Office, Sacramento.

18. Desert Planning Staff, Bureau of Land Management, Riverside: While concerned primarily with the California deserts, this research unit has some data concerning the study area. Mr. Robert Laidlaw, ethnographer, has collected various oral interviews with the Owens Valley Paiute. Typed transcriptions and various indices will be available in the near future for this material.

19. National Archives of Anthropology, Smithsonian Institution, Washington, D.C.: The Archives maintain a file of all Antiquities Act reports for the United States as well as other research materials on North American Indians. Of special interest is J.P. Harrington's research materials on the California Indians some of which concerns the Northern Paiute groups (cf. Walsh 1976 for information).

20. Federal Records Centers at Bell and San Bruno.

21. Desert Research Institute, University of Nevada, Reno: This research unit's files may contain information on the study area. Our request for information was not answered.

22. Bureau of Land Management, Bakersfield and Bishop Offices: These offices maintain a cultural resources inventory file plus a manuscript collection pertaining to the area. These are available to qualified professional archaeologists for research and planning purposes.

23. Southwest Museum, Los Angeles: Collections of photographs on the Washo (cf. Downs 1966).

Collections - Material Culture - Institutional

1. R.H. Lowie Museum of Anthropology, University of California, Berkeley: One of the foremost anthropology museums in the western United States, this museum has an extremely large collection of material from California. For the study area, the collections made by Riddell (1951), Osborne and Riddell (1978), Meighan (1955), Steward (n.d.) and Lanning (1963) are available for study and reference use.

2. The Science Museum, Diablo Valley Junior College, Pleasant Hill: This facility has projectile points and scrapers from Inyo County, Deep Springs Valley and a few Mono and Panamint baskets.

3. The State Indian Museum, Sacramento: This museum may possibly have some materials from the area but no answer was received to our inquiry.

4. San Bernadino County Museum, Redlands: Materials excavated but not yet reported on by Ruth Simpson from Watterson Canyon Rockshelter near Crowley Lake are under curation by this institution. Additional materials collected by Dr. Emma Lou Davis may be in the collections from the study area.

5. University of Nevada, Las Vegas: This institution may have the collections made by Dr. C.N. Warren (1975) under its care until final analysis is completed. See also Brooks et al, (1977).

6. Nevada State Museum, Carson City: This institution has some collections from the study area (cf. Tuohy 1965).

7. Nevada Archaeological Survey, University of Nevada, Reno: This research unit has materials from the study area (Elston and Covington 1977).

8. Sacramento State University, Sacramento: This institution has the cultural material recovered during Ann Peak's various projects in the study area boundaries.

9. Native American Cultural Center, Bishop, California: Not yet completed but it may curate archaeological collections concerned directly with the study area. Possibly may be the repository for the Enfield Collection.

10. University of California, Los Angeles: Collections from the study area have been listed previously.

11. California State Division of Parks and Recreation - Bodie Historical Site: A small museum of representative artifacts is maintained at this park.

12. Eastern California Museum, Independence: This local museum has numerous material culture items from the surrounding areas, including Owens Valley and Mono Lake.

13. Laws Railroad Museum, Laws: A local museum containing basketry, projectile points and other miscellaneous artifacts. Of some use in the history of local railroading.

14. University of Pennsylvania Museum, Philadelphia: This institution houses the Richard Waln Meirs Collection of 120 Washo Indian baskets (cf. Museum Journal X(1-2):26-28, 1919.)

15. University of Colorado Museum, Boulder: The museum has a collection of 22 baskets collected between 1850 and 1900 near Topaz on the California-Nevada border (Nyswander Collection).

16. Museum of Anthropology, University of Michigan, Ann Arbor: Several Eastern Mono or Washo baskets are in the general collection of California Indian artifacts.

17. The Milwaukee Public Museum, Milwaukee: The collections include 148 Washo artifacts collected by Barrett in 1923.

18. Southwest Museum, Los Angeles: Local collections including the Stahl Site (Harrington 1957) material. Mostly earlier archaeological material (e.g. 1920-1950).

19. Mono County Museum, Bridgeport: Local historical museum housed in an old schoolhouse built in 1880 (National Register of Historic Places). Houses photos, documents and other memorabilia tracing the county's heritage.

20. Field Museum of Natural History, Chicago, Illinois: A number of items from this collection are referred to in Steward (1933).

Collections - Material Culture - Private

1. Enfield Collection: Grace and Rollin Enfield of Bishop have an extensive collection of local cultural materials with reasonable documentation (Helen Castillo, personal communication, 1978). This collection, if ever analyzed or documented by professional archaeologists, will be of some value in understanding the prehistory of the area.

2. The following collections have been noted by Price (1963) as pertaining to the Washo Area (Coleville PU and vicinity). He should be consulted for full details on the material culture represented in the collections. It is not known if these collections are still extant. Local inquiry may produce this information and if the collections are still intact, full recordation should be attempted.

A. Juanita Schubert of Minden, Nevada has a collection of artifacts from 11 sites in Washo territory. The following sites apparently fall within the confines of the Coleville PU.

   1. The Bagley Valley site is in a flat 1.0 miles north of Heenan Lake and 1.5 miles east of Monitor, California.

   2. The Heenan Lake site is along the north shore of Heenan Lake. Four DSN and one Humboldt Concave Base B points were among the artifacts.

   3. The Antelope Valley site is on the east side of this valley about 3.0 miles southeast of the town of Topaz. A single white chert DSN point with a notched base was found here.

B. Iva Ashurst of Topaz, has collections from two sites west of Topaz Lake and US Highway 395 in Douglas County, Nevada close to the Nevada/California State Line.

   1. A cache of 21 leaf shaped obsidian blades was found, on the south slope of a wash about 50' west of US 395 and 0.25 miles north of Topaz Lodge.

   2. At a site of 0.25 miles west of the above and at the foot of the mountain west of Topaz Lodge, more than 1600 glass trade beads were found in an area 6.0' x 6.0'. The beads may have been used as a cremation offering.

3. Emma Lou Davis (1964) has studied a number of private collections in conjunction with her work in the Mono Basin. These are chiefly point collections from private individuals in Lee Vining, Benton and Bishop. The following have been taken from her publication.

A. Anonymous Collection, Old Benton, California: An extensive collection from Old Benton and the surrounding area.

B. Collection of Mr. and Mrs. Pete Mathieu, Lee Vining: Primarily from the Cain Ranch or Black Point in the Mono Lake Valley.

Undoubtedly numerous other private collections are in existence for the area (cf. Simpson 1961) but have not been recorded or even known by professional archaeologists. A thorough recording as attempted by Simpson (1961) coupled with possible curation of the material in a local facility would along with detailed study produce data of immense value to the prehistory of the region.

Reference Source

Bean, L. and S. Vane
1977 California Indians: Primary Resources, A Guide to Manuscripts, Artifacts, Documents, Serials, Music and Illustrations. Ballena Press, Ramona.

Note

The sources cited in this appendix can be found in the main bibliography of the report. The Ethnographic and Archaeological Overview portions of this report should be consulted for specific information on some of these collections.

APPENDIX C

Obsidian Sourcing and Exchange

Obsidian was a highly valued natural resource of the aboriginal populations of California. Obsidian was used to produce a wide variety of utilitarian implements as well as immense, greatly treasured 'ceremonial' blades (bifaces). Although alternate lithic raw materials were available throughout the state, obsidian, even in small amounts, is usually found in archaeological sites statewide. Obsidian artifacts are frequently found in sites well over a hundred miles from known geological sources of obsidian (Jack 1976:183).

History of Research

Ericson (1977:14-15) defines chemical characterization (of obsidian) as a process or procedure which defines the chemical parameters by which a set of sources can be distinquished. The purpose of chemical characterization in this connection is to accurately identify the origin or source of obsidian which can then aid the prehistorian to interpret prehistoric trade and economic networks and shed light on prehistoric social relationships. Perlman, Asaro and Michel (1972) have reviewed the already extensive literature on this subject. In California, systematic research into obsidian source determination was first conducted by Griffen, Gordus and Wright (1969) and Jack and Carmichael (1969), followed by important studies by Stevenson, Stross and Heizer (1971), Bowman, Asaro and Perlman (1973), Jackson (1974), Jack (1976) and Ericson, Hagan and Chesterman (1976). Ericson (1977) has reviewed most of the previous research dealing with the chemical determination of the sources of obsidian utilized by aboriginal populations in California.

X-ray Fluorescence analysis focusing on the elements zirconium, rubidium, and strontium (cf. Jack and Carmichael 1969) proved to be non-destructive, rapid and inexpensive. Unfortunately, this approach has proven to be inadequate for the chemical separation of a number of important obsidian sources, particularly those in the Mono Basin area. Recent modifications in the original approach (cf. Jackson 1974 and Jack 1976) have overcome many of these difficulties. Ericson (1977) has demonstrated that utilization of neutron activation analysis of long half-life radionuclides offers the best promise of overcoming the problem of chemical overlapping and the concommitant difficulties that arise in chemical distinguishment between obsidian sources.

The utilization of X-ray Fluorescence analysis for sourcing of obsidians was first applied in California by Weaver and Stross (1965) and Parks and Tieh (1966). Parks and Tieh were the first investigators to deal exclusively with the differentiation of California obsidians and it was their suggested use of strontium/rubidium ratios for the segregation of source materials that helped direct present research (Jackson 1974:9). Articles by Stevenson, Stross and Heizer (1969), Hester, et al. (1971a, b), Jack and Heizer (1968) and Stross, et al. (1968) followed developments in the technique established after the initial experimentation by Weaver and Stross (1965) (cf. Jack, Lajoie and Carmichael 1967 and Jack and Carmichael 1969 for details of X-ray analysis techniques).

Jack, Lajoie and Carmichael (1967) and Jack and Carmichael (1969) were able to determine that obsidians are highly homogeneous in major element composition and only slightly less so in minor element composition. Hence, the identification of obsidian flows as distinctly homogeneous chemical entities, discrete from one another, allows for seeking a means to 'fingerprint' individual sources by elemental analysis. The differences between obsidian flows can be expressed through determination of the relative peak amplitudes of only three minor elements: rubidium (Rb), strontium (Sr) and zirconium (Zr). While the relative peak amplitudes of these elements will not distinguish between geographical sources of obsidian in every case (cf. Jackson 1974:13-14 and Jack 1976:188) the results obtained to date have been sufficiently encouraging to warrant continued use of the technique (Hughes 1978:62). This rapid-scan semi-quantitative X-ray Fluorescence technique has been described in detail by Jack and Carmichael (1969), Jackson (1974), Jack (1976) and Hughes (1978). Problems of chemical overlap and difficulties with the chemical separation of certain sources (Bodie Hills from Pine Grove Hills, Mono Craters from Mono Glass Mountain, Mono Craters-Mono Glass Mountain from Fish Springs or Coso Hot Springs (Sugarloaf)) have led to the use of neutron activation analysis in order to overcome these problems (cf. Bowman, Asaro and Perlman 1973 and Ericson 1977). With neutron activation analysis it is possible to chemically distinguish between all obsidian sources in California and Nevada.

