PREHISTORY OF KERN COUNTY

AN OVERVIEW

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BAKERSFIELD COLLEGE PUBLICATIONS IN ARCHAEOLOGY

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INTRODUCTION

This document is a monograph designed to synthesize and review the archaeological information available for Kern County. This information is assembled in a form which it is hoped can be of use to both archaeologists, planners and the interested lay audience.

The information contained in this report is not exhaustive, as certain documents and reports were not available, or inadvertently omitted. In addition, in all probability, there are many manuscripts, site records and field journals in the possession of private individuals for which we have no reference.

Much of the information to be presented will be given in a generalized manner, as this document is an overview and is not intended to be a detailed analysis of Kern County prehistory.

This report was funded by a matching grant from the State Office of Historic Preservation and Bakersfield College.

STATEMENT OF PURPOSE: OBJECTIVE

The Archaeological Overview of Kern County is intended as a guide to planners and archaeologists. The preparation of this document was designed to provide a foundation for conducting archaeological research in Kern County and to assist in the management of cultural resources.

The main objectives include:

1) To review the current status of prehistoric archaeological inquiry in the county; and to provide a direction to future archaeological investigations;
2) To review current research directions pertinent to further understanding of Kern County prehistory and the development of regional research questions and topics;
3) To provide information and recommendations for cultural resource management and planning which will assist local planning agencies and individuals to evaluate archaeological reports and cultural resource materials.

The methods used to acquire data for the preparation of this document included:

1) Review of previously published studies;
2) Review of unpublished manuscripts and environmental documents;
3) Solicitation of oral and written comments from archaeologists with interests in Kern County prehistory;
4) Solicitation of comments from those involved in local planning and cultural resource management, and;

5) a regional meeting of over 40 individuals knowledgeable of local prehistory or concerned with archaeological resources.

This document is intended:

1) To provide archaeologists with a review of prehistory and previous research. By making this data available and by developing regional research questions, problems and topics of inquiry, it is believed that the quality of archaeological investigations will be enhanced. This effort will also provide for a degree of continuity in data collection and analysis.

2) To provide background information on some of the basic goals, practices and techniques of archaeology which we hope will act as a guide to environmental planners, developers and local government agencies involved in evaluating cultural resource reports and the management of these resources. Materials contained in this document will assist them to determine the kinds of cultural studies that are necessary for particular projects. This document should also enable these individuals to determine who is qualified to conduct archaeological resource investigations and should aid in the judgement of the completeness and accuracy of environmental documents submitted to them.

ANNUAL UPDATE-REVISION

Current plans are to continually update this overview on an annual basis. The format has been designed so that sections can be added, modified or deleted as necessary to maintain the effectiveness and quality of this document. When new sets of information, ideas, methods of evaluation and research questions are developed, they will be added to this overview.

THE ROLE OF THE REGIONAL OFFICE

The Regional Office is essentially an extension of the California Office of Historic Preservation. The duties of the Regional Office center around the management and maintenance of the archaeological site record files for Kern County. The office reviews environmental documents, is a referral service for archaeological consultants and a repository for local archaeological records and reports. In addition, the Regional Office is called upon to provide record checks and archival research by archaeological consultants, environmental consulting firms, and municipal, county, state and federal agencies responsible for cultural resource management. These services include archival/record examinations of areas proposed for parcelling and evaluating the impacts of large-scale development projects on archaeological resources. The Kern County Planning Department has been provided with an archaeological sensitivity map of the county.

The Regional Office at Bakersfield College is widely used by various agencies, firms and individuals. Approximately four to six inquiries are received each week and over three hundred site records are submitted each year for recording. The Regional Office is the primary source for archaeological information of Kern County.

ENVIRONMENTAL BACKGROUND

ENVIRONMENTAL BACKGROUND

Introduction

Kern County covers an area of 8,172 square miles. It is 66 miles long from north to south and 130 miles wide from east to west. The county contains five of California's thirteen geomorphic provinces, with the three most prominent being the San Joaquin or Great Interior Valley of California, the southern Sierra Nevada (including the Tehachapi Mountains) and the western portion of the Mojave Desert. The south and western portions of the county include the Transverse Ranges and the southeastern Coast Ranges. Elevations in the county vary from 205 feet in the Tulare-Buena Vista drainage system to 8,750 feet in the Mt. Pinos region.

The southern part of the Great Interior Valley is a flat surfaced structural trough (geosyncline) trenching northwest-southeast and is bounded by the Coast Ranges to the east, the Transverse Ranges (San Emigdio Mountains) to the south and the Sierra Nevada to the east. A maximum of 50,000 feet of marine tertiary sediments overlie pre-tertiary crystalline rocks covered by a thin quarternary alluvium.

The high mountains that exist in Kern County are found in the Sierra Nevada (8,400 feet Owens Peak) and the Tehachapi Mountains (7,988 feet Double Mt.). The Sierra Nevada batholith represents a tilted (to the west) fault block of granite rock. Scattered throughout the region are many pre-Cretaceous meta-sedimentary roof pendants.

The Kern County portion of the Mojave Desert is bounded by the San Andreas and Garlock Faults. Isolated buttes of tertiary volcanoes and small mountain masses of pre-Cretaceous meta-

sediments are irregularly scattered on a gently undulating surface. Most of the area is underlain by Mesozoic granitic rock. Numerous broad shallow basins contain quarternary playa-lake sediments with the greater portion of the desert floor covered by quarternary alluvium.

Today, Kern County ranks second in California in the value of mineral products produced. Gold, tungsten and uranium are the leading minerals mined (in that order) with lesser amounts of mercury, antimony and copper. Non-minerals produced in the county include clays, borate ore, sand and gravel and gypsum. Kern is the third ranking county in the United States for the value of its agricultural produce and is the fourth largest producer of petroleum products in the United States.

Geologic History

For this general treatment of the geologic history of Kern County, the following served as major sources: Reed and Hollister (1951), Jenkins (1948), Hinds (1952), Miller (1957), and Camp (1952).

Throughout the Paleozoic and early Mesozoic, most of Kern County, along with what today comprises the western United States, was submerged under a widespread ocean, the floor of which consisted of deep sedimentary accumulations. The shores of this ocean, somewhere in the eastern part of the Pacific Basin, contributed constant and massive erosions to an already deep sedimentary bottom. The weight of volcanics, plus the weight of the older sediments, eventually led to a depression of a geosyncline at the western portion of this submerged region in early Mesozoic time. During the Jurassic or early Cretaceous time, the trough finally yielded to tension, and the area was uplifted. The tremendous changes in temperatures and pressure, resulting from this uplift activity, caused many of the sedimentary layers to metamorphose into shists, quartzites, and marbles. In addition, the metamorphosed materials

were intruded by granitic magmas which in turn became the great batholiths of the Sierra Nevada and the Mojave Desert Region. A rising of the trough followed, while erosion reduced the uplifted and exposed granites to low relief. Again sediments began to accumulate to a great depth in the trough while a gradual but steady vertical movement continued into the early tertiary. The Eocene, a period of relative quiescence, was followed by activity characterized by up-arching and rejuvenation of supine areas during the Miocene and early Pliocene. This up-arching of the Miocene/Pliocene eventually resulted in a fracture of the great granitic block into several segments. One of these segments, the Sierran Block, remained intact and tilted to the west; the eastern flank broke into a series of eastward tilted basins and range blocks. During the late Pliocene, a final, or second series of Sierran uplifts occurred, resulting in the present day heights of this range of mountains.

To the west, the present day Coast Ranges existed as a series of islands since Cretaceous time. During the Pleistocene, as a result of great compressive activity on the San Andreas Fault, these islands were uplifted to form what is today part of the Caost Ranges. Once uplifted, these coastal ranges were joined to the similarly uplifted mountainous areas to the east, thus effectively blocking drainage from the San Joaquin Valley to the sea. In the final stages of the Pleistocene, the San Joaquin became a fresh water lake, receiving the run-off from the Sierran streams. Eventually this large, generally shallow, watery landscape began drying out and was transformed by fluctuations in weather, into a marshland region. In recent years, what remained of the great marshy sloughs of the original great Pleistocene lake was drained and reclaimed for agriculture.

Three hundred million years of time characterize the "recorded" physiographic and topographic history of Kern County. The most recent chapter in this history can be delineated by the past 70 million years of the tertiary era. Today, the com-

plex geologic elements that comprise the landscape of Kern County are divided into the following geomorphic units: the Great Interior Valley, the Sierra Nevada Province, the Inner Coast Range Province, the Mojave Desert Province, and the Great Basin Province.

The San Joaquin Valley

The arid southern third of the San Joaquin Valley, which occupies a large portion of western and central Kern County, can be characterized as a combination of alluvial fan surfaces with intervening shallow basins of the playa type: the Tulare and Buena Vista Drainage systems (Hinds 1952:152). That portion of the San Joaquin Valley which occurs in Kern County is completely circumscribed by a u-shaped arch of mountains and has no access to the sea. On the west the Coast Ranges, which together with the intervening valleys are some fifty miles wide, effectively blocking coastal influences. Completing the isolation of the San Joaquin Valley are the Mt. Pinos and the San Emigdio Ranges on the south, the Tehachapis on the east, and the southern Sierra Nevada on the north and northeast. This isolation results in enormous pressure systems that characterize both the physical and climatic aspects of the region (Hinds 1952).

When the Pleistocene sedimentary ridges of the Coastal Ranges and those of the Sierran ridges formed a barrier blocking drainage to the sea, the southernmost area of the San Joaquin Valley became a large fresh water lake fed by Sierran streams (Miller 1957:171). As late as the 1840's the lake, at high water, measured 44 by 22 miles, covering as area of 760 square miles (Miller1957:172). In recent decades the great marshy slough landscape that had sustained a gradual drainage and reclamation for agriculture has been almost completely dessicated.

The soils of the San Joaquin Valley reflect their source of origin: on the eastern side they are coarser granitic materials, while on the western side they are of finer grained

marine sediments (Jenkins 1948). Great areas of the lower central part of the valley have alkaline soils which have become more intensively alkaline with the drainage of the marshes and sloughs during the last several decades.

Drainage has played a forceful role in determining the topography of the southernmost area of the San Joaquin Valley. The southern half of the valley receives practically all its water from the Sierra Nevada. This strong dominance has given the southern half of the valley an asymmetrical form, the axis of which is much closer to the Coast Ranges than it is to the Sierra Nevada; the western slopes being somewhat steeper than those on the eastern side. This asymmetrical cross section is the direct result of the aridity of the region (Hinds 1952:150). The water volume of the Sierran streams is many times greater than streams flowing from the western side of the valley, and their flow is, of course, much less erratic. These powerful streams are overloaded with sediments as they reach the lower, drier slopes, resulting in conspicuous alluvial fans forming at the mouths of these eastern streams (Hinds 1952).

On the western edge of the valley a series of fold-fault, low-lying ridges occur. The most conspicuous of these are the Kettleman Hills, the Lost Hills, and the Antelope Hills. They run roughly north to southeast and are geologically linked to the Temblor Range to the west (Jenkins 1948).

The Temblor Range

The Temblor Range is a series of low-lying arid ranges aligned with the San Andreas fault (Reed and Hollister 1951:58). It once existed as a series of islands above the Cretaceous and Jurassic seas but was uplifted as a result of tectonic activity during the Pleistocene. The Temblors, together with the Diablo Ranges to the north (of which only Mt. Orchard is represented in Kern County), are the only significant ranges not directly associated with any of the uplifts of the Sierra Nevada (Jenkins 1948). In addition to the tremendous compressive activities

along the San Andreas Fault, significant geologic factors in the formation of the Temblors was its submergence in several ancient seas of both saline and fresh water (Miller 1957). Today the uplifted blocks which form the range are of a predominantly marine sedimentary composition, as are those of the neighboring low-lying Kettleman, Lost and Antelope Hills (Jenkins 1948).

The Temblors lie north of the San Emigdio Range and trend to the southeast for about 65 miles, forming the cut-back border between Kern and San Luis Obispo Counties. The base of the range, along the San Joaquin Valley, is about 1,000 feet in elevation. The highest peak, Mt. McKittrick, is 4,332 feet. There are no permanent streams in the entire range. On the eastern slope,the drainage is to the San Joaquin Valley, while on the western side the seasonal streams drain into Soda Lake in San Luis Obispo County (Twisselman 1967:24).

Mt. Pinos Region and San Emigdio Range

Beyond Grapevine Canyon and Castac Valley, the trend of the ranges of Kern County becomes decidedly western. This is the region of Mt. Pinos and the San Emigdio Range. Though these two areas jointly occupy a relatively small portion of the southern portion of Kern County, they play a significant role in the county's floristic and geomorphic makeup. Mt. Pinos is the highest peak in Kern County with an elevation of 8,750 feet. (This is actually the northwestern side of the crest of Mt. Pinos; the main portion is located in Ventura County.) Both Mt. Pinos and the San Emigdio Range constitute a meeting place for the floras of the Sierra Nevada, the Mojave Desert Region, and the Great Basin Range Province (Twisselman 1967:81).

The original granitoid core of the area, like that of the Tehachapis, is part of the great Sierran batholith. However, since Cretaceous time its history has not been directly associated with any Sierran movements (Hinds 1952); rather, it has

been the activity of the San Andreas Fault and its tributaries that has been responsible for the compression and uplift of the area (Miller 1957). (The southwestern scarp of the San Andreas Fault froms the north face of Mt. Pinos and affects the associated ranges on the Ventura County line--Mt. Abel and Sawmill Mountain.)

The trough separating Mt. Pinos and the San Emigdio Range forms a series of quickly-eroding meadows, also the result of activity on the San Andreas Fault. The San Emigdio Range, some 20 miles long and lying north of Mt. Pinos, is the result of intense folding, faulting, and compression activity which continues to this day (Twisselman 1967). From the Pleistocene until recent times, canyons, such as San Emigdio, the Pleitos, and Blue, have been forming as a result of continual upheaval along the San Andreas, White Wolf and associated faults. In the northeastern part of the San Emigdio Range a complex Miocene marine formation occurs (Miller 1957). These marine deposits link the area to the Temblor Range during the Cenozoic (Hollister and Reed 1951). The San Emigdio Range ends where it links with the Temblor Range, forming the southeastern portion of the u-shaped definition of the Kern County mountain system.

The Sierra Nevada

As the Sierra Nevada reaches its southern extreme in Kern County, it changes direction, (Hinds 1952). Elevations decrease from about 8,200 feet in the northern part of the county to about 6,000 feet where the Sierra Nevada Province adjoins the Coast Range Province near Tehachapi Pass. This southern most portion of the Sierra Nevada is represented in Kern County by the Greenhorn Range, Mt. Breckenridge, the Kern Plateau, and the Paiute Mountains (Twisselman 1967). The Greenhorn Range and Mt. Breckenridge border the San Joaquin Valley to the east and are separated from each other into distinct areas by the lower reaches of Kern River Canyon. To the east of the Green-

horns lies the end of the Kern Plateau which is isolated from its immediate environs by its own rugged terminus, the upper portion of Kern Canyon, and the South Fork Valley areas. South of the Kern Plateau lies the narrow range of the Paiute Mountains, and beyond these to the southeast, the last of the Sierran main crest, terminating with the end of the Sierra Nevada Fault at Jawbone Canyon.