Obsidian Sources in the Vicinity of the Planning Units (Figs. 40-43)

Ericson, Hagan and Chesterman (1976:221) have reviewed geographic and geological information pertinent to the obsidian sources in Nevada and California. Of 32 sources of obsidian in California and 3 in western Nevada, seven California and three Nevada obsidian sources are present either within the planning units, are in close vicinity to the units, or the obsidian from these sources is present in archaeological sites in the planning units, and/or the aboriginal populations whom inhabited lands within the planning units quarried at these sources or obtained obsidian from these sources through trade. Ericson, Hagan and Chesterman (1976:223-226) and Jackson (1974) presented descriptions of these various obsidian sources and information relevant to sources in or near the planning units will be reviewed and where necessary paraphrased.

Sugarloaf, Inyo County, California (also called Coso Hot Springs)

Sugarloaf (Section 13, T22S, R38E, MDBM, Haiwee Reservoir Quadrangle), is located in a volcanic field of perlite domes and fumaroles within the southwestern portion of the Coso Mountains about 150 miles northeast of Los Angeles (Heizer and Treganza 1944). The area has been mapped by Chesterman (1956). The other perlite domes do not contain obsidian suitable to flake tool manufacture. The obsidian outcrops halfway up Sugarloaf occur in five lenses, two of which were sampled by Ericson (1977). Archaeological indications are that quarrying took place over a wide area. The informants among the Owens Valley Paiute did not mention the use of this obsidian quarry, rather they referred to the use of the Mono Lake obsidian sources (Steward 1933).

However, since the Owens Valley Paiute visited Coso Hot Springs, four miles to the east, it is assumed that they used the quarry (Farmer 1937). According to Steward (1933) the Tubatulabal once held the territory in which the quarry is located. Within comparatively recent times, the Shoshone (Koso, Panamint and Koso-Panamint) came into this territory from the north (Farmer 1937).

Fish Springs, Inyo County, California (Fig. 43 , No. 8)

Near Fish Springs (NE¼, NE¼, Section 25, T10S, R33E, MDBM, Big Pine Quadrangle) is an obsidian-perlite dome, located 9 miles south of Big Pine, California. The surrounding volcanic field has massive lava flows and cinder cones. The obsidian source was found using an Owens Valley Paiute descriptive term for mountain, ta'kapi, obsidian by Heizer and Treganza (1944) and Steward (1933). The obsidian occurs as small nodules above and below rhyolite. This quarry is the site of an active perlite mine. Although the quantity of obsidian is comparatively small, the area around this dome has frequent scatters of obsidian and other lithics. This quarry is located within the territory of the Owens Valley Paiute.

Inyo Craters, Mono Lake, Mono County, California (Fig. 41 , No. 5)

The complex Mono Lake volcanic field has a number of obsidian sources within the three volcanic structures described below. The Mono Craters, a series of rhyolite domes and coulees, extends southward from Mono Lake to Wilson Butte (cf. Gilbert, et al. 1968 and Jack and Carmichael 1969). The Inyo Craters, the southern extension of the Mono Craters, are a series of composite rhyolite-obsidian domes which are chemically and petrographically quite different from Mono Craters (Gilbert, et al. 1968 and Mayo, et al. 1936). Glass Mountain and Truman Canyon (Queen) obsidian sources are 20 to 30 miles to the southeast of Mono Lake. The obsidian varies from coarsely vitrophytic, opaque (Inyo Craters) to multicolored, clear varieties (Glass Mountain and Truman Canyon-Queen). Although archaeological evidences of quarry-workshops are absent at many of the obsidian sources, it is interesting to note that a number of continuous eruptions forming the Mono Craters occurred during recent prehistoric times, through the period of 1300 - 12,000 years, based on potassium-argon (Dalrymple 1967) and obsidian hydration dating (Friedman 1968). The extrusions of Glass Mountain and Truman Canyon occurred prior to 0.9 million years ago based on a potassium-argon date (KA-2081) of Glass Mountain obsidian (Gilbert, et al. 1968). The southernmost dome of the Inyo Craters was dated by potassium-argon as less than 60,000 years (Everden and Curtis 1965).

The Inyo Craters are a series of five composite rhyolite-obsidian domes which are east of the Sierra Nevada escarpment. No archaeological quarry-workshops were observed in this area, possibly due to the generally poor quality of the obsidian which contains numerous large phenocrysts. Ericson (1977:224) sampled four domes and used used provenience descriptions of Mayo et al. (1936) which are repeated here.

Hill 8491 (Dome 5) NE¼, SE¼, Section 5, T3S, R27E, MDBM, Devils' Postpile Quadrangle

Hill 8160 (Dome 4) NE¼, SE¼, Section 5, T3S, R27E, MDBM, Devils' Postpile Quadrangle

Hill 8520+ (Dome 3) SW¼, NE¼, Section 29, T2S, R27E, MDBM, Mono Craters Quadrangle

Hill 8611 (Dome 2) Section 20 and NW¼, NE¼, Section 20, T2S, R27E, MDBM, Mono Craters Quadrangle

Mono Craters, Mono Lake, Mono County, California (Fig. 41 , No. 4)

Mono Craters are a series of domes, lapilli rims and coulees which are the northern extension of the trend of the Inyo Craters. No archaeological evidence of quarry workshops was observed in this area. The lack of workshops might have been the result of the sanction taboos placed on the use of the obsidian in this area or the quality of the obsidian. The Owens Valley Paiute considered the Mono Craters obsidian to be poisonous (Heizer and Treganza 1944 and Steward 1933). This might be explained by the fact that these craters erupted during the occupation of this area. Friedman (1968) has dated Panum (North) Dome at 1300 years B.P., the Northern Coulee at 2500 years B.P. and the Southern Coulee at 5800 years using obsidian hydration dating. Ericson (1977:225) sampled two of these structures and reports their provenience as follows:

(North) Panum Crater, NE¼, SW¼, Section 19, T1N, R27E, MDBM, Mono Craters Quadrangle

N.W. Coulee, SW¼, SE¼, Section 30, T1N, R27E, MDBM, Mono Craters Quadrangle

Jackson (1974:49) collected obsidian from the Mono Craters (Section 19, T1N, R27E) and reports that it is quite glassy and entirely workable, as opposed to the vast majority of the obsidian from the area which is quite frothy. The question arises as to whether this source of material was actually available for use by the Indians. The age of the Mono Craters obsidian has been determined as between 1500 to 10,000 years old, there being several periods of eruption (cf. Gilbert, et al. 1968 for discussion). The material at the north end of the chain may not have been uncovered before recent quarrying operations for road material exposed the flows and thus, the workable obsidian may have been inaccessible to the Indians. Until recently, the Mono Craters obsidian could not be chemically differentiated from that of Mono Glass Mountain (at least not with X-ray analysis) which is dated to 0.9 million years (Gilbert, et al. 1968). Since the two are chemically similar, the artifacts recovered from archaeological sites cannot be assigned with confidence to one source or the other unless neutron activation analysis is used.

Steward (1933) does not mention the exploitation of the Mono Craters area. He does specifically mention the Mono Glass Mountain source and states that, "Mono Lake obsidian, piju'um, came from Glass Mountain" (Steward 1933:232), but see above discussion of the obsidian being 'poisonous'. Hence the Mono Craters areas is a locality from which workable material could have been derived, but whether it was actually available and utilized remains to be demonstrated.

Mono Glass Mountain, Mono Lake, Mono County, California (Fig. 41 , No. 3)

Mono Glass Mountain (Section 14, T1S, R30E, Section 16, T2S, R30E, MDBM, Glass Mountain Quadrangle) at an elevation of 11,120 feet asl is a large composite rhyolite-obsidian dome with an estimated volume of 15 cubic kilometers (Gilbert, et al. 1968). At Sawmill Meadows (9200 feet asl in Section 16) the obsidian, which is occasionally porphyritic, varies from red, brown, mahogany and black. Many quarry-workshops are evident. The Owens Valley Paiute quarried this obsidian source (Heizer and Treganza 1944 and Steward 1933). Obsidian cobbles were also collected (Section 14) in the drainage of this source.

Truman Canyon-West Queen Mine, Mono Lake, Mono County, California

(Also called Queen or Truman Meadows) (Fig. 42 , No. 7)

Gilbert, et al. (1968) reported small rhyolitic extrusions on the northeast flank of Queen Valley (SE¼, NW¼, Section 29; SW¼,NE¼, Section 33, T1N, R32E, MDBM, Benton Quadrangle). These were not located in the field although numerous reddish-brown and clear, black-banded obsidian nodules were observed in the stream channels of Truman Canyon (Section 29). The area around the mouth of this canyon is a vast quarry-workshop. A stream has recently washed out W. Queen Road (Section 33) and exposed two strata, the upper stratum, 0-58", buff colored sand with no archaeological remains, and the lower stratum, 58-109", sand and gravel with a large quantity of archaeological material found at 60-87".

Jackson (1974) reports that the source known as Queen (Truman Meadows) is located just across the state boundary in Nevada. Obsidian from this deposit is scattered over a wide area of the Queen Valley and the nearby hills but the major deposit is located at Truman Meadows at an elevation of some 7200 feet. The general area of obsidian can be defined as Section 7,8,9,17 and 19, T1N, R32E, MDBM.

Casa Diablo, Mono County, California (Fig. 41 , No. 6)

Jack and Carmichael (1969) reported an obsidian source in Little Antelope Valley (NW¼, NW¼, Section 26 and Section 22, T3S, R28E, MDBM, Mount Morrison Quadrangle). There are many quarry-workshops in the area. Jackson (1974:50) notes that the Casa Diablo obsidian source is not mentioned by Steward nor is it discussed by any of the ethnographic accounts. Casa Diablo source is located to the east of the resort of Mammoth Lakes, near the site of the former village of Casa Diablo. Obsidian is spread over an area of at least twenty square miles and is one of the most spectacular sources east of the Sierras. A major quarry site (CA-Mno-10) is located in this area and the nearly 500 foot high hill of obsidian along Hot Creek is a magnificent sight, rivaled only by the huge flow of Mono Glass Mountain.

Bodie Hills, Mono County, California (Fig. 40 , No. 1)

Bodie Hills obsidian source is a rhyolite and obsidian intrusion (E½, NE¼, Section 21, T5N, R26E, MDBM, Bridgeport Quadrangle). The surface of an extensive area is covered with obsidian debitage. This is the source of many artifacts from Alpine County and a few from Contra Costa County (Jack and Carmichael 1969). The obsidian is clear grey.

Pine Grove Hills, Lyon County, Nevada

Jack (1976) using X-ray Fluorescence analysis techniques was unable to distinquish between this source and the Bodie Hills source. Ericson (1977) using neutron activation analysis, has successfully segregated them, however.

Mount Hicks, Mineral County, Nevada (Fig. 40 , No. 2)

Obsidian occurs on the east slope of Mount Hicks by the roadside in Alkali Valley (Section 24, T5N, R29E, MDBM, Aurora Quadrangle, California-Nevada). Except for Jack and Carmichael (1969) there is very little published information on this site but material from Mount Hicks was analyzed by Ericson (1977).

Exchange Networks in the Planning Units

Ericson (1977) has extensively studied the trade networks operating among the aboriginal inhabitants of California, especially with reference to the trade of obsidian. Ericson has logically grouped the various obsidian sources located east of the crest of the Sierra Nevada into exchange systems. The following discussion is a review and synthesis of Ericson's analysis of prehistoric exchange systems operant in the vicinity of the planning units and is presented here at face value, and not as a critical review. Although Jack (1976) and Ericson (1977) based their conclusions on the analysis of hundreds of specimens from many dozens of sites, the sample of archaeological obsidians is relatively small.

Bodie Hills Exchange System

This exchange system includes the Bodie Hills, Pine Grove Hills and Mount Hicks obsidian sources. Ericson (1977:203-206) reports that the obsidian from these sources is generally clear grey and black in color and occur as cobble-to-pebble in size. The structure of the deposits are massive flows in an area of about 9 square kilometers surrounded by rhyolite. The obsidian has a hardness of 907 kg/mm^2 and the age of the flows are unknown but may be Pleistocene. The radius of catchment is 226 km and the estimated number of consumers is 98,000 persons (the estimated number of persons in the exchange system - explained by Ericson 1977:256, Table 6-3). The Washo controlled these sources[1], and in exchange for obsidian, they obtained acorns, shell beads, sea shells, paprum bulbs, redbud bark for basketry, soaproot leaves for brushes, kutsavi (insect larvae), baskets and manzanita berries. The Washo also exported salt, pinyon nuts, buffalo skin robes, rabbit skin blankets. The primary recipients of obsidian from these Washo 'controlled' sources were the Northern Paiute, Maidu, Eastern and Western Mono. Jack (1976) in his X-ray analyses of artifacts from California archaeological sites, reports that obsidian from these sources comprise 85% of all Washo obsidian, 3.4% of Bay Miwok obsidian, 39.7% of Plains Miwok, 75% of Northern Sierra Miwok, 25.2% of Southern Sierra Miwok, 2.7% of Western Mono, 0.9% of Coast Miwok and 5.5% of the Costanoan.

Casa Diablo Exchange System

The Casa Diablo exchange system includes the Casa Diablo, Truman Canyon-West Queen Mine, Mono Glass Mountain and Mono Craters. Ericson (1977:206-211) reports that the obsidian from these four sources varies from black to gray (some are red streaked) in color and occurs as cobbles or pebbles (Casa Diablo) in size. The structure of the deposit is a coulee (?) in an area of 15 square kilometers (Casa Diablo) surrounded by volcanic parent rocks. The (Casa Diablo) obsidian has a hardness of 799 kg/mm^2 and the age of eruption is unknown for the Casa Diablo source. The age of the Mono Craters source is 1300 to 12,000 years B.P. and Mono Glass Mountain is 0.9 million years B.P. The radius of catchment is 256 km and the estimated number of consumers is 354,000 persons. The Mono Lake Paiute (Eastern Mono) controlled these sources and in exchange for obsidian, they received squaw berries, shell beads, glass beads, acorns, clam disk beads, baskets, manzanita berries, bear skins, rabbit skin blankets, elderberries, fungus used in paint, black and yellow paint, deer-antelope-elk skins, steatite, salt grass, salt, acorn meal, fine Yokuts baskets, shell ornaments, buckskins. They also exported salt, pine nuts, seed food, rabbit skin blankets, tobacco, baskets, buckskin, pottery vessels, clay pipes, pandora moth catepillars, kutsavi, red paint, white paint, pumice stone, basketry materials, sinew-backed bows, mocassins, jerked deer meat, hotrock lifters, shell beads, mineral paint, pitched-lined basketry water bottles, acorns, mountain sheep skins, tailored sleeveless buckskin jackets, fox skin leggings, and unfinished obsidian arrowheads. The primary recipients of obsidian from these sources were the Washo, Western Mono, Koso and Owens Valley Paiute. Jack (1976) reports that obsidian from these sources comprise 20.6% of all Panamint Shoshone obsidian, 20.9 to 26.4% of the Owens Valley Paiute (Iny-76 and Iny-1,2), 31.8% of the Kawaiisu (Panamint Mountains), 75% of the Kings Canyon, Sierra (Yokut), 9.5% of the Plains Miwok, 72.7% of the Southern Sierra Miwok, 95.6% of the Western Mono, 97.6% of the Northern Valley Yokuts, 66.7% of the Southern Valley Yokuts, 18.5% of the Buena Vista Lake Yokuts and 5.5% of the Costanoan. The Owens Valley Paiute quarried at Mono Glass Mountain.

Fish Springs Exchange System

The Fish Springs exchange system includes only the Fish Springs source. Ericson (1977:211-214) notes that Fish Springs obsidian is gray-black in color and occurs as pebbles (almost too small for projectile point manufacture). The deposit is a pumice dome structure in an area of about 0.5 square kilometers. The obsidian has a hardness of 714 kg/mm^2 and the age of the eruption is unknown, but possibly Pleistocene. The radius of catchment is 68 km and the estimated number of consumers is about 17,000 persons. The Owens Valley Paiute (Eastern Mono) controlled this source and received in exchange for their obsidian, the same goods as described in the Casa Diablo exchange system. The items exported are essentially the same as described above for the Casa Diablo exchange system. The primary recipients of Fish Spring obsidian were the Mono Lake Paiute, the Western Mono and the Koso. Jack (1976) reports that Fish Spring obsidian comprises 5.9% of Panamint Shoshone obsidian, 70.1% to 5.3% for the Owens Valley Paiute (Iny-76 and Iny-1,2), 31.8% for the Kawaiisu (Panamint Mountains), and 25.0% for the Kings Canyon, Sierra (Yokuts). Fish

Springs obsidian is referred to by the Owens Valley Paiute as 'kapi' or obsidian.

Coso Exchange System

The Coso exchange system includes only the Sugarloaf source (or the Coso Hot Springs source). Ericson (1977:234-238) reports that the Coso obsidian is black in color, occurs as blocks and cobbles and is found in a volcanic dome structure. The obsidian has a hardness of 773 kg/mm^2 and the age of the eruption is unknown, probably Pleistocene. The radius of catchment is 162 km and the estimated number of consumers is about 74,000 persons. The Coso controlled this source and in exchange for obsidian they received shell beads and various goods. They also exported salt. The primary recipients of Coso obsidian were the Eastern Mono, Western Mono, Tubatulabal, Chemeheuvi and Kawaiisu. The Owens Valley Paiute had access to this source. Jack (1976) reports that obsidian from this source comprises 100.0% of Tubatulabal obsidian, 100.0% of Kawaiisu obsidian, 73.5% of the Panamint Shoshone, 8.3 to 63.2% of Owens Valley Paiute obsidian (Iny-76 and Iny-1,2), 54.5% of the Kawaiisu (Panamint Mountains), 33.3% of the southern Valley Yokuts and 77.8% of the Buena Vista Lake Yokuts. Steward (1933) stated that the Tubatulabal once held the territory in which the quarry is located. However, in recent times the Koso, Panamint and Koso-Panamint came into the territoty from the north (Farmer 1937).

Notes:

1. To say that the Washo "controlled" these sources is misleading. Ericson (1977) is correct when he cites Jack's (1976) data indicating about 85% of obsidian found in Washo sites derived from these sources. However Stewart (1966:224, Map 21) indicates the Washo did not permanently occupy the territory around Mono Lake, nor did the Washo nuclear territory include Bodie Hills or Mount Hicks. Pine Grove Hills are very close to the nuclear territory of the Washo as drawn by Stewart (1966:224, Map 21). Jack (1976:213, Fig. 11.2c) using Kroebers' tribal-linguistic areas (as published by Heizer 1966) maps these sources outside of the Washo 'boundaries'. It is more likely that the Washo had access to the sources and quarried there.

Patterns of Obsidian Exchange

The presence of obsidian from sources east of the Sierra in Costanoan (Ohlone) sites of the San Francisco Bay area has been reported by Jack (1976: 190). For sources in the planning units, Jack's (1976:191) suggestion is quite useful. He suggested considering as one group the Bodie Hills/Pine Grove Hills obsidian sources characteristic of Washo sites and as another group the Mono Basin sources - Casa Diablo/Truman Canyon/Mono Glass Mountain/Mono Craters - which are absent in Washo sites but are common in the sites of their neighbors to the south. Ericson (1977) did just that and labeled the Bodie Hills/Pine Grove Hills (and added Mount Hicks) the Bodie Hills exchange system. The Mono Basin sources, Casa Diablo/ Truman Canyon/ Mono Glass

Mountain/ Mono Craters are designated as part of the Casa Diablo exchange system. Jack (1976:192) demonstrated that the decrease in proportion of Bodie Hills/Mt. Hicks (Ericson's Bodie Hills exchange system) obsidian westward from the Northern Sierra Miwok (and probably ultimately from the Washo) territory is balanced by the increase in the proportion of Coast Range (Napa, Annadel) obsidians towards the coast. Similarly the decrease in proportion of Mono Basin obsidian (Ericson's Casa Diablo exchange system) northward from Western Mono territory is balanced by increasing proportions of Bodie Hills exchange system obsidian types and decrease southward in the San Joaquin Valley is balanced by increasing proportions of Coso Hot Spring (Sugarloaf) obsidian.

J.T. Davis (1961) has provided abundant confirmation from the ethnographic literature of economic exchange in aboriginal California and of the trails followed (cf. Sample 1950). The Northern Sierra Miwok who were in contact with the Washo to the east provided finished arrowheads and obsidian to the Plains Miwok (Davis 1961). The Sierra Miwok engaged in trade across the crest of the Sierra with the Owens Valley Paiute (Barrett and Gifford 1933) but this trade did not reach the intensity of that between the Western Mono and their linguistic kin in Owens Valley (Elsasser 1960). Bennyhoff (1956) correctly identified the source of most of the Yosemite obsidian as derived from Casa Diablo and Mono Craters. Casa Diablo exchange system obsidians are nearly three times more abundant in Yosemite as are obsidians from the Bodie Hills exchange system. Jack (1976:193) further elaborates on the trade relations between peoples inhabiting the planning units and groups on the western side of the Sierras. Jack (1976:193-194) documents long range trade and notes that Coso Hot Spring (Sugarloaf) obsidian has been reported 30 miles offshore in Southern California Island Chumash sites on Santa Rosa Island, over 200 miles from the source! In general terms, obsidian from the Mono Basin on the north was introduced into the central Sierra Nevada and into the interior, even reaching the coast probably via the Tubatulabal and possibly the Kawaiisu who were friendly with the Southern Yokuts. The use of the Mono Basin obsidian sources by the Mono Lake Paiute is noted by E.L. Davis (1965),and the use of those sources and of the Fish Springs source by the Owens Valley Paiute has also been recorded (Steward 1933). Jack (1976:195) states that the apparently free exchange of obsidian from all available sources throughout the Owens Valley and adjacent Great Basin areas is in direct contrast to the apparent exclusive use of the Bodie Hills/Pine Grove Hills and Mount Hicks obsidian by the Washo to the northwest and, more significantly, the absence of these obsidian types in Owens Valley sites, even though these sources are in what is normally mapped as Mono Lake Paiute territory. This exclusiveness in the use of obsidian sources may be in part due to the fact that the Washo, whose distinctiveness of language was unusual for a Great Basin group, were traditional enemies of the (Owens Valley) Paiute (Steward 1933). On the north the Washo were also at times in conflict with the Northern Paiute (Kroeber 1925). Although the Washo traded with both the Miwok and Maidu to the west, there is no clear evidence that such relationships were especially friendly (Elsasser 1960).