The southwestern side of the Sierra Nevada, including the Greenhorn Range, is sharply contrasted in dimension, slope, and topography with the great scarp fronting in the opposite direction (Hinds 1952). Only in one place for a distance of some five miles north and south of the Kern River Canyon, east of Bakersfield, is the western base defined by a fault. Elsewhere, except for minor effects produced by faulting, the southwestern side slopes gradually to its base where it passes under the thick sedimentary deposits of the Great Interoir Valley (Miller 1957). On their eastern side, the Greenhorns are characterized by a wide belt of foothills. Poso Creek, the main drainage of this range, is an almost year-around stream. To the east of Poso Creek lies the striking high valleys, Lynns, and near it, on the Tulare County borderland, Sunday Peak, the highest in the Greenhorns, measuring 8,295 feet in elevation. South of Greenhorn Pass, Shirley, Cooks, and Greenhorn peaks contitute a string of mountains of relatively gentle topography (4,000-4,900 feet). These peaks of metamorphic strata are an unusual feature in a predominately granitic landscape. From these crests the range swings sharply southwest running approximately 25 miles to its end at the mouth of Kern River Canyon on the eastern border of the San Joaquin Valley (Hinds 1952). Mt. Breckenridge, lying directly south of the Greenhorn Range, and separated from it by the steep gorge of Kern River Canyon, shares much the same topography with the Greenhorns. The only exception is that it is a smaller range with peaks more abraded and therefore lower in elevation (Twisselman 1967).

Immediately to the east of the Greenhorns lies the slightly obtuse, two-cornered terminus of the Great Kern Plateau on the Tulare County line border. Although this region occupies a relatively small portion of the Kern County Sierra Nevadan complex (about 10 miles east to west and 5 miles north to south of the Tulare County line), it forms, together with the Kern and South Fork Valley region, an important aspect of Kern County topography. The Kern River, the main drainage for the western and central part of the Sierra Nevada, forms the western boundary of the Kern Plateau. In addition, the Kern's point of conflunece with the South Fork of the Kern is located at the southwestern corner of the terminus of the Kern Plateau. (Lake Isabella, a reservoir built in 1952, occupies the point of confluence of the two great rivers.) The eastern wall of upper Kern River Canyon forms one section of the boundary of the western section of the Plateau, while the South Fork Valley, continuing 25 miles to the northeast, encompasses the bow-shaped southern end of it. The eastern side of the Plateau is defined by its own rugged topography and the South Fork of the Kern (Twisselman 1967:13). The eastern section of the Kern Plateau is still one of Kern County's most inaccessible regions. Steep granite domes averaging 6,000-7,000 feet in elevation characterize the area.

Paiute Mountain is separated from the Kern Plateau by the long and relatively narrow South Fork Valley. The Paiutes are a relatively narrow range dominated by Paiute Mountain which is 8,400 feet high. The entire range is less than 40 miles in length. Three main creeks drain the Paiutes: Erskine Creek drains the north-central protion; Cottonwood Creek the south end, emptying first into Jawbone Canyon and eventually into the desert at Koehn Lake near Cantil; and Kelso Creek, which rises near Landers Meadow on the east-central part of the range, gives rise to several short tributaries and eventually flows into the South Fork of the Kern near the town of Weldon. The Paiute Mountains terminate at Tehachapi Pass. The main crest

of the Sierra, however, terminates to the immediate east of the Paiutes. This portion of the Sierra Nevada is a desert range with Mt. Kiavah (Scodie), (slightly more than 7,000 feet in elevation) its highest point. South of Scodie Mountain the range rarely exceeds 6,000 feet in elevation. The Sierra Nevada ends at Jawbone Canyon (Jenkins 1948).

The Tehachapis

The Tehachapi Mountains, measuring about 45 miles in length, lie southwest of the Sierra Nevadas. On their northeastern side they are marked by Jawbone Canyon and on the west by the Caliente watershed (Twisselman 1967:17). This funnel-shaped range, about 35 miles at its widest in the northeastern reaches, curves to the southwest and finally narrows to a few miles near its end near Tejon Pass (Hinds 1952:29). The Tehachapis are bounded on both sides by steep slopes with severely eroded canyons. The summits are of gentle topographic relief. This range has long been considered an extension of the Sierra Nevada; evidence shows, however, that in spite of the many granitic exposures of the original Sierran batholith, the present-day topography of the Tehachapis is actually a horst (a plateau uplifted by a complex of faults) (Miller 1957). Earlier uplifts, notably those occurring in Mesozoic time, have been followed in more recent times by uplifts resulting from compression against the Garlock Fault on the east, and along the White Wolf Fault to the northwest (Reed and Hollister 1951).

The northeastern section of the Tehachapis, a relatively long section of the range, veers sharply to the east. Tollgate, Barren, and other ridges culminate in the rugged, eroded, volcanic sedimentary rocks composed of tuffs and stream-laid sediments are exposed (Twisselman 1967). Between the town of Monolith and Jawbone Canyon rhyolite plugs and dykes are common. Bear Mountain, one of the highest peaks in the range (6,898 feet

in elevation) lies in the northwestern corner of this range- its northwestern base formed by White Wolf Fault. To the southeast of Bear Mountain, separated by Bear, Cummings, and Tehachapi Valleys, lie the rounded crests of Cummings Mt., Tehachapi Peak and the rugged, much abraded summit of Double Mountain (7,981 feet high), the highest peak of the Tehachapis. South of Double Mountain in the vicinity of Tejon Canyon, the range narrows and swings to the southwest. An interesting feature of this southwestern portion of the range is highly mineralized Castac Lake, lying in the trough-like western end of the Garlock Fault. The continually-narrowing area of the Tehachapis, in the Tejon Pass region and southwest of it, is a landscape of eroded ridges and canyons, rounded domes and deep soils. With Castac Valley and Grapevine Canyon, the Tehachapis end, marking the beginning of ranges that include the Mt. Pinos and San Emigdio complex. With these last two regions, the eastern and southern mountains of Kern County end, completing their portion of the u-shaped turn of mountians that joins, to the northwest, with the Temblor Range.

The Mojave Desert

Topographically the Mojave Desert consists of mountain ranges of varied trends and composition although predominately of ancient igneous, metamorphic, and tertiary volcanic rocks (Hollister and Reed 1951). Lying between the ranges and enclosed by them are larger and smaller plains or valleys. These valleys lack external drainage and may contain dry lakes or playas. The metamorphic rocks are of pre-Cambrian, Paleozoic, and early Mesozoic eras (Miller 1957:26). Granites of Mesozoic and earlier ages occur although Cretaceous strata have not been found in the region (Jenkins 1948). The non-marine sediments in the Mojave Desert region are faulted, folded and are highly unconformable on the older metamorphic and igneous rocks (Hollister and Reed 1951:24).

The western part of the Mojave Desert takes the conspicuous shape of an acute triangle, its westernmost point abutting the Tehachapi Mountains and the Transverse Ranges near Tejon Pass. The San Andreas and the Garlock Faults border this area, and although the outer boundaries of the Mojave Desert are not universally agreed upon, lines are sometimes drawn from these two faults to delimit the general eastern portions of this area (Barbour and Major 1977). The southern Kern County line, which continues eastward from the Tehachapis, eventually meets the county's eastern border near Rogers Lake. The area occupied by the Mojave Desert, in southeastern and northeastern Kern County, comprises about 30% of the total area of the county (Twisselman 1967). Included in this desert section are Indian Wells Valley in the northeastern corner of the county, and the Rand and El Paso Mountains in its east-central section. Both Indian Wells Valley and the Rand-El Paso Mountains mark, properly speaking, the southern extent of the Great Basin Province. They are, for floristic and geographic consideration, included in the Mojave Desert Province (Barbour and Majors 1977).

Three distinct geographic areas are represented in the Kern County portion of the Mojave Desert. The largest of these is the broad region of plains and accompanying series of sinks and playas in the extreme southeastern corner of the county. North of the plains (in the central portion of the larger eastern section) are the desert ranges, the Rand and El Paso Mountains, including Fremont Valley which separates them. North of the El Paso Mountains, on the Tulare and Inyo county lines, lies Indian Wells Valley (Twisselman 1976:24).

The Mojave plains run from the Tehachapi Mountains to the south and southeast for a distance of some fifty miles. Numerous buttes, actually the cores of tertiary volcanoes (Miller 1957) punctuate this otherwise uniform, flat landscape. Some of these volcanic buttes or cores provide notable landmarks in the area. Soledad Mountain (4,150 feet in elevation), a few miles south of the town of Mojave, rests near the western

border of the desert. Low ridges east and notheast of Mojave are surviving surfaces of the ancient mountain mass of Mohavia (Miller 1957), now almost completely eroded away. In the southeastern corner of the county lies Muroc Sink, a Pleistocene lake bed which once served as the drainage basin for the mountains to the west (Twisselman 1967:26). Today a series of dry lakes-Rogers, Buchthorn, and Rosemond--are the only remnants of this once huge body of water. These dry lake beds are now separated from one another by extensive sand dunes and low-lying hills. The dry lakes are hardpacked surfaces of very fine playa clays impregnated with saline materials (Hollister and Reed 1951). The sediments composing these lakes are extremely deep (Jenkins 1948).

To the east of Muroc Sink lies the ancient lake bed of Koehn Lake. This lake, located in the northeastern reaches of Fremont Valley, is never totally dry, receiving water from several sources: the southeastern drainage of the Paiutes, the northern drainage from the Tehachapi Mountains, and the drainages of the southern Sierra Nevada by way of Jawbone and Red Rock Canyons (Twisselman 1967:60). In addition, drainage also reaches Koehn Lake from the Rand and El Paso Mountains.

The chemically impregnated waters of this "dry" lake can reach considerable depths in wet years. Generally the lake is at most a damp, muddy expanse. This northeast section of Fremont Valley is a depressed fault block separating the Rand and El Paso Mountains. Originally these two mountain ranges and the intervening valley formed one solid mass, forming the southern boundary of the Great Basin Province (Hinds 1952). Both the Rand and El Paso Mountains are severely eroded desert ranges. The Rand Mountains to the south of the more northerly El Pasos have moderate relief on the southeast side and are steep and abrupt on the northwestern slope. The Rand Mountains are composed primarily of metamorphic rocks, some of great age. The older portion is of pre-Cambrian schist, exposed on the northeastern flank (Twisselman 1967:61). The southwestern two-thirds of the range have been intruded by Cretaceous granite and the western end of the range is largely overlain with quarternary terrace

deposits (Jenkins 1948). The El Pasos have steeper slopes on both sides with deep canyons that drain to the south. The westernmost canyon is the highly eroded Red Rock Canyon. The central portion of the range is drained by Last Chance Canyon, and the eastern end by Iron Canyon and Goler Gulch (Twisselman 1967:62). The El Paso Mountains are composed of a great variety of rocks. Exposed beds are common. Most of the deposits are metamorphic, particularly those in the eastern portion of the range. The pre-Cambrian Mesquite schist in the central part of the range is overlain by Paleozoic Garlock materials of slate, chert, quartzite, and limestone. Thick Pliocene sedimentary beds and lava flows occur in the northwestern end of the range. Much of the landscape of the El Pasos is eroded to form interesting landscapes of canyon and badland topography. In many areas wind and wind-driven rains have caused differential erosion creating buttes, ravines and cliffs of varied color. Two basaltic lava flows occur in the El Pasos. The first is located near the Ricardo Formation in the central portion of Red Rock Canyon. The second is Black Mountain, the highest peak in the El Pasos (5,259 feet in elevation), a cap of a large Pleistocene flow that covers the entire north flank of the range (Twisselman 1967:62).

North of the El Pasos lies Indian Wells Valley, a north-south trending valley some twenty miles wide. This valley forms the southernmost basin of the Basin Range Province (Hinds 1952). It separates the Sierras and the Argus Range. China Lake, on the eastern side of the valley (at the lowest elevation attained in the valley), is also a part of the great Pleistocene Sierra Nevadan drainage system as are the dry lakes to the south. This portion of the drainage had its origin at Mono Lake to the north and ended at Manly Lake, in present-day Death Valley. The ancient bed of China Lake, whose western portion lies in Kern County, is covered with sand dunes and wind-stabilized sand formations. The broad plains of loose, sandy soils in the south-

west end of the valley are ideally adapted to an especially rich annual desert flora (in good years). Southeast of Walker Pass, at the end of the plain, is Robbers Roost--a cluster of rhyolite plugs and an ancient landmark of the desert.

The Flora of Kern County: Introductory Remarks

The flora of Kern County has been shaped by two great forces: a severely xeric climate, and a landscape dominated by a geography of merger and transition.

Kern County's climate is characterized by an almost desert-like aridity. Except for a few mountain areas where large amounts of precipitation occur in the form of snow (certain areas of the Greenhorn Mountains receive an average of 30 inches of precipitation per year), most areas in Kern County receive an average of 5-10 inches of rainfall per year. In addition, great variations in precipitation are common in Kern County from year to year, as are periods of drought. Summers are long, averaging from May to October. Daytime temperature for low-elevation areas are high (Bakersfield averages 110 days of temperature of over $90^{o}F$). Winters are generally mild and precipitation commonly occurs from December through April. In some parts of the county winter temperatures can be severe, with sub-32 degree temperatures commonplace.

Five of California's eleven geomorphic provinces and several geographic regions are represented in Kern County. As a result, several regional floras are also represented in the county. Where regions meet and overlap the extent to which that merger becomes an identifiable plant community is often very difficult to determine. In Kern County geographic and floristic boundaries are often impossible to set since great deviations from a stricter definition of regional floras, such as that set by Munz and Keck (1968), is commonplace. For this reason the problems presented by patterns of plant migration, by transitional aspects of species, endemism, or the occurrence of habitat types at unlikely elevations or in unusual locations, become serious considerations

in presenting the flora of the county in a complete manner. For the purposes of this study the delineations of Twisselman (1967) will be used. In this work seventeen demarcations are recognized and reflect all the naturally occuring plant community habitats in Kern County. In addition, descriptions, references and data from Munz and Keck (1968), Ornduff (1974), and Barbour and Majors (1977) will be utilized throughout this section.

The Plant Associations of Kern County

The Alkali Sink Association: In Kern County the Alkali Sink Association is of three types, the largest of these is the "landlocked-basin type", consisting of the long drainage basin in the center of the San Joaquin Valley between Buena Vista Lake on the south and Tulare Lake on the north; second are the "sag-pond" areas, typified by smaller or larger occasional or perennial ponds usually occurring along the major faults. Examples are Castac and Proctor Lakes along the San Andreas Fault; and third, in the desert, are the "Pleistocene drainage basin" types such as the Muroc Dry Lakes, Koehn Lake and China Lake. The rainfall in most of the Alkali areas is low, averaging two inches per year or less. The soils are usually saturated with high amounts of mineralized materials (mostly salts) and the temperatures, in general, are high. Many of the typical plants of this association belong to the goosefoot family, notably Allenrolfea occidentalis, Salicornia subterminalis, and Kochia californica. Many of the shrubs have characteristically fleshy leaves and stems.

Alkali sink groups vary in both vegetational and general aspects. Some areas, such as the Buena Vista-Tulare areas, are dominantly mesquite scrub associations, while the desert areas often provide a barren aspect. In regard to special features of distinct areas, the occurrence of dry, hard-packed surfaces such as those found in the dry lakes have caused a special

symbiotic relationship to develop between certain plant species and ants (Ornduff 1974). Ants bury seeds below the surface in the process of carrying them to their nests for use as food. Inadvertently they bury the seeds well below the harsh mineralized layers so that chances for germination become favorable. Typical plants of the alkali sink association are:

pistichlis spicata
Hordeum depressum
Sporobolus airoides
Scirpus paludosus
Allenrolfea occidentalis
Atriplex argentea var. *expanse*
Atriplex coronata
Atriplex serenana
Bassia hyssopifolia
Astragalus hornii
Prosopis juliflora var. *torreyana*
Sida hederacea
Frankenia grandifolia var. *campestris*
Tamarix pentandra
Tamarix tetrandra
Kochia californica
Nitrophila occidentalis
Salicornia subterminalis
Suaeda fruticosa
Suaeda torreyana
Sesuvium sessile
Delphinium recurvatum
Lepidium dyctiotum
Wislizenia californica
Cressa truzillensis var. *vallicola*
Allocarya acanthocarpa
Heliotropium curassavicum var. *oculatum*
Aster intricatus
Lasthenia ferrisiae
Lasthenia minor

The Lower Sonoran Grassland: This area consists of the broad treeless plains at the head of the San Joaquin Valley that encircles the Buena Vista-Tulare drainage system. These arid plains receive 4-6 inches of rainfall per year and only in years of exceptional rainfall do the typical plants of this area grow with a semblance of vigor. During periods of normal or subnormal rainfall, the area has a distinctly desert-like appearance. The small amount of rainfall is supplemented by the dense tule fog which fills the valley from December until February. The soils of the Lower Sonoran Grassland on the west side of the valley are light alluvial loams, often reaching to great depths. On the eastern side they are coarser, granitic-derived alluvial soils. Only one perennial shrub, *Atriplex polycarpa* is common in this association.