Ericson (1977) presents information, generated from obsidian hydration dating, that sheds light on the nature of obsidian exchange in prehistoric California. Ericson was able to determine diachronic production rates of three interrelated exchange systems in Central California; St. Helena (Napa), Bodie Hills and Casa Diablo. As noted earlier, all but two obsidian sources important to the planning units - Fish Springs and Sugarloaf (Coso Hot Springs), are included in either the Bodie Hills or Casa Diablo exchange systems. The St. Helena exchange system was examined through data obtained from three nearby sites, CCo-30, CCo-309, CCo-308 (cf. Fredrickson 1969). The Bodie Hills system was examined through production analyses at the quarry Mno-612 (cf. Singer and Ericson 1977). The Casa Diablo exchange system is viewed from the village-workshop at the Mammoth Junction site, Mno-382 (cf. Michels 1965).

Ericson (1977:276) concluded that for the St. Helena exchange system the rate of exchange of obsidian increased rapidly beginning at the Middle Horizon/Late Horizon transitional phase, circa 750-1050 A.D. as recently revised by Ericson based on data from Fredrickson (1969:Table 8) and Jackson (1974). The rate of exchange increased continuously until the Protohistoric period.

The Bodie Hills exchange system, examined through Singer and Ericson's (1977) careful study of the diachronic production rate at the Bodie Hills source using obsidian hydration dating to determine the time of use of specific quarry workshops, was in use 5000 years ago, synchronous with the Early Horizon of Central California[2]. Heizer (1974) noted that Bodie Hills obsidian was used in making Windmiller (Early Horizon) culture artifacts. A relatively constant production rate was maintained until about 2000 B.C. which is synchronous with the beginning of the Middle Horizon (Heizer 1964:127). At this time, the production rate rapidly increases, reaching maximum at about 1000 B.C. and then diminished with the close of the Middle Horizon dated ca. 500 A.D. by Singer and Ericson (1977:186). Critical here are the synchronous changes in lithic technology (Ericson 1977:284). Earliest production at Bodie Hills focused on large bifaces (5000 - 2250 years B.P.). In time, several biface forms occured, but gradually there was a reduction in their size throughout the Middle Horizon. In other words Singer and Ericson (1977) demonstrate some evidence for an early, luxury biface exchange followed by a later, utilitarian blade exchange. In addition, the major changes in the rate of production appear to be synchronous with the 'break points' of the Central California cultural chronology (Ericson 1977:287). Whether the biface production terminated at 500 A.D. to be replaced by blade production remains to be determined. The Bodie Hills exchange system continued to produce obsidian after 500 A.D.

The diachronic production of obsidian at the Casa Diablo quarry is monitored at the Mammoth Junction site, Mno-382 which was intensively studied by Michels (1965) for his dissertation and also reported on by Sterud (1965). Michels was concerned with the application of obsidian hydration dating to assess problems of stratigraphic mixing. Ericson (1977:288) used his data to determine a working diachronic production rate curve for the Casa Diablo exchange system. Ericson (1977:290) has determined that both production rate curves of Casa Diablo and Bodie Hills are almost identical in form and the

same processes of production and supply must have been operating at the same time.

In summary, Ericson (1977:298) notes that the production rates of the Bodie Hills and Casa Diablo exchange system diminished near the beginning of the Late Horizon of Central California prehistory. The eastern sources at Bodie Hills and Casa Diablo both produced bifaces (knives) until about the end of the Middle Horizon, when their production became quite diminished. In the middle of the Middle Horizon, these systems appeared to have begun to diversify their lithic technology in producing blades for export. The St. Helena systems appears to have undergone a gradual development which resulted in a digression of the trans-Sierran systems in the western Foothill region. Since the products of the St. Helena system appear to be more utilitarian from its inception , they may have favored the success of this system over the trans-Sierran systems. The St. Helena system always had a definite advantage in terms of accessibility and continuity of supply, considering the heavy snow covering the trans-Sierran exchange routes during October to May.

Ericson (1977:299-301) discusses that the region as a whole underwent a continuous population growth and increasing sedentism (cf. Heizer 1964) and that the Sierran foothills became areas of permanent settlement (cf. Moratto 1972) which resulted in increased demand since much of the foothill region lacks durable lithic materials. As well, during the Middle Horizon a major change in lithic technology occurred with the appearance of the bow and arrow, replacing the atlatl. Each of the exchange systems had to respond to these conditions. The large functional obsidian bifaces in an Early Horizon context indicate that obsidian was used for the production of luxury items (but not necessarily 'ceremonial' forms). The Bodie Hills and Casa Diablo systems were the main contributors of these items, from evidence presented by Jackson (1974). The growth of the St. Helena system and its utilitarian products did affect the trans-Sierran systems. As a response during middle Middle Horizon times, Bodie Hills and Casa Diablo systems increased their net productive output of bifaces as well as changed their lithic technology to blade production which provided a smaller, more generalized form. Ericson notes that it is still uncertain whether or not the decrease in the production rates of the Bodie Hills and Casa Diablo systems in Central California is real. As an alternative, with the conditions of constant production and continued population growth, these systems would appear to have receded in time. If so, the growth of the St. Helena system would have been a response to a diminishing supply rather than direct competition.

Notes:

2. Obsidian hydration measurements indicate the Early Horizon dates to 5000 B.C. although there are not yet radiocarbon dates that old for the Early Horizon.

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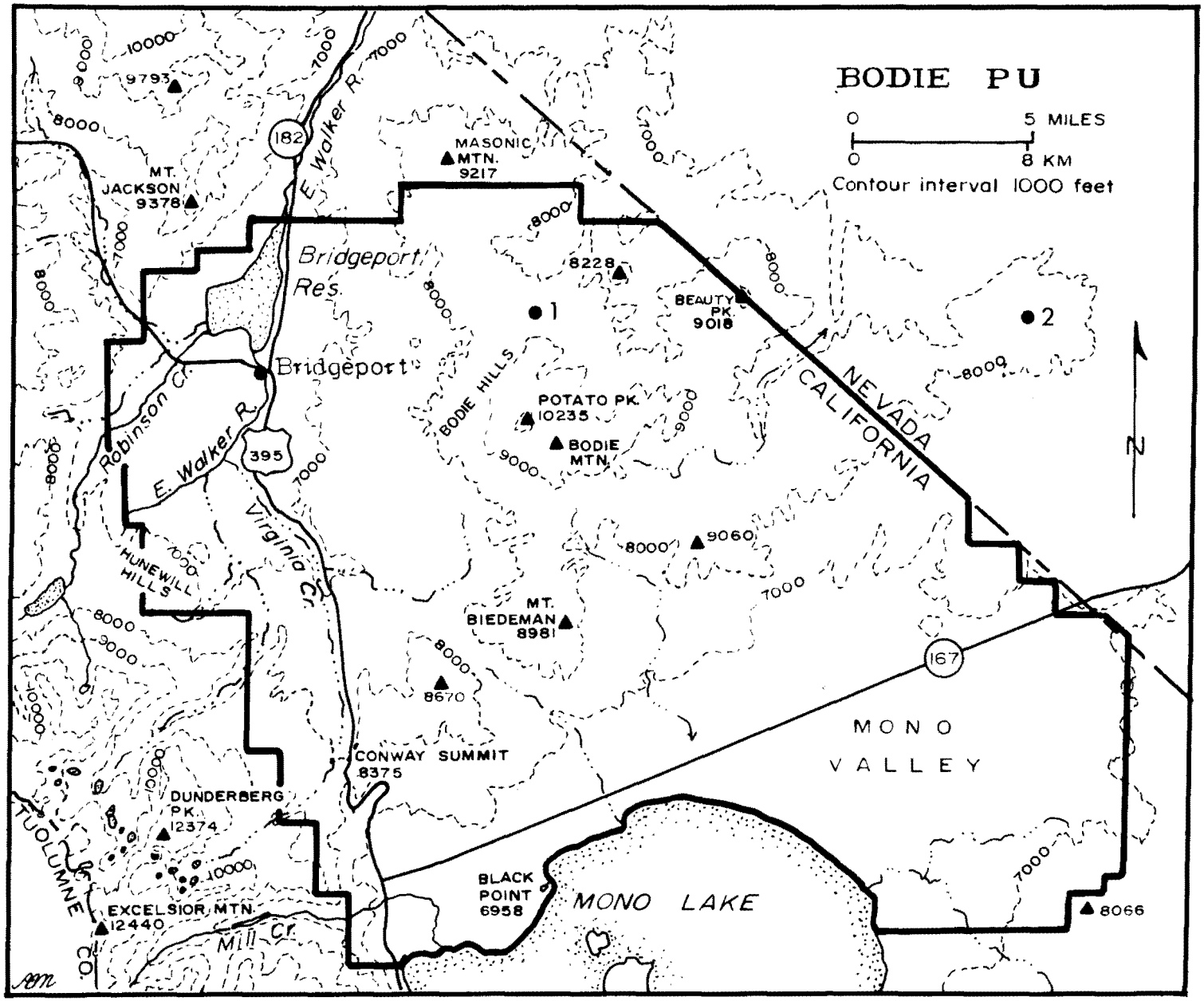

BODIE PU
0 5 MILES
0 8 KM
Contour interval 1000 feet
MASONIC MTN. 9217
MT. JACKSON 9378
9793
182
E. Walker R.
Bridgeport Res.
Bridgeport
Robinson Cr.
E. Walker R.
395
8228
BEAUTY PK. 9018
1
2
BODIE HILLS
POTATO PK. 10235
BODIE MTN.
NEVADA
CALIFORNIA
N
9060
HUNEWILL HILLS
Virginia Cr.
MT. BIEDEMAN 8981
167
8670
CONWAY SUMMIT 8375
MONO VALLEY
DUNDERBERG PK. 12374
TUOLUMNE CO.
EXCELSIOR MTN. 12440
Mill Cr.
BLACK POINT 6958
MONO LAKE
8066

Figure 40

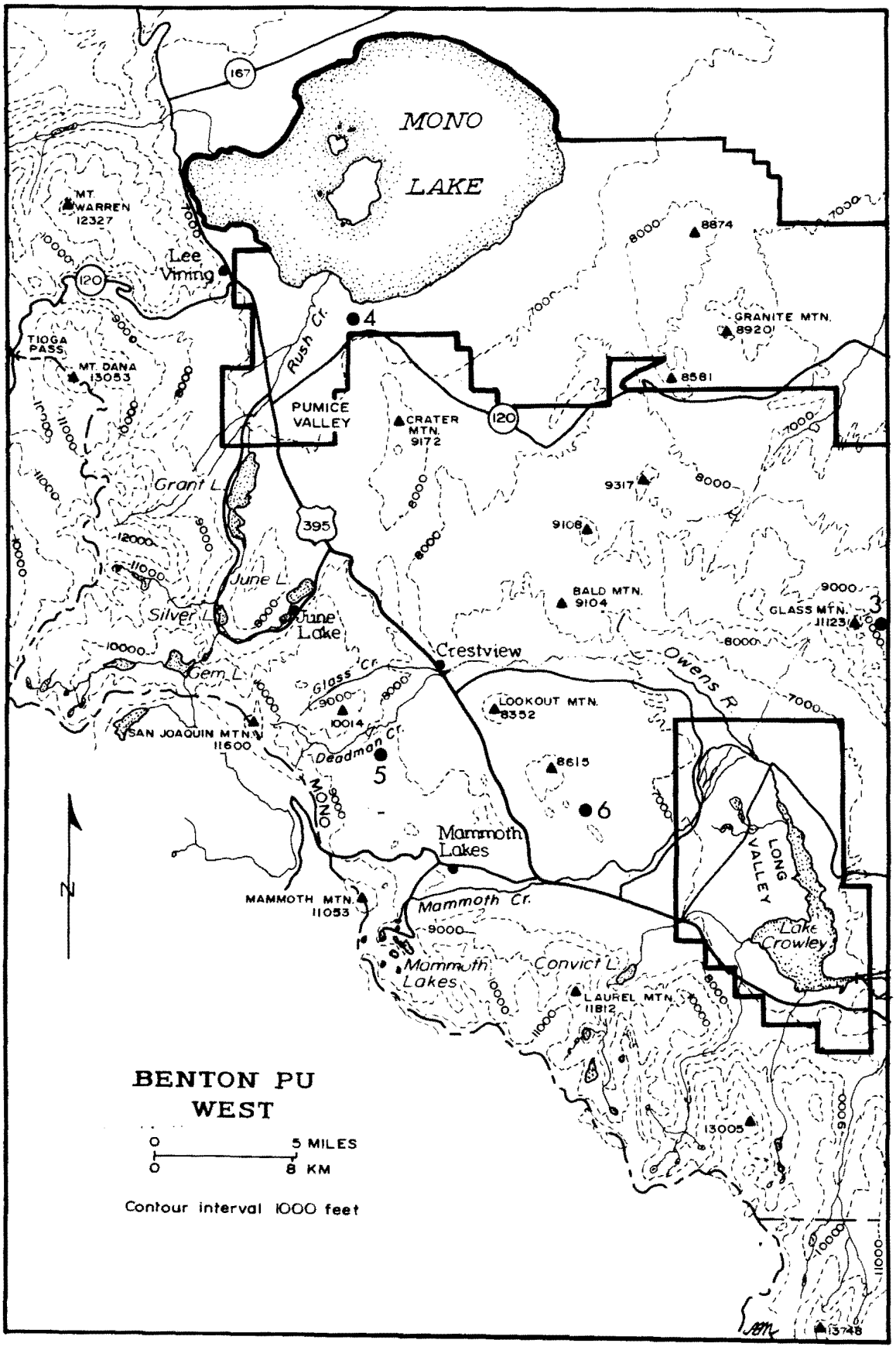

MONO
LAKE
MT. WARREN 12327
Lee Vining
TIOGA PASS
MT. DANA 13053
Rush Cr.
PUMICE VALLEY
CRATER MTN. 9172
GRANITE MTN. 8920
8874
8581
9317
9108
BALD MTN. 9104
GLASS MTN. 11123
Grant L.
June L.
Silver L.
June Lake
Gem L.
Glass Cr.
10014
SAN JOAQUIN MTN. 11600
Deadman Cr.
Crestview
Owens R.
LOOKOUT MTN. 8352
8615
Mammoth Lakes
MAMMOTH MTN. 11053
Mammoth Cr.
Convict L.
LAUREL MTN. 11812
LONG VALLEY
Lake Crowley
13005
13748
167
120
395
MONO
BENTON PU
WEST
0 5 MILES
0 8 KM
Contour interval 1000 feet

Figure 41

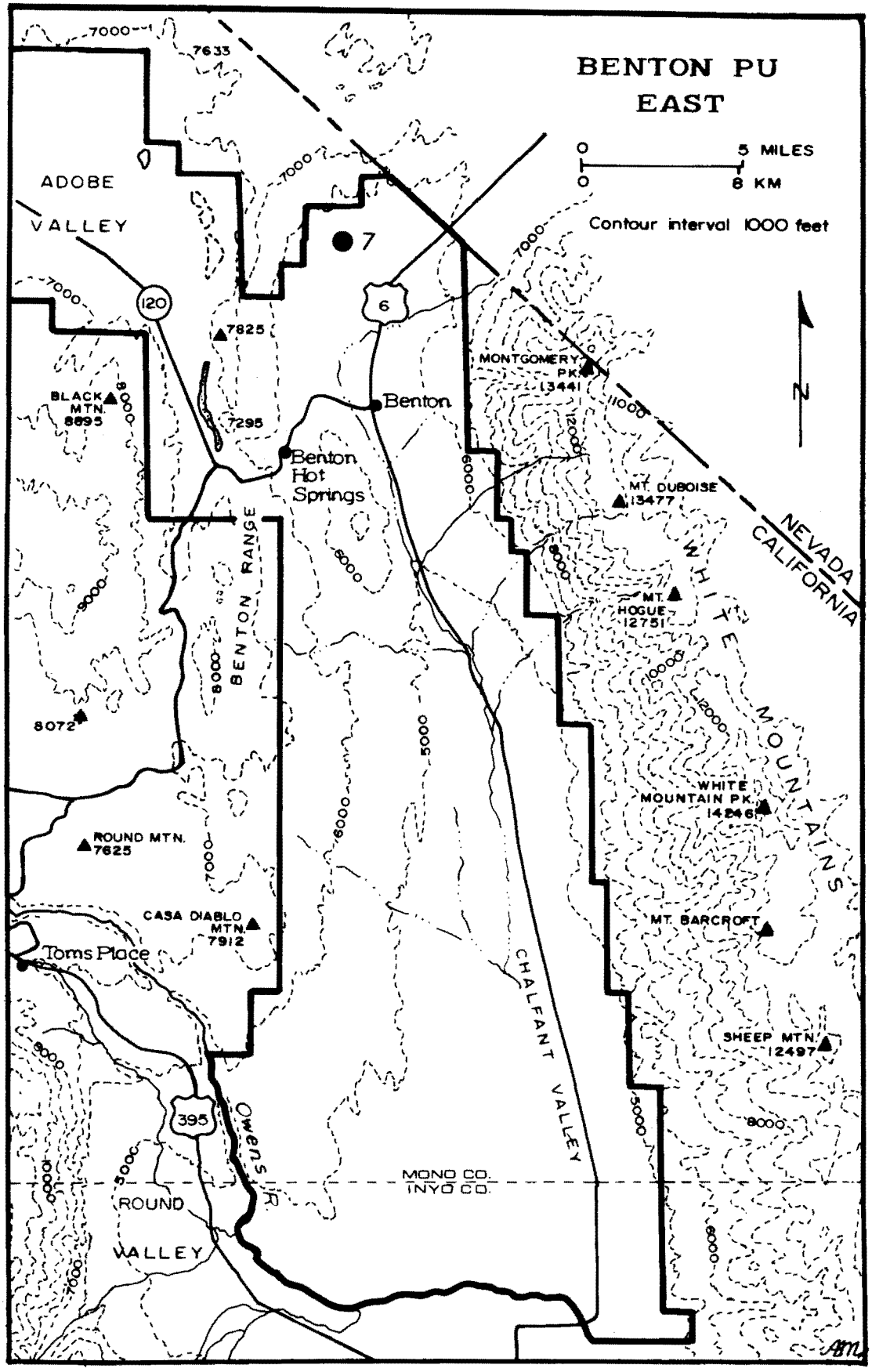

BENTON PU
EAST
0 5 MILES
0 8 KM
Contour interval 1000 feet
N
ADOBE
VALLEY
7000
7633
7825
7295
BLACK
MTN.
8695
8000
Benton
Benton
Hot
Springs
BENTON RANGE
8072
9000
8000
6000
5000
MONTGOMERY
PK.
13441
11000
12000
MT. DUBOISE
13477
NEVADA
CALIFORNIA
MT.
HOGUE
12751
WHITE MOUNTAINS
WHITE
MOUNTAIN PK.
14246
MT. BARCROFT
ROUND MTN.
7625
CASA DIABLO
MTN.
7912
Toms Place
CHALFANT VALLEY
SHEEP MTN.
12497
120
6
395
Owens R.
MONO CO.
INYO CO.
ROUND
VALLEY

Figure 42

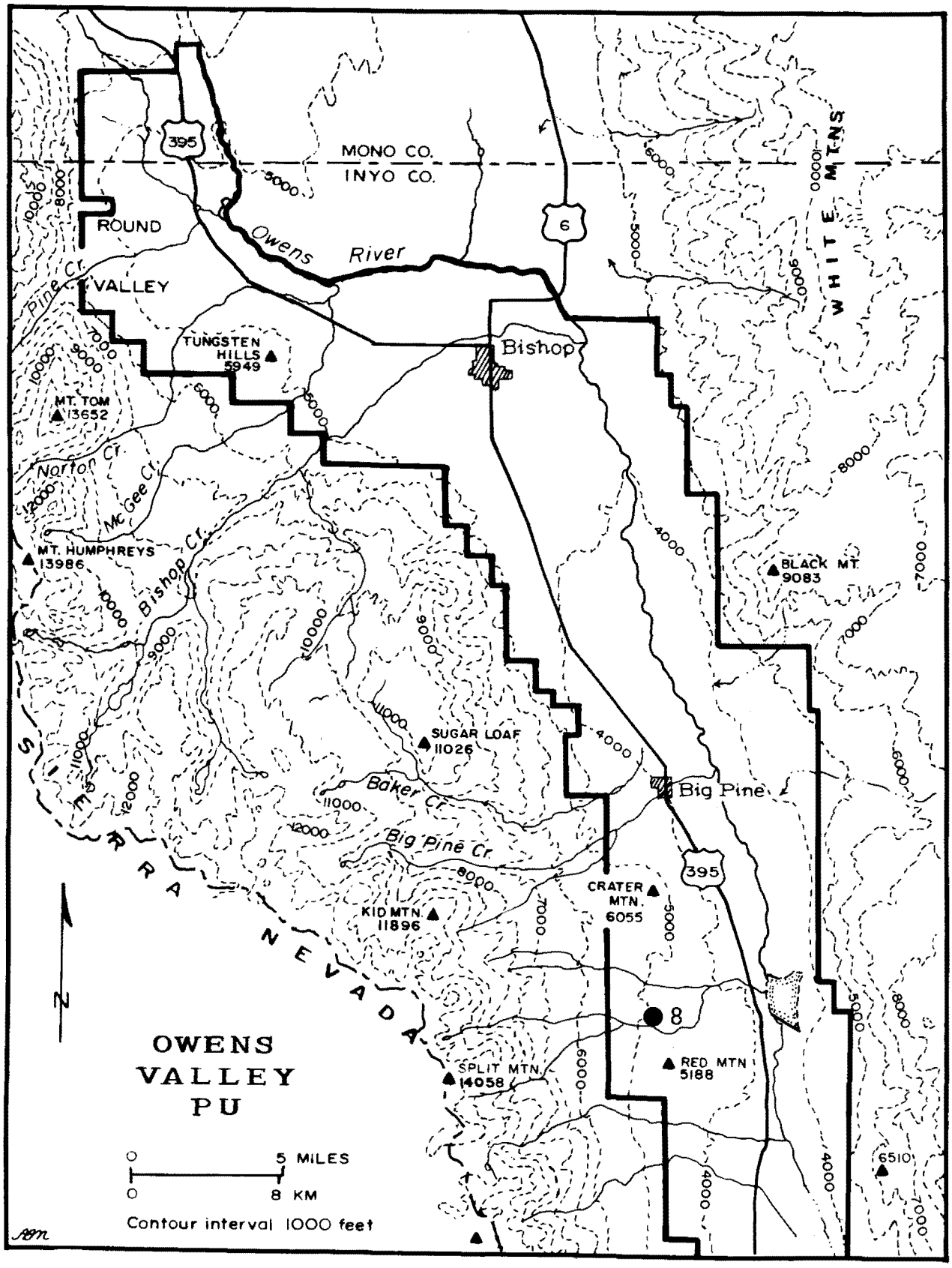

MONO CO.
INYO CO.
395
6
ROUND VALLEY
Pine Cr.
Owens River
Bishop
TUNGSTEN HILLS 5949
MT. TOM 13652
Norton Cr.
McGee Cr.
Bishop Cr.
MT. HUMPHREYS 13986
WHITE MTNS
BLACK MT. 9083
SUGAR LOAF 11026
Baker Cr.
Big Pine Cr.
Big Pine
CRATER MTN. 6055
KID MTN. 11896
SIERRA NEVADA
SPLIT MTN. 14058
RED MTN 5188
6510
OWENS VALLEY PU
5 MILES
8 KM
Contour interval 1000 feet