Authorities, notably Munz and Keck (1968), claim that the area was once a perennial grassland destroyed in recent decades

by heavy grazing. Typical plants of the Lower Sonoran Grassland are:

Bromus rubens	Festuca microstachys var. simulans
Festuca reflexa	Lupinum manus var. menkerae
Hordeum glaucum	Eremalche kernensis
Avena barbata	Opuntia treleasei
Schismus arabicus	Gilia tricolor ssp. diffusa
Allium hosellii	Linanthus liniflorus ssp. pharnaceoides
Eriogonum gossipinum	Astragalus oxyphysus
Atriplex polycarpa	Trichostema ovatum
Lepidium dictyotum	Eatonella cogdonii
Sisymbrium irio	Astragalus lentiginosus var. nigricalcys
Lasthenia chrysostoma	Hemizonia pallida
Eremalche parryi	Malacothryx californica
Erodium cicutarium	

The Upper Sonoran Grassland: This association occurs intermittently over a wide area at elevations ranging from 900 feet in the hills near Granite Station to nearly 6,000 feet in the rounded slopes of the Tehachapi Mountains. Normal rainfall varies from 6.5 inches in the lower, drier levels to 10 inches in the Douglas oak woodland associations. Mean minimum temperatures are about 23°F at the lower levels and may fall as low as 0°F at higher elevations. Typical daytime summer temperatures often exceed 100°F. The dominant species of the Upper Sonoran Grassland are annuals with scattered shrubs in favorable places. The soils are generally deep, heavy loams. In areas where the soils are uncommonly deep and there is sufficient rainfall, some Douglas oak and valley white oak stands occur. Typical plants of the Upper Sonoran Grassland are:

Bromus arenarius	Medicago hispida
Bromus diandrus	Trefolium tridentatum
Bromus mollis	Erodium circutarium
Bromus rubens	Erodium moschatum
Festuca confusa	Clarkia cylindrica
Festuca megalura	Lomatium urticulatum
Festuca dertonensis	Clarkia purpurea ssp. quandrivulnera
Festuca pacifica	Nemophila menaiesii
Poa scabrella	Phacelia ciliata
Hordeum leporinum	Amsinckia douglasiana
Avena fatua	Amsinckia intermedia

Stipa vernua
Allium peninsulare
Bloomeria crocea var. aurea
Chenopodium californicum
Mirabilis froebellii
Stellaria media
Delphinium gypsophilium
Astragalus asymmetricus
Trichostema lanceolatum
Orthocarpus purpurascens
Plantago hookeriana var. californica
Archyrachaena mollis
Monolopia lanceolata
Microseris douglasii
Lagophylla ramosissima

The Upper Sonoran Subshrub Association: The arid hills around the head of the San Joaquin Valley from Adobe Canyon northeast of Bakersfield southwest through the Tehachapi Mountains and the San Emigdio Range, then northwest along the east side of the Temblor Range, support a vegetative zone that is transitional between the valley's grassland and the more typical Upper Sonoran associations (Twisselman 1968). This complex does not consist of species that are limited to it, or that are even typical for the association. The assemblage is one of merger and transition where softwood shrubs of neighboring associations are most suited to limited moisture, shallow rocky soils, with a long season of dry, hot weather. Many of the shrubs are summer dormant and can endure long periods of winter drought. In the Temblor and western San Emigdio Ranges Haplopappus linearifolius and Eriogonum fasciculatum sp. polifolium are the most common shrubs. From Grapevine Canyon through the lower slopes and canyons of the Tehachapi Mountains to the western flank of Breckenridge Mountain, Isomeris arboreus var. globosa is the dominant shrub. Four species are almost exclusively found in the association area--Eastwoodia elegans, Eriogonum temblorense, Clarkia temblorense, and Stylomecon heterophylla var. micropetala.

Minimum winter temperatures are rarely less than 26°F; summer daytime temperatures are typically over 90°F. Rainfall averages from 5-7 inches and is augmented by valley fogs. Elevation ranges for the association are from 900-1500 feet, though sometimes ascending to 2,200 feet in the southern

Temblor Range west of Taft. Typical plants for the Upper Sonoran subshrub association are:

Eriogonum fasciculatum ssp. polifolium	Clarkia temblorensis
Eriogonum temblorense	Amsinckia vernicosa
Stylomecon heterophylla var. micropetala	Eastwoodia elegans
Isomeris arborea var. globosa	Gutierrezia bracteata
Mentzelia pectinata	Camissonia californica
Haplopappus acradenius ssp. bracteosus	Haplopappus linearifolius

Douglas Oak Woodland: The Douglas oak woodland is a complex and variable association which can be divided into three distinct yet poorly defined phases in Kern County. The first phase is best seen between Granite Station, Woody and Glenville. It occurs at middle elevations and exhibits the typical parkland aspect. Many annual species, characteristic of the Upper Sonoran Grassland occur in this first phase. The second phase, often in conjunction with Quercus lobata, occurs in the protected mountain valleys such as Castac Valley at Lebec, on the flats at Tejon Pass, in the valley around Tehachapi, and at Lynns Valley in the Greenhorn Range. Vernal pools are often associated with the white and douglas oaks in these areas. The third phase includes rocky and exposed places along ridges and in canyons with poorer soils. Here Pinus sabiniana is dominant, with the Douglas oak often growing in a stunted, shrub-like form. Aesculus californica is another common species in this phase.

While these phases of the Douglas oak woodland describe a somewhat idealized demarcation of the association, the reality is that often these three aspects of the association overlap with other associations, making definite distinctions impossible in many areas. For example, only in the Greenhorn foothills between Granite Station and Glenville does the Douglas oak woodland seem at all extensive. Generally speaking, it alternates with chaparral, shin oak bush, and even at times with the yellow pine forest. In the San Emigdio and Temblor Ranges it occurs in distinctive association with California junipers, and from the Paiute Mountain region south through the Tehachapi Mountains, with juniper and pinyon pines. Although the Douglas oak wood-

land is not at all common on the desert slopes, it sometimes occurs locally, particularly in the western end of Antelope Valley. It also occurs on the southern end of the Paiutes at Kelso Valley only a few hundred yards from Joshua Tree areas and its associates.

The Douglas oak woodland occurs from 1,000-3,500 feet in elevation in the Greenhorn Range; from 2,000-6,000 feet in the Tehachapi Mountains and the Mt. Pinos Region; and from 1,500-4,300 feet in the Temblors. This association has the highest rainfall of any of the associations in Kern County. In the Temblor and the San Emigdio Ranges the average annual precipitation is about 9.5 inches, and in Bear Valley in the Tehachapis, about 19.5. The typical average for the whole association is somewhere between 11 and 14 inches. Some of the precipitation for the associations occurs in the form of snow. Winter temperatures range from relatively mild in the Temblor and San Emigdio Ranges (20°F minimum) to severe cold in Lynns Valley (10°F). Typical plants for the Douglas oak woodland are:

Pinus sabiniana
Stipa coronata
Brodiaea lutea var. scabra
Yucca whipplei ssp. caespitosa
Ranunculus occidentalis var. ensenii
Ribes quercetorum
Arabis sparsiflora var. arcuata
Astragalus lintiginosus var. idriensis
Trifolium ciliolatum
Aesculus californica
Sida malvaiflora ssp. sparsifolia
Viola quercetorum
Datisca glomerata
Scrophularia californica var. bunda
Clarkia unguiculata
Clarkia xantiana
Quercus douglasii
Quercus lobata
Eschscholtzia lobbii
Daucus pusillus
Meconella linearis
Perideridia pringlei
Linanthus montanus
Plagiobothrys nothofulvus
Plagiobothrys tenellus
Verbena lasiostachys
Penstemon heterophyllus
Minulus pictus
Hemizonia heermanii
Clarkia dudleyana
Microsteris sylvatica

Chaparral: The Chaparral and its associated species are poorly represented in Kern County. Stands exist on the northwest spur of Mt. Abel, in scattered localities in the Mt. Pinos region, in the central Temblor Range, in the southwestern and the northeastern Tehachapis, on the southwestern flank of the Paiute Mountains, and only occasionally on other mountain slopes.

In the Blue Mountain region near Glenville the chaparral achieves the more shrubby aspect similar to that in the Coast Ranges and in the Sierra Nevada foothills to the north. Good stands also occur from Tollgate Ridge east of Keene to the west slope of Cache Peak at the head of Jawbone Canyon. In this last region the chaparral is specialized to some degree, being the most drought-resistant species of their respective genera: Quercus turbinella ssp. californica, Ceanothus vestitus, and Ceanothus cuneatus. Rainfall information for this region is scant. Estimates from stations in the vicinity indicate that it is between 12-18 inches. This is decidedly less than the typical rainfall average for the chaparral of the Coast Ranges, which averages about 30 inches per year. The association occurs at atypical elevations in Kern County: from 3,200-4,200 feet in the Blue Mountain Region; 4,000-5,000 feet on Paiute Mountain; and at over 5,000 feet on Mt. Abel. Minimum winter temperatures are 0°-10°F. Summers are hot with daytime temperatures exceeding 90°F. Typical plants of the chaparral are:

Chlorogalum poneridianum
Quercus turbinella ssp. californica
Zuercus dumosa
Quercus wislizeni var. frutescens
Ceanothus leucodermis
Ceanothus vestitus
Rhamnus californica ssp. tomentella
Arctostaphylos glauca var. puberula
Garrya flavescens var. pallida
Arctostaphyloc glauca
Arctostaphylos parryana
Silene claifornica
Zigadenus exaltatus
Adenostoma fasciculatum
Lotus scoparius
Cerococarpus betuloides
Ceanothus cuneatus
Eriodictyon californicum
Fremontodendron claifornicum
Marah horridus
Lonicera johnsonii
Haplopappus arborescens

Shin Oak Brush Association: Shin oak, or Quercus garryana var. breweri, is a shrubby form of a large forest tree of the north. In southern California it reaches its best development in the mountains of Kern and Los Angeles Counties. Dense thickets, sometimes growing in colonies covering hundreds of acres, cover many mountain slopes. The shin oak association occurs on the western slope of the Greenhorn Range, on the eastern slope of Breckenridge Mountain, and less extensively on the northern end of Paiute Mountain.

Though shin oak superficially resembles chaparral, its characteristics are very dormant, and highly resistant to fire. It requires late spring and summer moisture and needs cold winters. It thrives in rich, deep soils. With the exception of Quercus chrysolepis, which usually grow in a shrubby form, shin oak almost always forms pure strands.

This association occurs at elevations of 3,000-4,500 feet in the Greenhorns, at 4,000-6,000 feet on Breckenridge Mountain, and from 5,000-7,500 feet in the Tehachapi Mountains. Winter temperatures of less than 15°F are common. Typical summer temperatures are about 85°F, with extremes in the 100°F range. The mean median annual precipitation is approximately 17 inches.

The Yellow Pine Forest: This conifer forest is the typical vegetation at the higher elevations of the mountains except for a small area at Sunday Peak in the Greenhorn Range where the Sierran red fir forest reaches its southern limits.

In the Greenhorn Range and on Breckenridge Mountain, Pinus ponderosa is often the dense and dominant forest tree. In the Paiute Mountains, in localities in the Tehachapis, and in the Mt. Pinos region, Pinus jeffreyi forms an open forest. Pinus lanbertiana is common in the Greenhorn Range, but occasional to scarce in the other Kern Ranges. Calocedrus decurrens is common in the Greenhorn Mountains and Quercus kelloggii is also a characteristic and common tree of the ponderosa and jeffrey pine forest. According to Twisselman (1967), about 48 species reach their southern limits in the ponderosa pine forest in Kern County. The limits of most of these species are generally abrupt.

The annual precipitation, mostly as snow, is from 20-35 inches in the ponderosa pine forest and 14-20 inches in the jeffrey pine forest. Winter temperatures often approach the 0°F mark and a typical summer day may reach between 80°-90°F. The frost-free season begins in early May and lasts through mid October.

The soils of the Yellow Pine Association vary from outcrops of basement rock to shallow but rich loams. Granitoid rocks and their accompanying erosive products are common as well as metamorphic rocks and their associated materials.

The yellow pine forest occurs at elevations above 5,500 in the Mt. Pinos area, on the northern slopes in the Tehachapis and in the Paiute Mountains. On Mt. Breckenridge and in the Greenhorns, it occurs between 4,000 and 5,000 feet and on the Kern Plateau at almost 6,000 feet. Plants typical of both ponderosa and jeffrey pine forests are:

Pteridium aguilinum var. pubescens	Arctostaphylos pltula
Gilia leptantha ssp. putpusii	Abies concolor
Bromus orcuttianus	Phacelia mohavensis
Stipa lemmonii	Nicotiana attenuata
Queucus kelloggii	Castilleha applegatei
Calyptridium umbellatum	Castilleha disticha
Ribes nevadense	Pentstemon speciosus
Ribes cereum	Collinsia wrightii
Lotus crassifolius	Calium bolanderi
Ceanothus cordulatus	Madia wheeleri
Sacrodes sanguinea	Cirsium andersonii
Arctostaphylos mariposa	Hieracium albiflorum

Plants typical of the ponderosa pine forest are:

Cysopteris fragilis	Rubus parviflorus
Pinus lambertiana	Sidalcea ranunculacea
Pinus pinderosa	Pterospora andromedea
Calocedrus decurrens	Pyrola picta
Tristeum canescens	Navarretia divaricata
Apicynum medium var. floribundum	Carex almo
Carex athrostachya	Phacelia mutabilis
Carex multicaulis	Phacelia purpusii
Stellaria jamesiana	Cynoglossum occidentale
Arabis repanda	Cordylanthus ferrisianus
Rorippa curvilisiqua	Mimulus montioides
Chamaebataria foliolosa	Symphoricarpos acutus
Eriophyllum lanatum var. croceum	Haplopappus whitneyi

Plants typical of the jeffrey pine forest are:

Lupinus excubitus var. austromontanum	Pinus jeffrey
Viola purpurea ssp. xerophyta	Pseudotsuga macrocarpa
Muhlenbergia asperifolia	Frasera neglecta

Carex douglasii
Astragalus whitneyi
Lupinus confertus
Phacelia davidsonii
Fritillaria pinetorum
Antennaria dimorpha
Calochortus invenustus
Symphoricarpos parishii
Potentilla santolinoides
Chaenactis santolinoides
Crepis occidentalis ssp. punila
Delphinium patens var. montanum
Leptodactyplon pungens var. hallii
Allium fimbriatum var. denticulatum
Eriogonum kennedyi var. austromontanum
Chrysothamnus viscidiflorus ssp. pemilus
Chrysothammus parryi ssp. vulcanicus
Chrysothamnus nauseosus ssp. occidentalis
Eriogonum molstum var. davidsonii
Lathyrus pauciflorus var. brownii
Phlox diffusa ssp. subcarinata
Erigonum wrightii var. curvatum

The Red Fir Forest: This association occupies the smallest area of all the Kern County plant associations. It occurs only near the summit of Sunday Peak on the northern and eastern slope (in the Green horn Mountains). It is common on open slopes and grows nostly on decomposed granite, rich in organic matter. This association is interspersed in its open phases with large colonies of Prunus emarginata and Castanopsis sempervirens. The red fir forest has the shortest growing season in Kern County, lasting about 120 days, and the highest amounts of precipitation, 40 inches annually, mostly as snow. Summer temperatures rarely reach 100°F, while winter extremes fall below zero degrees Fahrenheit. The forest occurs from 7,600-8,400 feet. Typical plants of the red fir forest are:

Athyrium felix-femina
Deschampsia elongata
Glyceria erecta
Carex feta
Carex subfusca
Luzula comosa
Castanopsis sempervirens
Aconitum columbianum
Stellaria crispa
Arabis platysperma
Ribes viscosissimum
Lupinus breweri var. breweri
Prunus emarginata
Rosa pinetorum
Gayophytum heterozygum
Cornus stolonitera
Arctostaphylos nevadensis
Hackelia velutina
Penstemon bridgesii
Penstemon caesius
Penstemon newberryi
Senecio clarkeanus
Senecio psuedoaureus
Chrysopsis breweri

Mountain Meadow Association: The meadows in Kern County are typically associated with the Sierra Nevada forests. Several distinctive meadow types occur within the association, these distinctions being marked by the amounts of moisture present in the meadow soils.