Figure 43

APPENDIX D

Obsidian Hydration Dating

Introduction

As discussed at length in Appendix C, obsidian sources located in or near the planning units were exploited by the aboriginal groups in the region as a raw material source for lithic manufacturing. The potential utility of obsidian hydration dating for archaeology has been discussed in detail by Michels (1973). As a direct dating technique of lithic material, it has a special use in the determination of stratigraphic mixing (of archaeological deposits) (cf. Michels 1967) and in the relative dating of surface sites lacking diagnostic artifacts (cf. Layton 1973). As a relatively inexpensive dating technique it provides the field archaeologist with an effective means of dating a large number of samples. Ericson (1977a,b) has utilized obsidian hydration dating to obtain synchronous control of large regional exchange systems operant in the planning units. Singer and Ericson (1977) and Ericson (1977b) found the technique particularly useful in studying the diachronic rates of production at obsidian quarry sites.

History of Research

The following review of obsidian hydration dating is adopted in large part from Ericson (1978:45-46). The obsidian hydration dating technique has been shown to be useful to archaeology (Michels 1967, 1973; Meighan, Foote and Aiello 1968; Johnson 1969; and Singer and Ericson 1977 among others). The hydration phenomenon involves the development of a measureable birefringence stress layer through a sequence of processes which are presently not totally understood. Atmospheric water is chemically absorbed on the surface of the obsidian. This water diffuses into the interior of the obsidian as functions of time and temperature (Friedman and Smith 1960). It is possible on theoretical grounds (cf. Ericson 1973a; Ericson, MacKenzie and Berger 1976) that the water also reacts with the structure (of the rock) which causes the hydration rate to deviate from the diffusional model proposed by Friedman and Smith (1960) (Ericson 1975).

In the absence of a complete understanding of the hydration process and the variables controlling the rate of hydration, there has been a considerable debate over mathematical form based on archaeological evidence (Clark 1961a,b, 1964; Meighan 1970; Meighan, Foote and Aiello 1968; Meighan and Haynes 1970; Johnson 1969 and Friedman and Smith 1960); the physical mechanisms of the hydration process (Ericson 1975; Ericson, MacKenzie and Berger 1976); and the variables which influence the hydration rates (Friedman and Smith 1960; Aiello 1969; Ambrose 1976; and Friedman and Long 1976). As originally formulated by Friedman and Smith (1960) the obsidian hydration dating technique relied on a general diffusion equation having two variables; time and temperature. To facilitate the application of the technique, broad temperature zones were established after the work of Chang (1957), within which a zonal hydration rate was to be used. Later, using archaeological evidence Clark (1961a,b, 1964) and Meighan, Foote and Aiello (1968) suggested that the proposed diffusion

model did not fit the empirical hydration data. In support of their original thesis, Friedman, et al. (1966) defended their diffusion model with the results of induced hydration experiments. From that point forward, researchers exercised greater data control in order to resolve the hydration problem. Ericson, MacKenzie and Berger (1976:39) summarized subsequent regional studies. Even with increased geographical control, yet another kind of variability was observed in the hydration rate formulation. Recent research now stresses the importance of chemical factors within each family of obsidians (cf. Aiello 1969; Ericson 1969, 1973; Ericson and Berger 1976; Kimberlin 1971, 1976a,b; Michels and Bebrich 1971; Morgenstein and Riley 1973; Layton 1973; Ambrose 1976 and Friedman and Long 1976).

Chemical Characterization of Obsidian Sources

Ericson (1977b) examined the problem of overlap of obsidian sources in California. Ericson (1978:47-48) notes that at first, X-ray fluorescence (XRF) analysis of the sources coupled with a ternary grouping of the elements promised to be non-destructive, the least toxic, most rapid, and least expensive means of chemical characterization. However, with the problem of chemical overlap in the numbers of sources involved, which increased the likelihood of statistical errors, this original procedure was soon abandoned in favor of neutron activation analysis. Ericson (1978:48) notes that the original XRF technique and recent modifications (Jackson 1974 and Jack 1976) are useful, but their power of discrimination impose definite limitations. Research by Ericson (1977b) has shown that neutron activation analysis of long half-life radionuclides has the best promise of overcoming the overlap problem.

Source-Specific Hydration Rates for California Obsidian Sources

Literally hundreds of obsidian artifacts and associated organic samples were processed for hydration rate determination by Ericson (1977b). The obsidian artifacts were chemically characterized as to source, and then hydration measurements were made. Organic samples were processed and their radiocarbon content was determined. Obsidian hydration measurements and associated radiocarbon data grouped by source are presented by Ericson (1977b). These data were used to evaluate a set of mathematical descriptions of interrelationships between time of formation and the hydration layer thickness, called the source-specific empirical hydration rate equations. The California data was used to evaluate each of the obsidian hydration dating models already published. Ericson (1977b) then observed the degree of internal consistency or statistical fit of each model to the data for all sources. The five models of the hydration process treated by Ericson (1977b) are as follows:

1. Linear Rate Model - Meighan, et al. (1968).
2. California Rate Model - Clark (1961a,b, 1964).
3. Diffusion Rate Model - Friedman and Smith (1960).
4. Cubic Rate Model - Kimberlin (1971).

5. Parabolic-Rate Model - Findlow, et al. (1975).

6. Square Root Rate Model - Ericson (1978).

Results of these tests are presented in Ericson (1977b and 1978). Ericson concluded that the diffusion model can be maintained as the general hydration model as long as the obsidian hydration data is stratified by source. Source-specific rates increase the accuracy of the dating technique. Ericson (1978: 51 and 1977b:51, Table 1-10) presents source-specific obsidian hydration rates for obsidian outcrops/quarried in or near the planning units.

Application of Obsidian Hydration Dating of Archaeological Sites in the Planning Units.

Michels (1965) conducted an extensive program of obsidian hydration dating of artifacts from the Mammoth Junction site, Mono County (CA-Mno-382). Michels was able to apply the obsidian hydration dating technique to analyze typological and technological attributes of artifacts, culture-historical taxonomic units involving artifact association and site deposits and excavation controls. The Mammoth Junction site collection was highly suitable for the study of the above topics because the collection consists almost wholly of obsidian artifacts; the time span of occupation at Mno-382 was quite long and the collection is rich in typological diversity. Michels divided 453 obsidian artifacts into four 'use' classes (projectile points, knives, scrapers and choppers) and seven selected attributes were treated as time series data. Later, Michels constructed artifact inventories for specific segments of time as measured by relative hydration depth. These in turn were used as building blocks in the construction of archaeological units (phases, stages, etc.). The relative frequency of members of artifact classes at different points in time was focused on for purposes of ascertaining occupational and industrial intensities through time at the site. Michels also made comparisons between the Mammoth Junction site and the Rose Spring site in Inyo County. Michels was able to correlate the stratigraphically mixed deposits at Mammoth Junction with the Rose Spring site with the aid of obsidian hydration determinations.

Obsidian hydration dating has been applied by Ericson (1977b) and Singer and Ericson (1977) on various artifacts from archaeological sites in the planning units in order to study diachronic production rates at certain quarries and to study regional obsidian exchange systems operant in prehistoric California. These seminal studies have been already reviewed in Appendix C.

Significance of Obsidian Hydration Dating for Archaeological Research in the Planning Units.

Numerically speaking, probably a majority of all archaeological sites in the planning units are open occupation sites (i.e., lithic scatters) and most of these contain varying proportions of obsidian debitage and artifacts. Layton (1973) has demonstrated the utility of obsidian hydration dating of artifacts from such open sites to obtain chronological information. Since two very important prehistoric exchange systems were based in the planning units (Casa Diablo and Bodie Hills exchange systems), and several other obsidian

sources/quarries are in the vicinity of the planning units, archaeologists now have the capability to not only chemically characterize a given piece of obsidian as to its geographical source, but can also (using source-specific hydration rates) relatively date the specimen as well. Recent refinements in obsidian hydration dating techniques reported by Ericson (1977b, 1978) hold great promise that archaeologists working in the planning units will be able to attain finer chronological control of lithic debitage and of the archaeological units of which they are a part.

A useful compendium of California and other obsidian hydration determinations have been published by Meighan, Findlow and De Atley (1974) and by Meighan and Vanderhoeven (1978) and these should be consulted for specific data on the planning units.

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APPENDIX E

Rock Art in the Planning Unit Areas

Introduction

A number of aboriginal rock art sites are present in the four planning units. Over a century ago, Stephen Powers visited the Washo and Paiute Indians of western Nevada to gather materials for the Centennial Exhibition of 1876 to be held in Philadelphia. Fowler and Fowler (1970) published Power's accounts for the first time. Powers noted that there were several places in Owens Valley and in the vicinity where the rocks had markings or paintings (pictographs) and hieroglyphs scratched or cut onto their surfaces (petroglyphs) (Fowler and Fowler 1970:138). On the eastern slope of the Inyo Range, a few miles above the town of Independence, Powers noted that there are in two cases, some red-marks enclosed in circles, "... which were made by Paiute hunters to indicate the spot where they performed certain exploits, as the killing of a mountain sheep, etc..." Powers listed other localities where he found examples of rock art (or was directed to rock art localities by early pioneers) including the western slope of the Inyo Range where the local Indians allegedly painted white marks to show the elevation of a great flood which once occurred there; on the west side of the Inyo Range, above Independence and about opposite Hot Springs, there are paintings on the slate rocks representing animals; on Bishop Creek, about 20 miles south of Benton, close beside the stage road, there are hieroglyphics cut in the rocks, in imitation of animals; and about five miles southeast of Benton, in the valley of Black Lake (actually being Casa Diablo and not Black Lake as Powers states), there is an inscription which Dr. Loew recognized as five Chinese characters. A sketch of these petroglyphs, drawn by Dr. Loew, was published by Wheeler (1876:326).