Meadow areas in Kern County follow a common pattern with areas being wet early in the summer and dry in the fall. Here the distinctive species mature by mid-summer. This type of meadow is common in the jeffrey pine forest in the Kern Plateau (Little Cannell and Cane Meadows) and the broad Landers and Woolstaff meadows in the Paiute Mountains. In the Greenhorn Range the meadows are small and wet. They generally occur on the east slope of the range. In the Paiute Mountains there are also the open, broad, and generally dry type of meadow, usually drying by mid-summer. Here Artemisia tridentata is the dominant species. Typical plants of the mountain meadows are:

Glyceria elata
Poa pratensis
Muhlenbergia filiformis
Carex bolanderi
Carex feta
Carex nebrascensis
Carex subfusca
Carex teneraeformis
Eleocharis acicularis
Juncus macrandrus
Juncus orthophyllus
Juncus tenuis
Veratrum californicum
Salix scouleri
Polygonum bistroides
Sagina saginoides var. hesperia
Potentilla glandulosa
Stellaria sitchana var. bongardiana
Potentilla gracilis ssp. nuttallii
Potentilla purpurascens
Lupinus latifolius
Lupinus polyphyllus var. superbus
Trifolium monanthum
Trifolium variegatum
Geranium californicum
Hypericum angalloides
Hypericum scouleri
Perideridia parishii
Allyocaryo hispidula
Mimulus moschatus
Mimulus primuloides var. pilosellus
Galium trifidum var. subbiflorum
Helenium bigelovii
Achillea lanulosa
Taraxacum officinale

The Pinyon Woodland: The pinyon woodland occurs on the desert-facing slopes of the Sierra Nevada, the arid eastern slopes of the Paiute Mountains, in the northwestern Tehachapis and much of the Mt. Pinos area. The well developed or sparse woodland of Pinus monophylla usually frown in conjunction with

Juniperus californica. This association is especially prominent on the Kern-Tulare County line at the southeastern corner of the Kern Plateau in the Lamont Peak region. From the Lamont area the pinyon woodland extends to Kiavah (Scodie) Mt. south of Walker Pass. South of Walker Pass on the desert-like summits of the southern Sierra Nevada, such as Gold, Dove, and Butterbread Peaks, the pinyon woodland is poorly developed. On the eastern slopes of the Tehachapis, primarily south of Tehachapi Pass, a scattered form of this woodland exists. In the Mt. Pinos and San Emigdio Range west to the canyons bordering the upper Cuyama Valley in Ventura and Santa Barbara Counties, the pinyon woodland grows in a continuous belt.

The pinyon woodland shows many affinities with the Great Basin floristic regions to the northeast as well as with the Mojavean areas nearby.

Rainfall records for the area indicate that normal precipitation is between 7-12 inches per year. Cold winters with minimum temperatures below 10°F are common. Typical daytime summer temperatures are between 85°-95°F. The frost-free season begins near the end of April continuing well into October. Shallow, sandy to rocky soils, with good drainage are common for the association. Typical plants of the pinyon woodland are:

Ephedra viridis
Pinus monophylla
Juniperus californica
Eriogonum barbatum
Eriastrum sapphirinum
Eriogonum baileyi
Eriogonum plumatella
Purshia glandulosa
Salvia dorrii
Lotus strigosus
Tetradymia canescens
Artemisia ridentata
Lupinus adsurgens var. undulatus
Rhamnus California ssp. cuspidata
Tauschia parishii
Allium fimbriatum var. denticulatum
Eriastrum densifolium ssp. elongatum
Gilia brecciarum ssp. brecciarum
Linanthus aureus
Cryptantha pterocarya var. cycloptera
Rosa woodsii var. ultramontana
Penstemon grinnellii ssp. scrophularioides
Chrysothamnus nauseosus ssp. consimilis

The Arid Scrub Association: While difficult to define floristically or even geographically, the arid scrub association occupies a distinctive place in Kern County's community complex.

Three plants are endemic to this region: Phacelia nashiana, Gilia cana ssp. elongata, and Camissonia kernensis. Although Eriogonum fasciculatum ssp. polifolium is by far the most common plant occurring within the association area, the Kern Joshua tree, Yucca Brevifolia var. herbertii, is by far the most typical.

This association lies bewteen the pinyon woodland and the desert creosote bush association. The areas it occupies are characteristically regions of deep canyons with steep slopes that are hot and dry in summer and cold and windswept in the winter. The coarse granitic, sandy or gravelly soils of the area are well drained. The most extensive slopes occur on the west side of Indian Wells Valley (the most arid area in the county), and in a fairly well defined zone south to Tehachapi Pass. This association is especially interesting in the Indian Wells portion of the association, for here in years of ample precipitation the flora displays are especially rich and colorful.

Winters are cold for the whole association; summers are hot. Spring arrives in late April, and the first frost occurs around November 1. Rainfall averages for the area range between 5.5-7.5 inches, but can be extremely variable. Typical elevations for the area are 2,500-4,000 feet. Typical plants of the arid shrub association are:

Stipa speciosa
Camissonia kernensis
Calochortus kennedyi
Chorizanthe thurberi
Gilia cana ssp. elongata
Phacelia nashiana
Eriogonum heermannii
Salvia dorrii
Eriogonum microthecum
Eurotia lanata
Delphinium parishii
Arabis pulchra
Isomeris arborea var. arborea
Prunus fasciculata
Prunus andersonii
Coleogyne ramosissima
Lotus strigosus var. hirtellus
Lupinus excubitus
Allium fimbriatum var. mohavensis
Eriastrum eremicum
Yucca brevifolia var. hervertii
Gilia brecciarum ssp. neglecta
Eriogonum fasciculatum ssp. polifolium
Salazaria mexicana
Eriogonum latifolium ssp. westonii
Castilleha chromosa
Penstemon incertus
Brickellia desertorum
Chrysothanmus nauseosus ssp. hololeucu
Chrysothamnus paniculatus
Chrysothamnus teretiflolus
Haplopappus linearifolius var. interi
Tetradymia spinosa var. longispina

The Creosote Bush Association: The xeric creosote bush association is by far the most extensive plant assemblage in Kern County. The whole northwestern corner of the Mojave Desert is covered and largely encompassed by this association. The arch-typical species of the association, Larrea devaricata, creosote bush, grows throughout the association in evenly spaced, seemingly landscaped formations. On higher slopes in the Mojave Desert, especially where alkaline conditions become evident, several other shrubs become commonly interspersed in the creosote bush complex; for example, Atriplex polycarpa and Atriplex spinifera. In the El Paso Mountains, highly local, out of range colonies of several plant species grow within the creosote association. Although the perennial species marking the creososte bush association do not wander far out of their delimited geographic areas, several annual species range as far west as the San Joaquin Valley, as far south as the arid southern ranges, and north to the Mt. Hamilton region.

This association occurs from about 2,300 feet at Muroc, Boron and Ridgecrest, to about 4,700 feet at Government Peak in the Rand Mountains. The climate is decidedly continental with cold winters of $0^{\circ}F$ and below a common occurrence. Summers are extremely hot with daytime temperatures averaging between 100°-$115^{\circ}F$. Humidity is extremely low; there are approximately 350 clear, sunny days per year in this area. Snowstorms are common, but snow cover is minimal and does not add significantly to the precipitation levels. Summer thundershowers, on the other hand, are a significant factor in the precipitation, contributing to the autumn blooming shrubs: Brickellia desertorum and Chrysothamnus nauseosus, and autumn blooming annuals such as Dicoria canescens and Psathyrotes annua. Precipitation is highly variable in this association though generally ranging between 2.5-5.5 inches yearly. Typical plants of the creosote bush association are:

Chorianthe thurberi	Allium fimbriatum var. fimbriatum
Eriogonum inflatum	Mirabilis bigelovii var. aspera
Eriogonum renigorme	Chrysothamnus nauseosus ssp. hololeucus
Eriogonum trichopes	Astragalus didymocarpus var. dispermus
Eriogonum watsonii	Astragalus lentiginosus var. variabilis
Oxytheca perfoliata	Lupinus horizontalis var. platypetalus
Grayia spinosa	Chaenactis stevioides var. brachypappa
Abronia pogonantha	Croton californica var. mohavensis
Dithyrea californica	Gilia brecciarum ssp. argusana
Lepidium flavum	Gilia latiflora ssp. elongata
Lepidium fremontii	Gilia latiflora ssp. excellens
Astragalus layneae	Gilia ochroleuca ssp. ochroleuca
Larrea tridentata	Nama demissum var. deserti
Eremalche exilis	Tricardia watsonii
Mentzelia nitens	Cryptantha dumetorum
Camissonia claviformis	Cryptantha nevadensis
Camissonia pallida	Cryptantha oxygona
Psathyrotes annua	Cryptantha pterocarya
Gilia stellata	Cryptnatha similis
Linanthus parryae	Astragalus acutirostris
Filago depressa	Coreopsis bigelovii
Franseria dumosa	Chaenactis carphocilina
Malacothrix setulosa	Chaenactis stevioides var. stevioides
Glyptopleura setulosa	Synthricopappus fremontii
Eriophyllum wallacei	Dicoria canescens ssp. hispidula

Shadscale Scrub Association: This typically Mojavean association is relatively uncommon in Kern County. It occurs in heavy soils of predominately clay content. The soils of this association, of the hardpan variety, tend to eliminate deep rooted species such as creosote. Eschscholtzia glyptosperma, Cryptantha angustifolia, Abronia villosa and Chaenactis micrantha are usually restircted to this association.

In the El Paso Range the shadscale scrub is common on the lower northeastern slopes and in the canyons of the range where clay deposits are found. This association also occurs south of Ridgecrest in the Rademacher Hills area, on the plains south of Boron, and on some of the bench areas around the eastern and southern borders of Indian Wells Valley.

The most typical plant of the association is desert holly, Artiplex hymenelytra.

The climate of the association closely approximates that of the neighboring creosote scrub association. Typical plants of

the shadscale scrub association are:

Atriplex confertifolia
Atriplex hymenelytra
Grayia spinosa
Abronia villosa
Aschscholtzia glyptosperma
Cleomelia obtusifolia var. pubescens
Cryptantna angustifolia
Gutierrezia microcephala
Chaenactis macrantha
Artemisia spinescens

The Freshwater Marsh Association: Until recent decades the Buena Vista-Tulare drainage system of the central San Joaquin Valley formed an intricate complex of marshes, sloughs, and playas. This large inter-connected water system was generally shallow; in some areas the level of the water was only a few feet in depth, while elsewhere the water was 25-50 feet in depth. In 1868 the whole area occupied about 1,200 square miles.

Because of damming, deep well pumping, and reclamation of lands in recent decades, the ancient freshwater marsh association has practically disappeared in Kern County altogether.

The few and limited examples of this association are to be found at the Kern National Wildlife Refuge northeast of Lost Hills. This marshland habitat area is the largest in Kern County.

The climate of the freshwater marshland association would have been exactly what it is for the San Joaquin Valley: hot and dry in the summer, the daily average temperatures above 100^{O}F; precipitation about 4 inches per year; with no frost before December 1 or after February 5. This area would have dense winter fog. Typical plants of the freshwater marshes included:

Marsilea vestita
Typha domingensis
Echinodorus berteroi
Sagittaria longiloba
Leptochloa fascicularis
Echinochloa crusgalli
Cyperus esculentus
Eleocharis palustris
Scirpus acutus
Cirsium crassicaule
Salix hindsiana
Polygonum argyocoleon
Polygonum lapathifolium
Polygonum coccineum
Rumex violascens
Amaranthus californicus
Rorippa islandica ssp. occidentalis
Ludwigia peploides
Bacopa eisenii
Achillea gigantea
Salix gooddingii var. vallicola
Grindelia prodera

Vernal Poolbeds: Vernal pools or "hogwallows", are usually small depressions which collect rainfall in the winter months, gradually drying out toward early summer, and remaining dry throughout the summer months. In the typical California vernal pool, water accumulates each winter. In Kern County many of the pool beds may remain unfilled for years. Some, like the permanent sag ponds along the San Andreas fault, may be somewhat subalkaline, giving the pool species a peculiar character of their own.

In the Glenville region, particularly in Lynns Valley, the vernal pools resemble the typical California pool bed.

Typical plants of the Tehachapi and Glenville poolbeds are:

Deschampsia danthanoides
Phleum pratense
Zigadenus venenosus
Lilaea scilloides
Lepidium campestre
Allocray bracteata
Pogogyne douglasii
Limosella aquatica
Veronica arvensis
Downingia pulchella
Downingia cuspidata
Psilocarphus brevissimus

Typical plants of the poolbeds in the Temblor and San Emigdio Ranges are:

Deschampsia danthanoides
Juncus bufonius
Spergularia marina
Boisduvalia glabella
Allocarya leptoclada
Nicotiana bigelovii
Xanthium spinosum
Gnaphalium palustre
Hemizonia pungens
Lasthenia ferrisiae
Lasthenia minor
Matricaria matricarioides
Xanthium italicum
Veronica peregrina var. xalapensis

The Streambank Association: The Kern River, the county's main waterway, occupies a singular place in the hydrology of Kern County. Unlike most of the streams of the county, which do not achieve the status of real rivers, the Kern runs year round. The rest of the streams and creeks run at best for most of the year, while a few run year round in wet years. This includes: Poso Creek and its tributaries on the west slope of the Greenhorn Range; Bull Run Creek on the east slope of this range; Erskine and Kelso Creeks in the Paiute Mountains; and

El Paso Creek in the Tehachapi Mountains. Caliente, Tehachapi and San Emigdio Creeks have water in late summer and may run all year in wet years. The most common representatives of this association are Popolus fremontii, Salix lasiandra, and Salix laevigata. Fraxinus latifolia and Cephalanthus occidentalis var. californica are common along the Kern River. From Kern Canyon south Platanus racemosa is common. Growing locally along Tejon and Bull Run Creeks is Populus trichopes. At higher elevations Alnus rhombifolia occurs. The herbaceous perennials and annuals that grow along the streams are a combination of the fresh water marsh and associations commonly found in the yellow pine forest zones.

Wildlife

Due to the size of the study area, with its environmental diversity, including topographic and physiographic variations, an extensive treatment of the faunal aspect of the area is impossible. Wildlife has generally been classified according to the guidelines set by C. Hart Merrian's (1898) "life zones". Although this system, modelled along an altitudinal gradient, is basically sound, it is not, by the very nature of its simplicity, an accurate representation of existing realities. Much overlapping of species and transitional aspects of the faunal distribution cannot be taken into account by this system. However, for the purposes of this study, a modified form of Merriam's system, using suggestions made by Powell (1963), will be used as a basis for description and classification of Kern County's faunal distribution. In Table I, two zones of demarcation are presented. Of necessity, they must present a limited and generalized picture of faunal life in the study area.

TABLE I

Faunal Zones Present in Kern County

Zone 1 Desert Scrub.....Includes Merriam's Lower and most of the Upper Sonoran Life Zones, exclusive of the pinyon-juniper belt.

Zone 2 Lower Forest.....Includes part of Merriam's Upper Sonoran, the pinyon-juniper belt, the Transition Zone, as well as the small section of the Canadian Zone present in Kern County.

General patterns of mammalian distribution and description follow Ingles (1947, 1965); reptiles and amphibians are covered in Stebbins (1954) and Van Denburg (1922). Avifaunal aspects are discussed in Grinnell (1915), Peterson (1961), and Robbins (1966). A treatment of the fish of the area is covered in LaRivers (1962).

Zone 1

The order rodentia in California is represented by more individual animals than all other orders combined (Ingles 1947:89). In Zone 1 at least two species of ground squirrel occur (Ammospermophilus nelsonii, A. leucrus), the Mojave ground squirrel (Citellus mohavensis), the California beechy ground squirrel (Otospermophilus beechyi), and the least chipmunk (Eutamias minimus), is common in the sagebrush habitat. The Botta pocket gopher (Thomomys bottae), is a common desert dweller. The pocket mice are represented in Zone 1 by several species, both in the Lower and Upper Sonoran Life Zones: the little pocket mouse (Perognathus longimembris), the San Joaquin pocket mouse (Perognathus inornatus), the spiny pocket mouse (Perognathus spinathus), a denizen of the hot desert terrains characterized by the most xerophilous plants: the long-tailed pocket mouse (Perognathus formosus), the Great Basin pocket mouse (Perognathus parvus), the yellow eared pocket mouse (Perognathus xanthonotus), found in Kelso Valley, Walker Pass and the Tehachapi Mountain area; and the desert pocket mouse (Perognathus penicillatus). Several species of kangaroo rat occupy Zone 1: (Dipodomys heermanii, D. panamintinus, D. merriami, D. nitratoides, D. infens, D. deserti). The western harvest mouse occupies both Zones 1 and 2 (Reithrodontomys megaloides). Three species of the genus Peromyscus occupy Zone 1: the canyon mouse (Peromyscus eremicus), occupying low elevations; the California mouse (Peromyscus californicus), inhabiting both zones; and the deer mouse (Peromyscus maniculatus). The dusky-footed rat (Neotoma lepida), chiefly occurs in sagebrush scrub habitats in the Lower and Upper Sonoran Zones. Both the longtailed (Microtus longicaudus), and the western jumping mouse are present in this Zone. In marshy areas, the musk rat (Ondatra zibethica), and the introduced Nutria (Myocatur copyus) may be present.

Of the family canidae, the kit fox (Velpes microtis) ranges throughout the desert areas, preferring sagebrush scrub, shadscale scrub, creosote and Joshua tree associations. The coyote (Canis latrans) occurs in both Zones, inhabiting almost all plant communities in the two Zones. The raccoon (Percyron lotor) and the ringtail (Bassaricus astutus) inhabit both Zones and range over a wide area, excepting the desert habitats.

The longtailed weasel (Mustela frenata) is uncommon but does inhabit portions of the Lower Sonoran Zone present in Zone 1. The badger (Taxidea taxus) occupies both Zones from the Lower Sonoran to the Canadian. The striped skunk (Mephitis mephitis) and the spotted skunk (Spilogale putorius) occupy both Zones and range from the Lower Sonoran to the Canadian Life Zones. In the Upper Sonoran and the Transition Zones, the bob cat (Lynx rufus) and mountain lion (Felis concolor) are found.
Of the ungulates, the mule deer (Odocoileus hemionus) is common to both Zones. The mule deer is found at low elevations throughout the winter. As spring approaches they move to mountain heights where they generally remain through summer and early fall. The Sierra bighorn sheep (Ovis canadensis californi, O. canadensis nelsonii), once a common inhabitant of Kern County's mountain ranges, including the desert ranges, is now restricted to very small populations. According to Schumaker-Smith (1978: 75), about 400 head inhabit the Sierra in five herds, scattered between Convict Creek and Cottonwood Creek, with the largest herd found near Mt. Baxter and Mt. Williamson. Pronghorn antelope (Antilocarpa americana) are said to inhabit the Desert Scrub Zone year round. The dwarf or tule elk (Cervus nannodes), once common in the Great Valley and especially well adapted to the great marshy areas in the southern San Joaquin Valley, is now limited to a small herd near Tupman in Kern County, on the Tule Elk Reserve (Ingles 1955).

The order insectivora is represented in both Zone 1 and 2 by the following species: The vagrant shrew (Sorex vagrans), the broad-handed mole (Scapanus latimanus), several species of

Myotis, (Myotis thysanodes, M. californicus, M. subulatus, M. volans, M. evotis, M. yumaensis, and M. osulatus). The hoary bat (Lasiurus cinerus) and the red bat (Lasiurus borealis), the silvery-haired bat (Lasionysteris noctivagans), the big brown bat (Epesicus fuscus), and the western pipistrelle (Pipistrellus herperus), the spotted bat (Euderma maculata), the pallid bat (Antrozous pallifus), the lump-nosed bat (Plecotus townsendii), and the brazilian free-tailed bat (Tadarida brasiliensis) also occur in these two Zones. The lagomorphs in Kern County's Zone 1 are the black-tailed jack-rabbit (Lepus californicus) and one subspecies of Audubon cottontail (Sylilagus audubonii arizonae).

For information about fish, reptiles and amphibians, and avifauna, the above references should be consulted.

Zone 2

In this Zone the presence of rodents is likewise prominent. The yellow-bellied marmot (Marmota flaviventris), though not very common, occupies the higher levels of the Canadian Zone present in Kern County's Tulare borderlands. The rock squirrel (Otospermophilus variegatus) inhabits pinyon areas, while the Sierra golden-mantled squirrel (Callospernophilus lateralis) inhabits higher elevations in the Upper Sonoran Zone.

Several species of chipmunk inhabit the pinyon-juniper associations, the Mt. Pinos region, the southern Sierra, and the Tehachapi Mountains respectively: (Eutamias merriami, E. panamintinus, E. speciosus, E. amoenus). The western gray squirrel (Scirus griseus) is found in the Tehachapi Mountains, the red squirrel (Tamiascurus hudsonicus) occurs in the Transitional Zone. The northern flying squirrel (Glaucomys sabrinus) is generally found in the Transition and Canadian Life Zones. The little pocket mouse, already mentioned in Zone 1 also inhabits the Upper Sonoran Life Zone. The white-eared pocket mouse (Perognathus alticolus) occurs in Yellow pine as well as in areas of the Tehachapis and in higher Transition zones.

The California pocket mouse (Perognathus californicus) occupies Transition zones. The heerman and panamint kangaroo rat, already noted in Zone 1. occupy this Zone with the latter being common to the pinyon-juniper association. The Great Basin kangaroo rat (Dipodomys micropos) is also found in the pinyon-juniper zones. The western harvest mouse (Reithrodontomys megaloides) ranges between both Zones 1 and 2. At least four species of Peromyscus are found in this Zone: (Peromyscus californicus, P. boylii, P. truei, P. maniculatus). The dusky-footed rat (Neotoma fuscipes), the long-tailed meadow mouse (Microtus longicaudus), the California meadow mouse (Microtus californicus), and the western jumping mouse (Zapus princeps) are also inhabitants of a variety of habitats in Zone 2.

The porcupine (Erethizon dorsatum) occurs in the Tehachapi Mountains. In the Canidae the gray fox (Urocyon cineroargentus) ranges in the Upper and Transition Zones; the coyote (Canis latrans), already mentioned in Zone 1, also occurs in Zone 2 in most communities. The wolf (Canis lupus) is extremely rare, and its restricted range in the Sierra is very doubtful. The black bear (Euarctos americanus) is still a reasonably common inhabitant of the Yellow pine in the Transition and Canadian Zones in Kern County. The raccoon and the ringtail, already mentioned for Zone 1, also occurs in Zone 2. The fisher (Martes pennanti) occupies chiefly the Canadian, Upper Yellow pine, and Red Fir Zones. The badger, the striped and spotted skunk also occur in this Zone and have already been noted for Zone 1. The wolverine (Gulo luscus), now a severely endangered species, once common, is very rare but does occur in the southern Sierra to Walker Pass (Ingles 1965).

The mountain lion (Felis concolor) and the bobcat (Lynx rufus) occur in the Transition and Upper Sonoran Zones in Zone 2. Mule deer and pronghorn antelope have the same range as they do in Zone 1, and mountain sheep, or bighorn, has also been mentioned.

The order Insectivora has been listed for Zone 1.

The white-tailed hare (Lepus townsendi townsendi) occupies the foothills and the mountains, feeding on creambush, sagebrush, and various grasses (Ingles 1947:266), while the snowshoe hare (L. americanus tahoensis) favors the red fir forest and most sections of the Canadian Zone in Kern County. The lower half of Zone 2 is inhabited by Nuttall's cottontail (Sylvilagus nuttallii), and two other cottontail species (S. audubonii and S. bachmanii).

Paleoclimate

Although a detailed reconstruction of the paleoclimate for the whole of Kern County is untenable for the purposes of this overview, a general summary of holocene climatic conditions for the study area is provided. The major early studies on paleovegetation and paleoclimate for western North America were carried out by Axelrod (1939, 1948, 1950, 1958). Later researchers (Antevs 1948, 1953, 1955; Roosma 1958; Bryan and Gruhn 1964; Baumhoff and Heizer 1965; Adam 1967; Curry 1969, 1971; LaMarche 1974; and Batchelder 1970) have provided studies on Holocene conditions motivated largely by an interest of post glacial influences on man in the Great Basin, the Sierra Nevada, the Mojave Desert, and in other parts of eastern and southern California. In spite of the seemingly inappropriate geographic areas available for comparison to the study area, the location covered in the literature cited are in fact applicable and relevant to Kern County as a whole.

Axelrod (1950) postulated that increasingly dry conditions characterize much of the present-day West from the Miocene onward. Rainfall decreased sharply from an average of 80 inches or more during the Eocene to possibly 12-25 inches in the Miocene, this condition being especially applicable to the western border of the Mojave Desert. Although this dryness arose mainly east of the Cascado-Sierran axis, summer dryness throughout what is now California became an important feature from the

early tertiary into the quarternary (Munz and Keck 1967). Accordingly, Pleistocene and Holocene vegetation in western North America has evolved from a progressive trend toward a drier climate as well. However, evidence shows (Antevs 1948; Adams 1967; Curry 1971; LaMarche 1973, 1974) that in spite of the predominately dry conditions from the early Miocene on, a remarkably consistent pattern of temperate periods occurred during the Pleistocene and the Holocene, coinciding roughly with periods of glaciation. During these pluvial or glacial periods the general area under consideration received slightly higher amounts of precipitation (Curry 1971). Also during these pluvial periods a drop in yearly mean temperature occurred; estimates by LaMarche (1973) indicate that this drop may have measured approximately $3.5^{o}F$, having a quantitatively significant effect on the biota. Thus, Pleistocene and Holocene climate was characterized by a more temperate climate, due to pluvial influences, than that which characterizes the region today (Curry 1971).

The episodic fluctuations in Pleistocene and Holocene climate have been documented by several researchers in some detail. One of the earlier researchers, Antevs (1948), based his findings on data provided by positions and fluctuations of lakes, glaciers, and snow lines; rate of tree growth; depositions and erosions by water and wind; plants and animals; and in historic time, by measured precipitation, run-off, and lake levels. Antevs' tripartite model of Holocene change in the Great Basin is generally based on this conclusions that pluvial periods in the Great Basin corresponded with the continental glaciation of higher latitudes, thus suggesting the date 9000 B.P. for the end of the Wisconsin glaciation and the begining of the Neothermal (Busby et. al. 1979). Correlating similar data from North America and other continents, Antevs proposed the three-part division of the Neothermal (Figure 1). Adam (1967) bases Holocene climatic change on pollen cores from the central Sierra

Nevada and constructs this epoch as a succession of cool and warm periods. The cool periods occurring from 10,500 B.P. to 9000 B.P., from 7000 B.P. to 5000 B.P., and from 3000 B.P. to the present; two thermal maxima occur in his scheme, one from 9000 B.P. to 7000 B.P., the other from 5000 B.P. to the present (Figure 2). Two pollen cores from Black Lake, Mono County, retrieved by Batchelder (1970) show evidence of fluctuations between meadow and marsh environments for the locality, suggesting the presence of warm or lake conditions prior to 5000 B.P., from about 3000 B.P. to 2100 B.P., and from 1000 B.P. to the present (Figure 2). The most detailed reconstruction of Holocene climatic conditions is perhaps provided by LaMarche (1967, 1973, 1974). Based on dendroclimatic records and on fluctuations observed in the elevations of the lower tree line of the alpine forms of the White Mountains, the treeline data suggests the presence of a relatively high treeline, indicating warm, possibly dry conditions from 5400 B.P. until 3000 B.P., followed by moderately cooler conditions lasting to about 800 B.P., at which time the region underwent a drastic cooling trend that extends to the present.

Although the magnitude of these climatic fluctuations (Figure 2) is unknown, the annual variation in precipitation and temperature throughout the Neothermal, i.e., the Holocene, has been within the range observed over the last 100 years (Curry 1971); the cool or warm intervals represent only the increased frequency of climatic extremes, e.g., drought years and wet years (Bettinger 1979:18). LaMarche (1973), for example suggests that the observed 200m downward displacement of the upper bristlecone pine treeline between the thermal maxima occurring from 5500 B.P. to 3000 B.P. and the neoglacial interval ending around 300 B.P., would require a reduction of only 3.5^{o}F in summer temperature. Curry (1969:35) states that: "Two additional snow storms per season (about 20-30% increase in precipitation over 16-30 year intervals) of average magnitude

are sufficient to cause neoglacial advances equal to those of the 14th through the 19th centuries and that one additional snow storm per season is sufficient to maintain mass budgets of the Sierran glaciers at the position of their maximum late neoglacial advance.

Climatic fluctuations affect biotic communities in extremely complex ways, but in general, fluctuations in precipitation have their greatest effect at lower elevations (Munz and Keck 1967), where moisture is the single most limiting factor. Thus, the lower ecotome of the pinyon woodland and alpine forests, for example, will move downward during wet periods and upward during dry ones (Bettinger 1979:35). Nut productivity would, of course, display a positive correlation with precipitation. In closing, systematic relationships between temperature and moisture should be mentioned. Winters with heavy snows tend to produce lower spring temperatures owing to increased cloud cover and ground albedo (Curry 1971). Similarly, lower temperatures will obviously result in decreased potential evaporation, thus increasing available moisture (Bettinger 1979:36).