The first serious attempt to determine the nature and occurrence of petroglyphs in North America was made by Mallery (1886:19-33) who cited evidence from the New England states, Pennsylvannia, Ohio, West Virginia, Georgia, Iowa, Minnesota, Wyoming, Idaho, Nevada, Oregon, Washington, Utah, New Mexico, Arizona and California. Rock paintings or pictographs are mentioned by Mallery (1886:33-37) from Virginia, Tennessee, New Mexico, Illinois, Minnesota, Iowa, Colorado, California, Utah, Idaho and Arizona. Julian Steward's classic volume on the petroglyphs of California and the Great Basin appeared in 1929. Steward analyzed rock art by style and presented perhaps the first geographic distribution of rock art by stylistic criteria. A number of sites in or near the planning units were first described by Steward (1929). Notwithstanding, another 30 years were to pass before his work was picked up afresh and renewed interest in the study of rock art was manifested. Steward (1929) assigned three major styles to the petroglyphs of the Great Basin through examination of stylistic schemes and apparent relative age. These styles were later named by Heizer and Baumhoff (1962) as the Great Basin Abstract Curvilinear Style, the Great Basin Abstract Rectilinear Style and the Great Basin Representational Style.

In the late 1950's, Heizer and Baumhoff applied their long field experience to the problem by recognizing that important environmental factors might

have been overlooked by Steward. They began a series of field investigations which required that known sites be revisited and all observable features within the area noted. The presence of game trails was one feature noted time and again. That is, trails of migratory deer, antelope and sheep were found in the vicinity of aboriginal rock art sites. In places where game trails were lacking, hunting blinds, corrals, stone walls and box canyons implied former ambush of game, and at these sites, often petroglyphs were found. The purpose of the rock art finally came into focus. In some fashion they had to do with the ritual of hunting (von Werlhof 1965:1). This hunting magic hypothesis of rock art function was first explicated by Heizer and Baumhoff (1959 and 1962).

The Great Basin Petroglyph Style

The following review is adapted in large part from Heizer and Clewlow (1973:23-25). The Great Basin Petroglyph Style is a widely distributed style in eastern California and in the planning units. It has often been referred to by this name in archaeological site reports (cf. Haenszel, n.d.; Ryerson, n.d.; Smith 1961; UCARF, n.d.; von Werlhof 1959, 1960 and 1965; Haenszel 1970; Moen 1969; Newman 1966; Price 1963; Rogers 1929; Simpson 1961; Smith 1957) and is commonly illustrated in popular articles (e.g. Anonymous 1953; Anonymous, n.d.; Berkholz 1961a,b,c; Grant 1971; Jackson 1969; Johnston 1938; Macdougal 1917; Smith 1944).

Heizer and Clewlow (1973:23) point out that the first attempt at recording California petroglyphs, with a Great Basin style site as the object of attention, was made in 1850 by J.G. Bruff (1873) in northeastern California, under threat of armed attack by hostile Indians. Julian Steward (1929:228) noted that the Great Basin area "...has most in common with petroglyphs in other parts of the western hemisphere, especially in its abundance of curvilinear designs." Some thirty years later, the Great Basin Pecked Style was named and subdivided into two substyles: Great Basin Curvilinear and Great Basin Rectilinear (Baumhoff, Heizer and Elsasser 1958). These styles were further refined in a later work (Heizer and Baumhoff 1962) as follows:

GREAT BASIN PECKED

Great Basin Representational

Great Basin Abstract

Curvilinear
Rectilinear

These categories have been applied in a number of recent studies of rock art from widely separated areas of the Great Basin (von Werlhof 1965; Nesbitt 1968; Aikens 1968; Cowan 1967; Nissen 1974) and have been generally accepted as being valid. A great advantage of the Great Basin style definition is that it is flexible enough to be applied in a wide variety of interpretive situations, ranging from nearly complete control of stylistic and ecological variables (cf. Grant, Baird and Pringle 1968), as is the case of the rock drawings of

the Coso Range (to the south of the planning units), to a minimal control of ecological data and an incomplete stylistic corpus, as in the knowledge of the general occurrence of the Great Basin Pecked Style in California. Human and animal elements fall under the Great Basin Representational rubric while such elements as the circle and dot, curvilinear elements, and angular elements fall into the Great Basin Abstract Style. Angular elements fall into the Rectilinear substyle and curvilinear elements fall into the Curvilinear substyle.

The most obvious characteristic of the Great Basin style in California is that in each county where it is present, five element categories consistently occur. Rectilinear and Curvilinear elements are by far the most common, ranging consistently between 19% (Rectilinear - Inyo County) and 69% (Curvilinear - Lassen County), and averaging about 40% each of the total element corpus. One can summarize the Great Basin style in California as being the only one in which rectilinear and curvilinear elements predominate, with Curvilinear the more common of the two, and with circle and dot, human and animal elements usually being present.

In their 1962 publication, Heizer and Baumhoff, in addition to establishing a definition of the Great Basin Pecked Style, demonstrated for the first time that Great Basin petroglyphs are functionally related to a subsistence activity of primary importance, namely the taking of large game animals in the hunt. Concerning the petroglyphs (Heizer and Baumhoff 1962:239):

> "...They are not aimless "doodling", nor are they deliberate and planned expressions of the artistic impulse. We think that we have proved that petroglyphs in the area we have studied are to be understood as part of the economic pursuit of hunting large game (deer, antelope and mountain sheep). We have found few or no indications that suggest an association with seed collecting, rabbit hunting, or fishing. Thus, petroglyphs are part of the magical or ritual aspect of taking large game. The petroglyph designs themselves must have had some meaning to their individual makers, but what a spiral, a snake, a lizard, or a grid design actually signified in the maker's mind at the time he fashioned it we are not, and probably never will be, able to say."

In a subsequent study, which will be reviewed later for its significance to rock art in the planning units, von Werlhof, investigating the rock art of the Owens Valley area, tested the hypothesis that petroglyphs were associated with favorable game hunting areas, and concluded the Heizer and Baumhoff theory to be correct (von Werlhof 1965). He states (Ibid:118):

> "...When the maps of the deer trails were compared with the maps of the petroglyph locations, it was seen that in every instance, the glyphs were located along the trails or in the winter grazing areas. Though some game trails occurred where petroglyphs were not observed, the glyphs do not exist where game movement is absent."

This was found to hold true for both the Great Basin Abstract and the Great

Basin Representational styles, with the Representational style more closely associated, proportionally, with winter grazing areas.

Campbell Grant, James Baird and Kenneth Pringle (1968) have recently published an intensive study, Rock Drawings of the Coso Range in which they have recorded over 14,000 separate drawings. They analyzed their relationship to game trails, springs, hunting blinds, and favorable ambush areas. They found the Heizer and Baumhoff hypothesis was again upheld, and, in fact, the Coso drawings were evidence of a sheep hunting cult which became so successful that it ultimately was instrumental in eradicating its primary prey, the bighorn sheep. Von Werlhof (1960:578) has also suggested a correlation between disappearance of local game populations and the abandonment of the practice of making petroglyphs in the Owens Valley area.

Thus a number of separate studies, both general in nature (Heizer and Baumhoff 1962) and oriented toward very specific areas (von Werlhof 1965; Grant, Baird and Pringle 1968) have demonstrated a direct connection between Great Basin style petroglyphs and big game hunting, or hunting magic. Heizer and Clewlow (1973:25) believe that this situation holds true for the style in California. A number of sites described by Heizer and Clewlow (1973) and von Werlhof (1965) are closely linked with game trails or winter grazing areas while many other sites, although lacking direct information on association with ecological features, nonetheless depict weapons or instruments used in the hunt, as well as the animal species which were presumably its primary victims. Thus site CA-Iny-205 (Heizer and Clewlow 1973:Figure 24a) has a bow and arrow, as well as an atlatl (spear thrower) prominently shown, and site CA-Iny-208 (Heizer and Clewlow 1973:Figure 22h,i), to cite just one example, clearly shows a number of bighorn sheep. Heizer and Clewlow (1973:25) believe that intensive studies of more individual areas in the future may show that different animals may have been stressed or preferred in different geographical microzones, such as the bighorn sheep probably were in the Coso Range. This could be due to a variety of factors, both ecological and cultural, which only more careful field study/analysis or archaeological excavations will be able to distinquish. It appears as a certainty to Heizer and Clewlow that the Great Basin Petroglyph Style can be linked with big game hunting and hunting magic.

Heizer and Baumhoff (1962:233-234) date the Great Basin Petroglyph Style in California from 1000 B.C. to A.D. 1500, with the various substyles occupying differing positions within that time frame. Drawings in the Coso Range have been dated at between 1000 B.C. and A.D. 1000, with the floruit divided into several time ranges on the basis of weapon technology centering on the change-over from the atlatl to the bow and arrow. Heizer and Clewlow (1973:25) note that no new evidence has appeared which would alter this interpretation and they accept the age of the Great Basin Petroglyph Style in California as no older than 1000 B.C. and probably not much younger than 1000 - 1500 A.D. Recent research on patination dating by Bard, Asaro and Heizer (1976 and 1978) and Bard (1979) indicates that the relative dating of western Great Basin petroglyph styles is consistent with the chronological ordering of these styles by Heizer and Baumhoff (1962).

Aboriginal Rock Art in the Planning Units

In 1929, Julian Steward published his work on the petroglyphs of California and adjoining states. Steward recorded, described and in some cases, illustrated the rock art present in what are now the planning units. The rock art sites reported by Steward have recently been given standard site numbers. The currently known (as of 1973) rock art sites in eastern California have been listed by Heizer and Clewlow (1973) with additional annotations as to the original recorder (be they Steward, von Werlhof, or other researchers). The number of aboriginal rock art sites existant in the planning units, or close by, number well over a hundred. The State of California Site Records Officer - Riverside and Bakersfield Regional Clearinghouses keep up-to-date records of rock art sites in what is now the planning units and there would be no point here in trying to list or otherwise enumerate the locations and other data on these rock art localities (although cf. von Werlhof 1965:Maps 1,4).

E.L. Davis (1961) reported on a group of petroglyphs located near the summit of the south cone of the line of Mono Craters. Davis (1961:236) reports that this unreported group of petroglyphs are all versions of a single "horseshoe" symbol carved in high relief. The more realistic ones appear to represent female genitalia and the rest seem to be more abstract versions of the same motif. Davis states that similar motifs occur in Southern California and results of ethnological research has turned up clues in the literature suggesting that the same "horseshoe" symbol survived until recently as a magical element in the Diegueno girls 'initiation' ceremony. It is interesting to note that Trudy Thomas (1976) found strong evidence connecting the "horseshoe" or fertility symbol (found at two central Nevada petroglyph sites) with the mechanics of game hunting.

Jay von Werlhof (1965), whose work will be paraphrased below, undertook a study of petroglyphs of the Owens Valley area in order to add data to the existing material gathered by Heizer and Baumhoff (1962). Von Werlhof assumed that the petroglyphs in the Owens Valley area were connected to the hunting economy as they are in Nevada. However, he notes that even though the pre-Numic peoples of Owens Valley are archaeologically linked with other cultures, there was no justification in automatically assuming that the petroglyph makers of central eastern California had devised glyphs with the same objectives as those of the Nevada tribes.