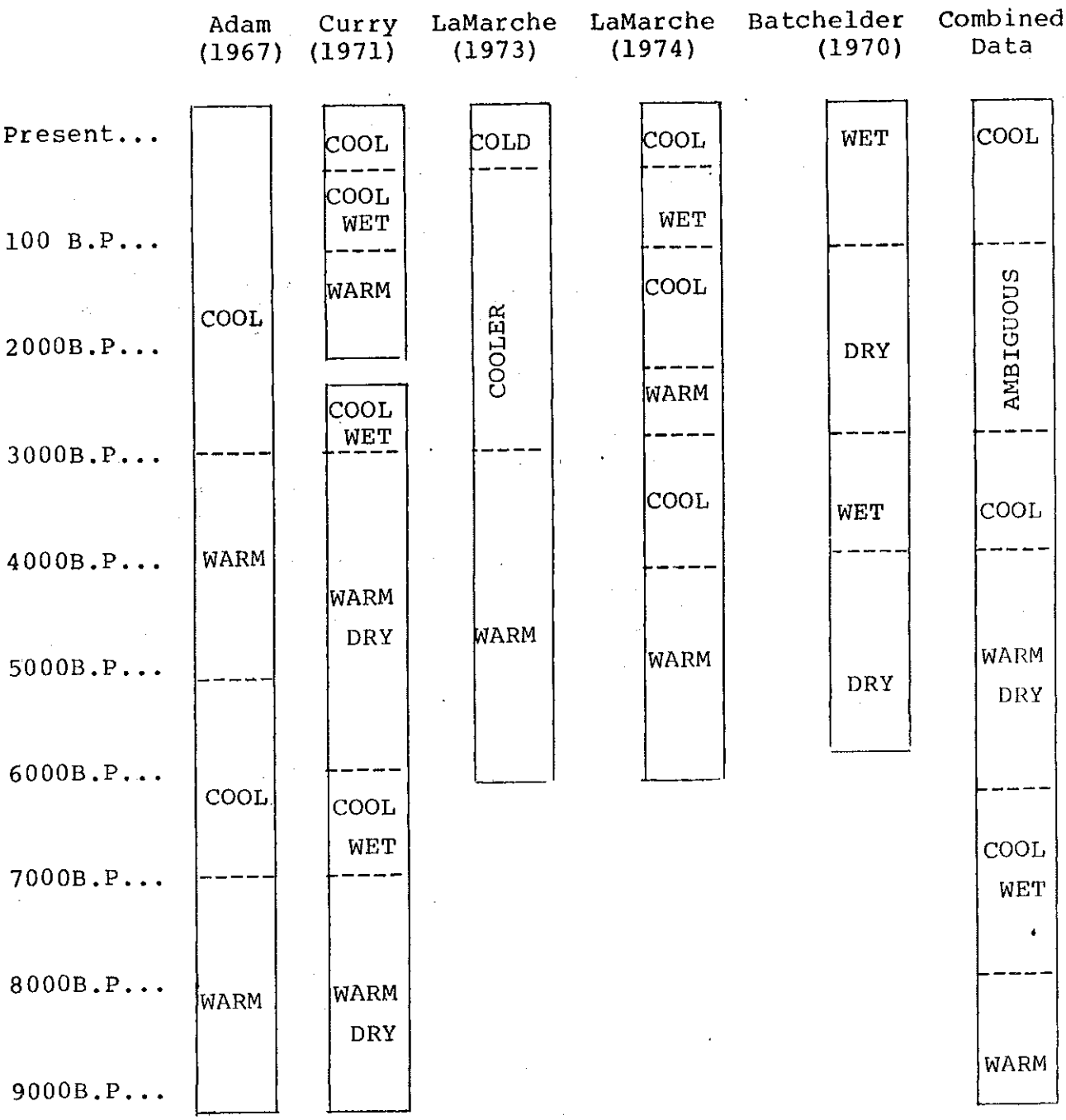
Figure 1

THE NEOTHERMAL
(Postglacial or Postpluvial)
(Antevs 1948:176)

	General temperature ages	Moisture conditions in the Great Basin and contiguous areas
Present		
	Medithermal	
	Moderately warm	Arid and semiarid; rebirth of lakes and glaciers
2500 B.C.		
	Altithermal	
	Distinctly warmer than present	Arid; disappearance of lakes and glaciers
5000 B.C.		
	Anathermal	
	At first as today, but growing warmer	Probably subhumid and semiarid

Figure 2

SUMMARY OF PALEOCLIMATIC INFERENCES FROM ASAM 1967, CURRY 1971, LaMARCHE 1974, and BATCHELDER 1970 *



*Adapted from Bettinger 1979:16, Figure 2.

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ETHNOLINGUISTIC/CULTURAL BACKGROUND

PENUTIAN LANGUAGES

Aboriginally, there were 40 Yokuts groups in California, each speaking a distinct, but mutually intelligible, dialect of the yokuts language family. This family is one of five such units within the California Penutian language phyla (Silverstein 1978:446). These 40 populations were divided by Kroeber (1907;309-315) into two dialectical regions: the foothill Division and the Valley Division. Six of these Yokuts groups were located within Kern County. Five are Valley dialects, including the Chuxoxi, Hometwoli, Tulamni, Yawelmani and the Wowol and the sixth group, the Palewyami, are a Foothill population.

The antiquity of the Yokuts in the Southern San Joaquin and adjacent Sierran foothills has not been clearly established. Attempts at resolving this question have led to several divergent opinions. The best estimate for the appearance of Yokuts speakers in the southern San Joaquin Valley has been developed by Baumhoff and Olmstead (1963,1964). they have utilized available linguistic and archaeological data to suggest that early Hokan speakers were replaced by the Penutian-speaking Yokuts around 4,000 years ago (Frederickson and Grossman 1978). This early date would apply to the Tulamni, Chuxoxi, Wowol and Hometwoli. The Palewyami and Yawelmani, according to linguistic analysis, encorporated a few sound and language patterns that correspond to Uto-Aztecan languages of the Great Basin and are believed to be latecomers into the Valley and Foothill areas.

SOUTHERN VALLEY AND FOOTHILL YOKUTS

Territory

The traditional homeland of the Southern Valley Yokuts centered around "Tulare, Buena Vista and Kern Lakes, their connecting sloughs and the lower portions of the Kings, Kaweah, Tule and Kern rivers"...(Wallace 1978:448). Within Kern County this territory included the last flowing watershed in the Temblor Range on the west, the lower foothills of the southern Sierra Nevada Mountains on the east, and on the south by the line drawn from where the Tehachapis meet the Coast Range across the lower foothills of the Coast Range.

The territory of the Foothill Yokuts populations was located along the western foothills of the southern Sierra Nevada Mountains as far westward as the San Joaquin Valley floor and eastward to elevations of around 2100 meters. Most settlements were between 650 and 1300 meters in elevation. In Kern County the Palewyami Foothill Yokuts occupied the area just west of Granite Station along the present-day oak tree line, on the south by Rattlesnake Creek, north to the Tulare County border and east along the Greenhorn Mountains. The major occupations of the Palewyami Yokuts was along the drainages of Poso and Little Creeks (Spier 1978).

Land Use Patterns

The six Yokuts populations occupy two environmental zones, Valley and Foothill. While sharing numerous cultural traits, the environmental factors did influence the individual populations. This can be seen in an examination of

the ethnographic record (Latta 1949; Wallace 1978; Spier 1978).

The Valley Yokuts followed a subsistence pattern based on the exploitation of many resources with emphasis on fishing, the collecting of shellfish, the gathering of seeds and roots and the hunting of waterfowl, rabbits, deer and elk. Acorns, the basic staple of many California Indians, were less important for the Southern Valley Yokuts who had to trade local resources for acorns with their Yokuts and Kawaiisu neighbors to the east or with the Chumash to the south. Many of these resources were seasonally obtained with an ample food supply virtually assured year round. Of great importance to their economy was the presence of the Kern River drainage, Buena Vista Lake (now dry), Kern Lake (now dry), and the many sloughs such as Jerry's slough and Goose Lake slough. These waterways and marsh lands provided the basic resources necessary for their subsistence. Several types of fish were caught, including perch, suckers, and steelhead. In the Kern River nearer the mouth of the Kern Canyon, trout were also available. Migratory water fowl were another important resource with large flocks of geese and ducks coming through the Southern Valley during their seasonal migrations with many staying to nest in the slough areas that covered the valley (Latta 1949; Wallace 1978). Also, large quantities of shell fish were obtained in the lake areas and along the sloughs and river channels.

Periodic rabbit drives were held with hundreds of rabbits procured and shared during a single hunt. Often these drives would include Chumash, Kawaiisu and several different Yokuts groups. Many rabbit drives took place along the valley portion of the Kern River where rabbits were trapped on one side by the Kern River.

The general abundance of food throughout the valley along with the resources that the Yokuts traded for enabled most populations to live in permanent year round villages. Seasonal

breakup of many villages occurred in the late spring and summer months when families left for several months to exploit more distant resources. Seasonal or temporary villages and camps would be set up during these periods (Wallace 1978:454).

In contrast to the Valley Yokuts groups, Foothill Palewyami subsistence was based on the hunting of deer and gamebirds and the gathering of acorns, all in plentiful supply. In addition, numerous varieties of seeds and roots were collected and many smaller game animals were hunted. In years when acorns were in short supply, the California buckeye supplied a reasonable substitute (Spier 1978).

Socio-Political Organization

While the basic economic unit consisted of the nuclear family, patrilineal totemic lineages provided the foundation for the social and political organization among the Southern Valley and Foothill Yokuts. Each village contained several totemic lineages named after various animals. The Valley lineages were further grouped into moieties with each lineage designated to one of the two halves, the only exception being the Foothill Palewyami who did not have moieties (Gayton 1948;48). Each village consisted of members from several lineages as lineage exogamy was a rule. Moiety exogamy was also generally practiced.

The lesser significance of moieties to the Foothill Yokuts and their absence among the Palewyami appears to be responsible for the differences in political organization between Foothill and Southern Valley Yokuts groups. For the southern Valley Yokuts each cultural group existed as a separate political entity (Latta 1949; Wallace 1978), with each divided into several self-governing local groups (Kroeber 1925). Each dialect group consisted of one or more main villages and several lesser satellite villages. Normally the larger villages were dominant over the smaller ones (Kroeber 1925:

478-484; Latta 1949). Each village had two chiefs, one from each moiety. The position of the chief was inherited. Leadership resided jointly based on group concensus and support from the heads of the various lineages. The two chiefs ruled over the main village and the smaller ones.

The Palewyami Yokuts (Foothill Division) had several chiefs with at least one in each of its villages. Each lineage was normally represented. The chiefs' executive powers were limited to internal affairs of the village (Wallace 1978:482). Villages were more autonomous among the Palewyami.

Cosmology

It has been stated that Southern Valley Yokuts' religion was not rich in ceremonies (Wallace 1978:456). This assumption may be the result of a lack of early ethnographic data on religious beliefs and practices. Practices said to be absent are the worship of a commonly recognized deity and the lack of an organized priesthood (Wallace 1978:457-458). What is known is that the Yokuts maintained deep respect and awe for the supernatural (Spier 1978:482).

The most elaborate of their rituals centered on death, burial and the honoring of the dead (Driver 1937:139). The interment of the dead among the Yokuts has the best possibility of having a physical presence in the archaeological record. Grave offerings included personal belongings: utensils, beads, basketry and occasionally a sacrificial dog (Kroeber 1925, Driver 1937; Wallace 1978).

Other important rituals were the Snake Dance (Kroeber 1925) and the widespread Datura Cult (Wallace 1978:456; Spier 1978:482; Kroeber 1925). The taking of a datura solution was part of male and female puberty rites and was important in assuring a healthy and prosperous life. Additional information on the Datura Cult is found in ?Atishwin: The Dreamhelper in South Central California (Applegate 1978).

Like other California cultures, the shaman was an important religious figure responsible for religious and community events and was a healer or medicine man.

Pictographs, generally attributed as manifestations of the religious system, are commonly found within the territorial limits of the Palewyami but are rare within the territory of the Valley Yokuts. It has been suggested, however, that some of the pictographs found in the Temblor Range and in the Carrizo portion of the Cuyama Chumash area, usually attributed to the Chumash may in fact be Yokuts. Recent research into Yokuts pictographs has suggested that some Yokuts pictographs may have astronomical significance.

HOKAN LANGUAGES

Occupying the western and southernmost portions of Kern County were the Hokan speaking Chumash. There were at least seven Chumash languages, including Ventureno, Barbareno, Ynezeno, Purisimeno and Obispeno. While the Castac Chumash are believed to have spoken Ventureno, it is uncertain if the Cuyama Chumash spoke one of the other five languages or a totally unique dialect (Grant 1978:505). At a recent conference which included a session on Chumash linguistics, it was stated that the existence of a Cuyama dialect was doubtful and may in fact represent a mixture of Chumash and Yokuts languages (Robert Hoover, personal communication, 1980). Grant (1978) identifies a third group, the Emigdiano and suggests they spoke Barbareno. John Johnson (personal communication 1979) indicated that the Indians occupying "Emigdiano" territory were in fact Castac Chumash and that the confusion was based on a few vocabulary words from an informant residing in the San Emigdio area.

Precise dates for the earliest Chumash presence in Kern County have not been firmly established. It has been postulated (Baumhoff and Olmstead 1963, 1964) that the early occupants of Buena Vista Lake, circa 8500 years B.P., were Hokan speakers, the forerunners of the historic Chumash. Baumhoff, using archaeological data, suggests that these Hokan speakers were replaced by the Penutian-speaking Yokuts about 4,000 years ago.

INTERIOR CHUMASH

Territory

The territory of the Interior Chumash included portions of Kern, Los Angeles, San Luis Obispo, Santa Barbara and Ventura counties. The Cuyama region of concern here

> "is bounded on the north by the mountains separating the drainages of the Salinas and Cuyama Rivers, on the south by the crest of the San Rafael Mountains, on the west by the Coast Ranges and on the east by the Temblor Range and the mountains dividing the watersheds of the Cuyama and Santa Clara Rivers." (Grant 1978:530).

Within Kern County their territory was limited to the Temblor Range. It is not known how far east into the Temblors they extended. However, it is suggested that while they may have travelled freely through the Temblors, their territory proper ran westward from the crest of these hills.

The Castac (and Emigdiano) region extended from Castac Lake along the drainage of Pastoria Creek in the Tehachapi Mountains on the east and "on the north defined by a line drawn roughly from Grapevine to the Mount Abel Road and including all the north flowing streams from the Mount Abel-Tecuya Mountain Region" (Grant 1978:533). To the south their territory extends an unknown distance into Los Angeles County, and on the west they border the Cuyama Chumash.

Land Use Pattern

The Inland Chumash followed a seasonal round that en-

abled them to use all segments of their territory and brought them into regular contact with their coastal affiliates. While the coastal Chumash relied heavily on marine resources as well as acorns, the inland Chumash followed a settlement-subsistence pattern similar to that of the Yokuts and the Tubatulabal (Landberg 1965). Foremost in their diet was the acorn obtained in great quantities during the fall months. Pinyon nuts were an important resource obtained during the summer. Hunting centered primarily around deer and the large herds of elk and antelope in the valley area. Latta (1949) and Veogelin (1938) reported that the Chumash joined in annual animal drives and hunts with their Yokuts, Kawaiisu and Tubatulabal neighbors.

The seasonal round of the inland Chumash affected their choice of residence. Villages and camps were located according to the season of the year and the availability of water. The Castac spent the hot summer months in the cooler mountainous areas where water was available and the winter months in the lower wooded valleys within their territory. Summer mobility was characterized by living in small camps while winter villages were larger and more substantial. The Cuyama spent much of their year in the western half of their territory using the eastern portion of their lands, within Kern County, for hunting and gathering expeditions.

According to available archaeological and ethnological data Chumash villages and camps can be found where water was available and where desired natural resources could be obtained. As such, sites have been recorded throughout their territory with density varying according to resource availability.

Social and Political Organization

The socio-political structure of the inland Chumash is

not well known, but it seems likely that they followed a pattern similar to that of other California cultures. Major Chumash communities were referred to as rancherias and were under the direction of a single chief. The organization of each rancheria was based on kinship with lineage headmen having the authority to make decisions. In addition to the major rancherias there existed hundreds of smaller settlements scattered throughout Chumash territory. These smaller communities were also based on lineage affiliation and were the result of the seasonal round where families would go off on their own during certain hunting and gathering seasons, rejoining a central rancheria during the winter months and for special cultural events.

Cosmology

While a considerable amount of information is available on Chumash religion in general, almost nothing specifically can be said about the cosmology of the interior Chumash. Nevertheless, a few known aspects of their belief system have the potential of revealing archaeological manifestations.

Shamans among the Chumash functioned as healers, astronomers and general religious practitioners (Grant 1978:513; Hudson and Underhay 1978). As part of their magical paraphernalia, shamans used fetish bundles. These magical bundles contained such objects as pieces of fabric, stones, awls, quartz crystals, carved steatite items, beads, pendants and bone items (Grant 1978:514). Also, like Yokuts shamans, the Chumash made use of carved charmstones.

The interment of the dead was an elaborate ritual involving the burial of the deceased, the offering of grave goods, and the mourning ceremonies (Grant 1978:512). Common funerary items included bowls, pestles, beads, personal effects and ceremonial offerings.

A major religious practice among the Chumash was the Toloache or Datura cult, involving the use of jimson weed. Although conjectural, it has been suggested that certain Chumash pictographs are associated with the Toloache cult which included both girls' and boys' initiation rites (Kroeber 1925:938). More certain, however, is the overall religious significance of Chumash rock art (Hudson and Underhay 1978). Current investigations using both ethnographic materials (primarily from J.P. Harrington) and from archaeological research, have associated Chumash pictographs with religious practices, astronomical knowledge and major cultural events.

UTO-AZTECAN LANGUAGES

Languages of the greater Uto-Aztecan family were spoken over interior western North America from the Columbia River in the north to the Valley of Mexico in the south (Cressman 1977). Members of this grouping include the simple food foragers within the study area and also the socially complex Aztecs of Mexico. Historical linguists have suggested that the original homeland for the Uto-Aztecan speakers was somewhere in the area of the Arizona-Sonora border and from this area migrations took place to the south and west (Fowler 1972).

Uto-Aztecan is represented in California by a number of languages and in Kern County is divided into three branches: Numic, Tubatulabic and Takic.

Numic and Tubatulabic

The Numic languages comprise the most northern branch of the Uto-Aztecan linguistic family. Numic languages are distributed throughout the Great Basin in a large triangular area whose apex lies in the southern Sierra Nevada and whose base lies along the Rocky Mountain chain (See Fowler 1972:106 for a general map). Kawaiisu and Panamint Shoshone belong to the southern and central divisions of Numic respectively. The language group Tubatulabic contains but a single language, Tubatulabal. This language has been suggested to be most similar to the Numic group (Hale 1958-59).

Linguists have noted that the Numic languages are all very closely related and this is considered to be indicative of their very recent spread across the Great Basin (Lamb 1958; Miller 1966; Miller, Tanner, and Foley 1971). Glotto-

chronological studies suggest that the present distribution of Numic languages dates to a period about 1000 years ago (Hale 1958-1959). Further information indicates a minimun period of divergence for Numic and Tubatulabal of approximately 2500 to 3000 years (Hale 1958-1959; Lamb 1958).

Studies of the distribution of Numic languages and their internal diversity suggest the area of the homeland for proto-Numic speakers. The greatest diversity of Numic languages is found in eastern California and the overall distribution of this language branch indicates a probable spread from this heartland.

Sydney Lamb (1958) states:

> "The present location of Tubatulabal speakers may well be the same as that occupied by their linguistic ancentors of three thousand years ago...The original Numic dialects may have occupied an area which could have included the historical territory of the Kawaiisu as well as that country just east of that part of the Sierra Nevada now assigned the Tubatulabal."

Fowler (1972) using the method of comparative linguistics, reconstructs the homeland for Numic speakers using plant and animal terms common to the various Shoshonean languages. By isolating those key plants which only occur in certain areas, she places the Numic homeland in an area which includes the southern Sierra Nevada and northwestern Mojave Desert.

Takic

The Takic branch of the Uto-Aztecan stock consists of six languages situated in southern California: Gabrielino and Fernandeno on the coast and Cahuilla, Cupeno, Serrano and Kitanemuk in the desert interior. Only the latter two concern us in this study (Shipley 1978; Kroeber 1925).

The Takic languages diverged from the other branches of Uto-Aztecan from 2500 to 3000 years ago and as such have a long antiquity in their present area (Hale 1958-1959).

KAWAIISU

Information on the aboriginal lifeways of the Kawaiisu is unsystematic and scattered in a number of papers. Most ethnographic fieldwork has been conducted by Maurice Zigmond (1938, 1941, 1972, 1977, 1978, n.a.) and Stephen Cappannari (1950) but as yet no full length ethnographic work on this group has been published. Zigmond is actively publishing papers on various aspects of Kawaiisu culture and a summary treatment of the culture will appear in the Smithsonian's forthcoming volume on the Great Basin in the new Handbook of the Indians of North America. Some data on the Kawaiisu is also available in Kroeber (1925), Steward (1938) and Driver (1937).

Territory

The Kawaiisu occupied a territory which included the southern end of the Sierra Nevada range and extended westward toward the San Joaquin Valley and eastward into the Mojave Desert (Kroeber 1925). These tribal borders are vague and difficult to delineate.

Steward (1938:71) indicates that the Kawaiisu also occupied certain desert areas: the southern end of the Panamint Valley, the Argus Mountains and the area in the vicinity of Trona. It should be noted that Steward's Kawaiisu informant resided in Grapevine Canyon in the southern Sierra Nevada. Steward (1938:71) suggested that the Tubatulabal adjoined the Kawaiisu to the north but occupied a portion of the Mojave Desert west of the Kawaiisu. Steward also stated

that the Tubatulabal had once owned the Coso obsidian quarry which is usually considered to be within Little Lake Shoshone territory. Zigmond (1938) suggested that the northernmost boundary of the Kawaiisu extended to an area just south of Owen's Peak and north of Walker Pass:this is contrary to Voegelin's (1938:7) statement that the Tubatulabal controlled Walker Pass and areas to the north. Grosscup (1977) reconciles these differences using information from C.H. Merriam's early ethnographic notes. Merrian indicates that the Tubatulabal's eastern border was most likely the crest of the Sierra Nevada and that a part of Walker Pass west of the crest of the Sierra Nevada, near Canebrake Creek but not the pass itself, was mutually occupied by the Pananmint Shoshone and the Kawaiisu. Zigmond's data (1938) indicates that the Kawaiisu alone controlled the pass.

The core area for the Kawaiisu is said to have been the southern Sierra Nevada and Tehachapi Mountains.

Land Use Pattern

Subsistence-settlement practices for the Kawaiisu are difficult to determine. The sketchy ethnographic accounts, alluded to in the introductory statements of this section, suggest that the Kawaiisu wintered in the Tehachapi Mountains occupying hamlets consisting of two to six houses. During the spring it is known that seed from certain annuals and grasses were gathered, including Indian Rice Grass (Oryzopsis hymenoides), Tick Seed (Coreopsis bigelovii), blazing stars (Mentzelia spp.), Tansy Mustard (Descarania pinnata), and chia (Salvia columbariae and Salvia carduacea). Summer was a time of considerable movement and fall was spent in the higher mountains gathering acorns and pinyon nuts. Fishing was conducted, although few good fish streams were found within Kawaiisu territory, and rabbits were hunted communally. Deer meat was a favored food but a wide variety of meat

sources were available, including: large and small game, rodents, birds and insects, Chuchwalla lizards were sometimes obtained out on the desert.

Social and Political Organization

Social organization of the Kawaiisu was similar in some aspects to that of the Tubatulabal. Chieftainship was associated with the possession of personal wealth. The chief had no coercive authority but supervised feasts and bore much of the expense for these occasions.

Cosomology

The Kawaiisu have a rich mythology which tells of animal-people, supernatural beings, whose actions accounted for all the key elements in the Kawaiisu world--the origin of fire, of sexual intercourse, of hunting, and for the presence of certain features of plants, animals, and the landscape. Prominently figured in the narratives is coyote, a cunning, foolish and lecherous fellow. Also important is the inipi (soul or ghost). The Kawaiisu world contains an...

> "invisible domain filled with identifiable beings and anonymous non-beings, with people who are half spirits, with mythical giant creatures and great sky images, with 'men' and 'animals' who are localized in association with natural formations, with dreams, visions, omens and signs" (Zigmond 1977).

Rituals were conducted accompanying key life events. The drinking of toloache (an infusion made from Datura) was initiated following the onset of puberty for both men and women. During the celebration, relatives and friends would gather, sing, dance and make offerings, scattering seeds, beads and berries about the area.

Death involved an elaborate ritual which first entailed

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the wrapping of a body in a tule mat, placing it in a rock cleft, and covering it over with a split burden basket and rocks. This took place usually the day after an individual's death. Commemoratory ceremonials for a number of persons were held at irregular intervals and several tribal groups might be represented. A circular enclosure was constructed where the images of the dead would be burned. The images, consisting of brush and bark figures dressed in the clothing of the deceased, were thrown into the fire as were beads, pinyon nuts and other offerings. This was an occasion for dancing and celebration for all but the mourners. Feasting and payments to the celebrants by the mourners concluded the ceremony.

KITANEMUK

Until recently very little information was available on the Kitanemuk. Recent synthesis based on the early ethnographic work of John Peabody Harrington (1917) provides the only detailed accounts of this group (Blackburn and Bean 1978; Hudson and Blackburn 1978). Some data is also available in Kroeber (1925:611-619).

Territory

The Kitanemuk were located principally in the Tehachapi mountains at the southern end of the San Jaoquin Valley. They most likely shared territory with the Tatavium in the western Antelope Valley, though this is uncertain.

Land Use Pattern

The Kitanemuk were a small group of people, perhaps numbering from 500 to 1,000 individuals. Little data is available on their economic patterns but their general ecological adaptation and subsistence technology differed little from that of adjacent groups. Their land was one of mountains and foothills dotted with oaks and the acorn served as a major staple. Annual harvests of acorns provided the bulk of the vegetal portion of their diet. Other plant foods available were pinyon pine nuts, chia seeds, yucca stalks, elderberries and mesquite beans. Fish and game were not plentiful in their territory and probably were of less dietary significance.

Social and Political Organization

The scant data available indicates that the Kitanemuk

were organized similarly to other Southern California indigenous peoples by the principle of patrilineages. Differing from their neighbors, the Kitanemuk lineages were not organized into more inclusive moieties nor were the lineages totemic.

Ritual leadership was supplied by the village chief (kika) and by a ceremonial manager (paha). Social ranking was well developed and status sustems incorporated a variety of administrative elite. Each village had a chief, ceremonial manager, two messengers, shamans, diviners and other ritual specialists.

No data is available on the political organization of the Kitanemuk.

Cosomology

The Kitanemuk possessed a sophisticated mythology which incorporated elements similarly found in Chumash, Yokuts and Gabrielino oral narratives. The religious beliefs and rituals, which were practiced with them, belong to the Northern Complex (Hudson and Blackburn 1978).

The Northern Complex involved a mythological system which employed a pantheon of Sky People who were perpetually engaged in a great celestial peon game whose outcome could affect life and death. Key members of the pantheon involved certain celestial objects: Moon was a neutral female who kept score, Sun and Sky Coyote or Sky Deer were opposing team captains. Sun was associated with Evening Star and represented death. Their opposition, Sky Coyote (Polaris) and Morning Star, were associated with rain, food and life. If the latter team won the coming year would be a prosperous one.

Other aspects of Kitanemuk religious beliefs included a puberty ritual for young men which took place during the winter. An infusion of Datura was given to the one or more

initiates by a pinipha or captain. The psychotropic plant produces visions which aided young men in their quest for a dream-helper. During their hallucinogenic experience some type of animal would usually be revealed, and this animal would become both protector and friend. Offerings would be taken to an isolated place in the mountains or to a shrine and the captain would pray to the boy's animal helper to give him power. Following this ritual the boy lived apart from the community for a month in a specially consturcted house, abstained from bathing, and prayed. He was then considered a man and his dream-helper would henceforth be his friend and protector.

Special rituals were associated with death and involved the mourners and other members of the village. The chief was responsible for the proper interment of the dead. The body was taken to the chief's house and he paid for the wake which lasted several days. The wake was restricted to old people who sang during the night and wept. The body was doubled up, tied, and wrapped in a mat by hereditary women morticians. At graveside the skull of the deceased was cracked open and tiny portions of the brain were distributed to the mourners to eat. The body was placed in a pit, previously excavated for this purpose, along with valuables. Following the ritual none of the mourners could eat meat or fat for a month. At a later wake, the personal possessions of the deceased were burned. At this time the chief announced when the next mourning anniversary would be held. Due to the expenses involved, these events were at four to five year intervals.

The mourning ceremonial lasted a full week and was held in a horseshoe-shaped ramada. An effigy was constructed and burned along with other items including baskets, beads, nuts and seeds. Dancing and singing were an important part of the event. The effigy was buried in the spot where it was burned

and covered in a way as to erase all trace of it. A specially selected dancer assured that no indication of the pit was left.

A chief's death required a special gravepole which several men cut from wood obtained in the mountains. The pole was painted with stripes of red, white and black. It was carried to the ramada and laid on mats where people threw beads and seeds. The men, whose responsibility was the production of the gravepole, would take some of these items as their pay. The pole would be placed in the center of the ramada and further decorated with fabric strips and banners of feathers. After the ceremony, the pole was taken to the burial site and baskets were slipped over it. Two ceremonial wands were further attached to the pole forming a "V"; the pole was then placed at the head of the chief's grave.

Shamanism required special abilities gained from your dream-helper. The helper was acquired during hallucinogenic experiences after ingesting Datura or a species of ant. To attain exceptional power, a number of dream-helpers were required and only a select number of individuals had the interest or capability to reach this state. Shamans served as curer for major illnesses and were paid for a performance which involved an all-night ceremony, dancing, and a call for the aid of his dream helper.

Especially skilled shamans had the ability to make it rain, cause anumal skins to come alive or make miniature animals appear on their arms while dancing. Diviners also existed as ritual specialists.

PANAMINT SHOSHONE

The Little Lake Shoshone also called Koso or Panamint Shoshone, are only modestly treated within ethnographic accounts on Great Basin peoples. Most material is found in Julian Steward's definitive volume, Basin-Plateau Aboriginal Sociopolitical Groups (1938:70-93). Other pertinent data on the Panamint Shoshone is found in Coleville (1892), Dutcher (1893), Steward (1933) and Grosscup (1977).

Territory

The territory of the Panamint Shoshone was a portion of the western Great Basin extending from the Sierra Nevada on the west to the Armagosa Desert of Nevada on the east and from Owens Valley southward to an area in the south most likely shared with the Kawaiisu and other Southern Paiute groups (Grosscup 1977). They would have occupied a small portion of northern Kern County.

Land Use Pattern

The subsistence-settlement practices of a segment of the Panamint Shoshone, the Little Lake Shoshone or the Shoshone district of Kuhwiji is the most pertinent to this discussion. The Kuhwiji district was made up of four loosely interrelated villages. These were located at Little Lake, Olancha, Coso Hot Springs and near Darwin.

Unlike the semi-sedentary Tubatulabal, the Little Lake Shoshone were a more sparse and scattered population, numbering about 200-250 individuals, adapted to the marginal resource base of the western Great Basin. Economic life was

centered around individual families with little more complex socio-political structures. Individual families would practice a seasonal pattern of transhumance timed to the differential availability of various plant and animal sources.

All available information for subsistence settlement practices in the Kuhwiji district comes from an informant from the village at Coso Hot Springs. Because the Coso village is somewhat east of the study area, it is uncertain whether the informant's comments pertain to land use practices nearer the eastern portions of Kern County. The seasonal round for the Little Lake Shoshone was not completely routinized, so it seems likely that the resources of the western Mojave Desert and southern Sierra Nevada (especially the productive and easily accessible pinyon groves) would have been exploited from time to time (Garfinkel et al. 1979).

In the spring, greens and seeds were gathered, and sometimes antelope were communally hunted. In midsummer, families might travel to Saline Valley or Death Valley to gather mesquite. From July through September, plant foods were gathered in the Coso Mountains. By September and October, the Shoshone would move into pinyon areas of the Coso Range, Panamint and possibly Sierra Nevada Mountains.

Winter villages were generally located on streams in the low valleys. These villages consisted of several families whose subsistence was greatly dependent on stored foodstuffs of which pinyon nuts was the major constituent, although meat from rabbits was a significant addition to the diet. Ducks were hunted at Owens Lake in the fall, with rabbit drives also conducted at this time. Additionally, bighorn sheep and deer were hunted throughout the year in the Sierra Nevada. Bighorn sheep hunting also appears to have been important in the Coso Range. Other food which supplemented the diet of the Little Lake Shoshone were fish from Little Lake, acorns from the eastern skirt of the Sierra Nevada,

fly larvae from the shores of Owens Lake, and caterpillars from Coso Hot Springs and Little Lake.