Von Werlhof (1965) gathered all available information contained in the files of the University of California Archaeological Research Facility and along with Davis Taylor, hiked across the Sierra Nevada to Bishop and from there methodically explored northern Inyo and southern Mono counties for rock art sites. The areas surrounding discovered sites were systematically searched for evidence of occupation or clues to subsistence possibilities. It was seen (von Werlhof 1965:2) that the petroglyph sites from Round Valley (west of Bishop), followed the border of the Casa Diablo volcanic tableland along its southern and eastern borders and then worked northward through the winter grazing lands of Sierran herds into Nevada. A westward offshoot cut through the tableland to the meadows in Wildrose Canyon. Von Werlhof's examination

in relation to deer habitats, showed that the sites were concerned not only with migratory herds but also with deer in winter quarter habitats. Here, then, were suggested two different seasonal uses for the sites. A final analysis showed that for Owens Valley a nomadic human population had penetrated the area from Nevada - probably through the same migratory route used by the deer - and over a period of time had settled in the lowlands near the grazing animals. According to von Werlhof (1965:2), the Great Basin Curvilinear style had been brought into the area by these people, and was first used along migratory trails where game had to pass through narrow draws or around obstacles. The greatest migrations in Owens Valley occured in the north and involved not only long distances, but also periods of several months. Before taking up a sedentary life, the tribes or groups pushed southward after the migrations in the fall had ended (von Werlhof 1965:2).

Little Lake is over one hundred miles from the rock art sites in northern Inyo County and is over 1500 feet lower in elevation. The winters were no doubt wetter and colder during the period when these migrations were going on - perhaps 4000 years ago or longer - than they are at present times. The level of Owens Lake was then nearly 200 feet higher than its present level (Antevs 1953) and the area was not nearly as arid as it is today. Von Werlhof (1965:2) notes that there was considerable movement between Little Lake and the area north of Bishop in those 'days of hunting'. Positive relationships between the bases at Little Lake and those in the north were established by statistical correlations. Within the confines of Owens Valley the people making the Curvilinear style worked toward the middle of the valley, setting up new hunting sites as the climate and population changed. Von Werlhof (1965:3) notes that indications of a change are manifested by petroglyph sites located at the most strategic points in the valley, except in the very center - between Aberdeen (CA-Iny-28) and Lone Pine (CA-Iny-38). Von Werlhof (1965:3) states that as far as he knows, there are no petroglyph sites within this forty mile area and the manifested change is stylistic and identified as the Great Basin Rectilinear style.

The Great Basin Representational style is even more restricted in distribution and placement. Except for a few sites (e.g. CA-Iny-259) which are on migratory trails, the representational elements are located in the lowland areas where grazing animals congregate or can be driven into cul de sac positions (e.g. CA-Iny-210, Mno-8, Iny-267). The distributions again, as in the case of the earlier Curvilinear, appear on the extremities of Owens Valley. Von Werlhof (1965:3) notes that the Representational style is most obvious on the north, east, south and west borders of Owens Valley, but the majority occur in the north, and in the north, the style appears in its most realistic form. At Iny-267 and Iny-398 animals are portrayed in striking detail, and at Mno-5 a drawing of a deer with an elaborate set of antlers and hooves, and measuring over two feet in length, is seen! Evidently, this development marks the peak accomplishment in rock art, and the art seems, after this, to have died rapidly (von Werlhof 1965:3). The Great Basin Scratched technique which may represent a feeble resurrection of rock art, spread from north to south, where it achieved an interesting level in representational drawings at Iny-389. The Great Basin Scratched appears to have been a short lived and fairly recent style standing between the pecked Representational style and the pictographs of historic or late prehistoric times.

Pictographs are rare in the Owens Valley area and there is some evidence that the style was picked up from the Western Mono of Tulare County following their period of contact, 1300 - 1400 A.D. (cf. Elsasser 1960). It would seem that this style was first tried in Owens Valley, probably by rubbing pigment into the grooves of petroglyphs (e.g. Iny-278), and finally by painting on free surfaces (von Werlhof 1965:3-4). That early attempts in pictography were made in relation to the hunting economy as were the petroglyphs of an earlier time - seems probable (e.g. Iny-28), but certainly the later periods of rock painting as evidenced in remote spots would seem to have been beyond the sight of animals (e.g. Iny-399)(von Werlhof 1965:4). Von Werlhof (1965:4) speculates that:

> "...Though the specific function of the petroglyphs in the hunting ritual is not known, it is clear that the designs were placed in positions to be seen by animals. Possibly the aborigines believed that the elements would attract, or distract, the attention of the game and hence give the hunter an advantage in the chase. His weapons were weak at best, and any advantage at close range meant a better chance of varying the pinon diet. At each site it is obvious that the elements face in one general direction from which animals would approach the site. Most of the sites along Owens Valley migratory trails were most advantageous to hunters meeting game as the herds came out of the mountains on their way to winter feeding grounds; few were placed to meet the return spring migrations. This is true of the Nevada sites on the eastern side of the White Mountains as well as in Owens Valley. Site NV-Es-1 (in Nevada), for example, between the Davis Ranch and Trail Canyon, lies along a low malapais ridge divided by a migratory deer trail. Every one of the petroglyph elements faces the trail toward the mountains; not one faces the downward slope which the deer would traverse on their way back to higher country in the springtime."

As a result of his intensive study of rock art in the Owens Valley region, von Werlhof (1965:4-5) notes the following:

> "...Our evidence suggests that the earliest petroglyph makers entered Owens Valley from Nevada through the pass in Mineral County. Sites in the Curvilinear style were situated along migratory trails in the northern portion of Owens Valley, and at Little Lake in the southern end where animals grazed in the milder winter climate. Quite nomadic the people moved about within the valley, setting up new sites as their population grew. A stylistic change occurred as more settlements were established. This change instituted the simpler Rectilinear style and replaced some of the earlier designs. An emphasis on lowland hunting, which came gradually to replace the earlier emphasis on shooting migrating game, perhaps initiated this stylistic development. Increasing population numbers, plus a concentration of settlement in the north, marked the time of the appearance of the Representational style, which was more restricted in distribution. This cultural backlash, from south to north, was the last important petrographic development. Except for a brief flurry of the scratch technique,

which spread rapidly throughout the valley, petroglyph-making came to an end. Contacts with the west side of the Sierra introduced pictographs, which technique, after a short trial in connection with the hunting ritual, was transferred to non-hunting practices."

Karen Nissen (n.d.) reports in her intensive study of six western Great Basin petroglyph sites, on the important site of Mno-8. Nissen carefully recorded the provenience of all design elements at the sites, and then, with the aid of computer processing, examined the association, or relationship, of the design elements with one another. In some cases, Nissen was able to demonstrate statistically significant correlations among individual design elements. Her research, which will be available in the near future, will contribute significantly to the knowledge of prehistoric rock art in the planning units and in the western Great Basin in general.

Native American Concerns - Protection of Rock Art Sites

Prehistoric rock art, like other cultural resources, if often the target of thoughtless vandalism and destruction. Archaeologists have long deplored the lack of protection afforded these rock art sites (cf. Heizer and Baumhoff 1962; Heizer and Clewlow 1973; Nissen 1977; Grant, Baird and Pringle 1968 among many others). It would serve no purpose here to further discuss the concerns of the archaeological community as it is unified in its opinion that vandalism and destruction must be halted if at all possible. Recently, various local Owens Valley area Native American groups have been expressing a greater concern for their past. Indian peoples throughout the country are both indignant over the destruction of their old habitation and burial grounds, and deeply concerned that if such ancestral sites are not preserved and protected, all physical traces of their ancestors will be destroyed forever. Nowhere is this concern more manifest in the planning units as with the status of aboriginal rock art sites. Since 1978, in particular, local Native American groups have lobbied and written letters in support of the cause of preservation of such rock art and other sites. In particular, Native Americans have expressed concern over the possible listing of the Petroglyph Loop Trip on maps (for public use) of the American Automobile Association. The Petroglyph Loop Trip (U.S. Highway 6 from the town of Laws to Red Canyon and back down Fish Slough Road to U.S. Highway 395) which passes by at least four obvious petroglyph localities, is a popular side trip for visitors to the Owens Valley region. Unfortunately, many visitors have defaced, or otherwise vandalized the engravings and in some cases have been known to pry loose decorated pieces of rock for personal use. On April 5, 1965, President Johnson signed Executive Order No. 10355 which withdrew these petroglyphs for permanent Federal Protection. Nonetheless, vandalism still occurs at these sites.

The following are excerpted statements of Native Americans regarding the Petroglyph Loop Trip in particular, and prehistoric rock art sites in general. Donna Vasquez (Director - Career Development Center, Na-Na-Tish-Ue, Inyo-Mono Paiute-Shoshone Indians - P.O. Box 1467, Bishop, CA 93514 (714) 873-5107) requests that the Petroglyph Loop Trip be deleted from the next AAA map, and believes great caution should be exercised in protecting and preserving these cultural sites from possible vandalism and that to publicize their

whereabouts might endanger their preservation. Vasquez further suggests that slides and photographs be taken and shown under the supervision and direction of the Owens Valley Paiute-Shoshone Cultural Center. In this manner it can be enjoyed and studied by interested parties without danger of destruction. Paul Chavez (Tribal Chairman - Bishop Indian Tribal Council - P.O. Box 548, Bishop, CA. 93514 (714) 873-3584) strongly opposes Auto Club map publicity that would result in an increase of persons visiting the Petroglyph Loop. He notes that such increased visitor pressure has already resulted in irreparable damage and destruction by vandalism. Neddeen Taylor (Tribal Secretary - Lone Pine Band of the Owens Valley Paiute-Shoshone Indians, 1101 South Main Street, Lone Pine, CA. 93545 (714) 876-5414) expressed the opinion that the Loop area be closed to the public.

It is clear that Native Americans and archaeologists are deeply concerned about the preservation of all rock art sites in the region of the planning units and future decisions regarding BLM use/protection/closures etc., of such sites must include input from not only the public, but also the legitimate concerns of Native Americans who wish to preserve physical evidence of their heritage and archaeologists who wish to preserve such sites for their scientific/interpretive importance.

Management Recommendations

Specific management recommendations regarding aboriginal rock art sites are discussed elsewhere in this report (cf. Recommendations Section).

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APPENDIX F

Project Responsibilities

Dr. Colin I. Busby, Staff Anthropologist, Basin Research Associates, acted as the principal investigator for the cultural resource overview. He was responsible for the overall coordination, review, editing and supervision of the project. Dr. Busby researched and compiled the anthropological section of the report.

Mr. John M. Findlay, Historian, Department of History, University of California, Berkeley was responsible and wrote the historical overview portion of the report. Mr. Findlay commented on and reviewed the other relevant portions of the overview as well.

Dr. James C. Bard, Staff Anthropologist, Basin Research Associates, researched and wrote Appendices C, D, and E. Dr. Bard also served as the alternate principal investigator and project administrator. He was responsible as well for the internal review of the majority of the report.

Ms. Pamela Endzweig, Research Assistant, researched and compiled the data presented in the natural setting section. Mr. John Liversidge, Research Assistant, provided bibliographic and research support of the project.

Typing and logistical services were provided by Ms. Lila Schwartz and The People's Secretary, Berkeley, California. The University of California Library Photographic Services was responsible for the graphics. Mrs. A. Morgan, Department of Geography, University of California, Berkeley provided cartographic services for the overview.