Social and Political Organization

Social and political organization of the Little Lake Shoshone was similar to other Great Basin groups. The nuclear family and the village were the basic political and social units. The nuclear family was, for the most part, a self-sufficient unit for most economic matters. Headmen were the only permanent leaders, and this position was usually identified with an individual who was a skilled hunter and a good orator. Responsibilities for this office were confined to suggesting settlement locations and directing communal activities.

Cosomology

Rituals were very limited among Great Basin Peoples and the Panamint Shoshone exemplify this pattern. No group ceremonials existed and the main rituals which did occur were at birth, girls' puberty, and death. These affairs were entirely individual, involving only the immediate family.

VANYUME

Very little information is available on the Vanyume since they were completely decimated very early by mission relocation and European incursions (Bean and Smith 1978). The little information that is known comes from W.D. Strong (1929) and Kroeber (1925). No data is available with which to assess their land use patterns, socio-political organization, or religion and it appears their activities were only very marginally represented in the county territory.

The Vanyume lived principally near the Mojave River in the western Mojave Desert. Territorial boundaries are vague but they appear to have ranged during their seasonal movements into the southeastern corner of Kern County.

TUBATULABAL

Ethnographic description of the Tubatulabal is most fully treated in the comprehensive work of Erminie Voegelin (1938). Additional information can be found in the works of Kroeber (1925), Driver (1937) and Charles Smith (1978). Summary treatment of the major features of this cultural group can be found in Salzman (1977) and Smith (1978).

Territory

Tubatulabal territory has been determined to include the region which was naturally drained by the Kern River including the area from the river's source near Mt. Whitney to the end of Kern Canyon northeast of Bakersfield (Voegelin 1938:9). The eastern boundary runs along the Sierra Nevada crest south to Walker Pass and then along the crests of the Kiavah and Paiute Mountains southwest to the San Joaquin Valley. There has been some question concerning the Tubatulabal-Kawaiisu border.

Land Use Pattern

The Tubatulabal lived in an area of varied topography and vegetation which contained both typically Sierran and Great Basin flora. Due to this condition, an abundance of resources were easily available. This abundant resource base allowed the Tubatulabal to maintain a substantial population (approximately 1000 persons) and relatively permanent village sites. These hamlets located along the reaches of the south fork of the Kern River were occupied through the

winter, early spring, and intermittently at various other times of the year.

From February to mid-August, food gathering activities for the Tubatulabal were focused near their hamlets. These activities included bulb gathering, fishing, hunting for deer, small game, and waterfowl, gathering seeds, greens and juniper berries and harvesting digger pine nuts. During this period use was made of resources available in the valleys, foothills and river canyons 600 to 1200 meters in elevation. In August and continuing through the middle of November families moved into higher elevations (1500 to 1800 meters). In the fall movement was oriented toward the use of pinyon resources on the western slopes of the Sierra Nevada. Later, movement was timed to coincide with the ripening of acorns in the Greenhorn Mountains. During the winter (mid-November to February) groups returned to the valley-foothill region and to their hamlets along the south fork of the Kern River.

Social and Political Organization

Tubatulabal society was composed of three discrete bands: the Pahkanopil, Palagewan and Bankalachi with only the former surviving after the Euro-American intrusion. Each band had its own chief, lived apart from the others during winter, but had strong ties with one another and intermarried. Each band had a great amount of internal unity and no overreaching political unit existed.

An informal council of old men united the various hamlets of the Tubatulabal and had the responsibility for choosing a chief. Neither of these political entities were sharply defined or institutionalized. The chief was simply a man who was either matrilineally or patrilineally related to the former chief (although the lineage principle was unrecognized), possessed some wealth, was of middle age, and had a "good heart". The office entailed the responsibilities of

arbiter, and gave him a degree of prestige among his fellows. The position of chief was a lifetime appointment.

Judicial responsibilities included the resolution of conflicts concerning women, family affairs, and the overseeing of collective gatherings. At the gatherings, the chief insured that all individuals contributed a fair share to the proceedings. The chief was also somewhat of an orator delivering uplifting lectures to the public.

The clown/dance manager, whose role was farcical rather than serious, counterbalanced the authority of the chief by publicly expressing discontent if the chief was an unsatisfactory leader. In this manner the clown/dance manager would instigate the selection of a new chief. The duties of the clown/dance manager also included the supervision of the annual mourning ceremony and dance. The office was patrilineally inherited.

Cosomology

The Tubatulabal lacked any concept of a supreme being but had a belief system which included the notion of a dying benefactor which related to the toloache ceremonial. Jimsonweed was said, according to legend, to once have been a man and had been transformed into the plant, he taught the people to dig and use roots, to cure sickness, poverty, and to obtain supernatural power.

As with other California Indian peoples, the Tubatulabal world was inhabited by a variety of supernatural spirits appearing in human or animal forms. Shamans gained power through these spirits by calling on them for help.

Important ceremonies included the mourning ceremony and toloache ritual. These rituals were similar to those previously described for the Kitanemuk and the Kawaiisu.

Disposal of the dead required that the day following a death, two women would wrap the deceased in tule mats and bury it in a shallow grave away from the village.

ARCHAEOLOGICAL BACKGROUND

SOUTHERN SAN JOAQUIN VALLEY

Introduction

The earliest European excursions into the southern San Joaquin Valley in the late 1700's reported sizeable Yokuts villages in several locations with numerous smaller satellite communities around them. Later ethnographic records named many villages with more recent archaeological projects verifying their location. Interest in the archaeology of the southern San Joaquin Valley and adjacent Sierran foothills began in 1899 with a University of California expedition (Gifford and Schenck 1926), which surveyed and excavated at several locations. Prior to that time we have no record of systematic archaeological inquiries. Since this first expedition numerous archaeological studies have occurred. The following comments summarize the major field and research projects carried out. The general region occupied principally, if not solely, by the six Yokuts populations will be divided into two sections. First, the valley areas containing the Chuxoxi, Hometwoli, Tulamni, Wowol, and Yawelmani Yokuts; and second, the Southern Sierra foothills, the territory of the Palewyami Yokuts.

The majority of the research carried out in both regions concentrated on the collecting and describing of artifacts with little concern towards processual archaeology or the answering of research questions. While research questions are being investigated today, the major thrust of current fieldwork is concerned with environmental impact reports.

The greatest threats to the archaeology in the valley portion of Kern County are agriculture (which has levelled and destroyed countless sites in the last 30 years), oil production, vandalism and the growth of urban communities. In the foothill areas, the greatest threats are the growth and development of

new communities, vandalism and ranching. An unknown number of sites in these two areas have been either totally or partially destroyed or vandalized. In regard to pictographs, erosion has been the greatest enemy.

Southern San Joaquin Valley

The earliest record of archaeological work in the Southern San Joaquin Valley (including portions of Kern, Tulare and Kings Counties) were five expeditions by the University of Califronia in 1899, 1909, 1923, 1924, and 1925. Each expedition was of short duration, lasting no longer than three weeks. Over twenty archaeological sites were recorded and test excavated. The results of these projects were reported by Gifford and Schenck (1926) who concentrated on a description of the artifacts found during the field work. Because of the early date of these investigations, most of the sites appear to have been intact and as such yielded large numbers of artifacts, including many perishable woven items. Sites excavated included villages and cemeteries. Although no research problems were explicitly addressed and there is little interpretation of the data, this volume contains a good deal of information concerning the artifactual remains exhibited at these sites. Presumably the collections discussed are still intact at the University of California at Berkeley. A second manuscript (University of California Manuscript 403, Berkeley), was judged by Gifford and Schenck to be too detailed to be included in the previous publications.

In 1933, H.A. Estep produced a manuscript (not available at this time) on the Indians of Pelican Island. Pelican Island was located in Buena Vista Lake and has since been destroyed by agricultural development.

In 1933-34 the Smithsonian Institute conducted excavations at five Yokuts sites on the west side of Buena Vista Lake. This two-season project was one of many W.P.A. archaeological efforts conducted during the depression. In the resulting report, Wedel (1941) described two phases of pre-European late occupation and

an early cultural complex. Wedel compared the earliest materials from Buena Vista Lake to the Oak Grove Culture of the Santa Barbara Coast. This early complex was dated at 2000-4000 years before present by Meighan (1955) and at 4000-7000 years before present by Heizer (1964).

From 1963-65 additional work was conducted by Fredrickson and Grossman (1977) who found an even older component at KER-116 (Tulamniu) beneath the materials excavated by Wedel. This study suggested that the deepest buried materials date to 7000-10,000 years before present. Other investigators have interpreted this site as representing an early Millingstone culture (Wallace 1954) and the Windmiller Pattern (Baumhoff and Olmstead 1963, 1964).

In 1935 W.M. Walker provided the first description of the 1933-34 Smithsonian expeditions. He also reported briefly on an excavation of a Yokuts cemetery near Buena Vista Lake sponsored by the Southwest Museum. In 1947 Walker published the complete details of this project. Over 110 burials were excavated along with numerous aboriginal artifacts and European trade goods. As a result of the late date for the abandonment of this cemetery, many perishable woven items were recovered. A great deal of artifactual material was obtained including many items of European manufacture. Of importance is Walker's assessment of various objects that were traded in from the coast, dating from the Spanish expeditions of Cabrillo (1542), Portola (1769) and Viscaino (1602). The overall artifact assemblage indicates a very late component.

In 1938 (Anonymous, not available) a report occurred in the Standard Oil Bulletin on "Where the Yokuts buried their dead". In 1951 there were two reports in the University of California Archaeological Survey Report No. 10-the first was by F.A. Riddell, who reported on the excavations at KER-74. This site was destroyed by land levelling in 1949 and salvaged by Riddell. Several burials and numerous artifacts were re-

covered. In addition, historic items found indicated that the burials dated to the early and mid-1800's.

The second report was by R. Heizer (1951) on a cave burial at KER-185. This article recounts the 1903 investigation of a dessicated child burial found near Bakersfield. The burial was that of a young child (approximately 12 years of age) placed in a woven basket with tule matting, a rabbitskin blanket, cordage and several strands of shell beads.

In the late 1950's, Jay von Werlhof and J. Vierhus conducted several surveys and excavations in the Southern San Joaquin Valley. Although most of their work was centered on the Tachi Indians of Kings and Tulare counties, several studies took place in Kern County. Although the manuscripts were not available at this time, von Werlhof excavated a burial complex near Buena Vista Lake (J. von Werlhof, personal communication). Most of the field notes from their research were turned over to the University of California Archaeological Survey, Berkeley.

An important excavation took place during 1957 and 1958 in Southern Tulare County. Warren and McCusick (1959) reported on the discovery of eight burials and attempted at that time to establish a temporal sequence of the different burial positions. Comparing their materials with Walker (1947) Wedel (1941) and Gifford and Schenck (1926) they suggested the following sequences:

Late Horizon 1450 B.P. - Historic

Tightly flexed on side or supine with moderate amount of grave goods.

Middle Horizon 3500 B.P. - 1450 B.P.

Supine Semi-flexed with few burial goods.

Early Horizon before 3500 B.P.

Supine or prone position with no burial goods.

This analysis was one of the first attempts in the Southern San Joaquin to conduct comparative studies and to develop a format that could be tested. Unfortunately, many cemeteries in the

southern valley have been destroyed through vandalism and by intensive agriculture. Future studies may provide supporting evidence for this burial sequence.

Several additional studies were written up in the late 1950's, although these reports are not available at the present time. These include studies by Nichols and Prince (1958) and J. Coyle (1957).

In 1971 a salvage excavation was conducted in an area being developed by the Kern National Wildlife Refuge. In addition to a surface collection, three two-meter square units were excavated. Two burials and numerous artifacts and ecofacts were recovered from this project. No theoretical questions or research problems were developed. However, the researchers did compare the two burials to the burial sequence given above (Summers 1971).

Another project in 1971 (Wallace) investigated the archaeological resources along the Buttonwillow Water Management Project. Twenty-two archaeological sites, many of which were previously recorded, were examined. Wallace describes the sites briefly and identifies the cultural remains found at each locale. Test units were dug at some of the sites for additional information. As part of his concluding remarks, Wallace summarizes the basic body of knowledge on the archaeology of the Southern San Joaquin Valley and defines three cultural periods on the basis of artifact assemblages. Questions raised are concerned with the transitional stages between cultural manifestations, the nature of the economy through time, the relationship between the communities of Buena Vista and Tulare Lake and the potential of neighboring areas in the arid hills along the west side of the valley to yield data on the earliest cultures in Kern County.

Wallace noted that the great majority of valley sites had been or were being destroyed by the expansion of farming. He

envisioned the continued destruction of sites at an accelerated pace with the development of new reservoirs, canals and water systems. Wallace's work is an important source of information of sites that no longer exist in the Southern Valley.

A test excavation was conducted at KER-64 in 1973 at Buena Vista Village. John Dieckman (1976) reviewed the artifacts and ecofacts from this village and attempted to clarify the historical questions relating to the location and time framework of Buena Vista Village. This site has now been almost completely destroyed through vandalism. In 1974 Bakersfield College excavated several test units in order to determine the depth of the deposit and the overall extent of the vandalism. Flakes and beads were the most common remains recovered.

In 1974 and 1975 Schiffman conducted two surveys of the Elk Hills Naval Petroleum Reserve #1 near the community of Taft. Both studies examined the locations for new oil wells proposed by the United States Navy and Standard Oil. Most of the study area included the higher, more arid portions of the reserve where much of the area had been severely disturbed by previous oil exploration. Five archaeological sites were recorded, all sparse flake scatters.

From 1973 to 1977 several reports were prepared on projects relating to the proposed construction of a nuclear power plant by the Los Angeles Department of Water and Power. The project, now cancelled, would have consisted of a power plant and associated water storage areas, roadways, a railroad spur line, transmission lines, auxilliary power stations and water conveyance systems. Several reports were prepared covering each development aspect. In several cases the reports were based on sensitivity studies with surveys pending on the acceptance of the project. For those areas surveyed (including the plant location and brackish water system areas), the majority of the land had been disturbed by intensive agriculture. Those areas

not under cultivation were surveyed for cultural resources. Several small sites and isolated finds were made, primarily in the areas near the old Kern River channel (now dry). These studies were preliminary surveys and sensitivity assessments offering no theoretical propositions. No collections of artifacts were made (Schiffman 1974e, 1974f, 1975, 1977c).

In 1974 a report was prepared assessing the project areas for the Berenda Mesa Water District. No resources were located (Schiffman 1974). On another project for the Kern Delta Water District (Schiffman 1975) a single archaeological site was located where a storage pond, along an existing canal, was proposed for construction. This site was partially destroyed by an existing pond and the canal. The site, part of a low-rising mound, had several bowl fragments, flakes and pieces of shell on the surface. The site appeared to have a buried midden deposit. Based on the resulting report, the pond was not developed. Subsequent agricultural development by Tenneco leveled the area for farming and destroyed the site.

The results of the first season's field work by Bakersfield College at a site near Hart Park along the Kern River was reported by Scandrett (1975). This site was a large seasonal village and yielded numerous milling tools and associated village features. This site was radiocarbon dated to approximately 2000 to 400 years before present. A large body of data on this site is available at Bakersfield College.

A marked increase in archaeological activity began in 1976 with the growing number of environmental impact reports being prepared. The majority of these reports do not incorporate research questions into their surveys and are only surveys. Few projects conduct any subsurface testing.

Two archaeological sites were found during a survey for the West Kern County Water District (Schiffman 1976f). Both sites were flake scatters in an area previously disturbed through petroleum exploration. It was determined that the water district project would not effect either site.

Three reports prepared in 1976 (Schiffman 1976c, 1976d, 1976e) provided few insights into the archaeological record as few cultural resources were found. Two studies, an examination of the areas to be annexed by the city of Oildale, and a survey of an existing petroleum refinery located no cultural materials. A third study of a waste-water disposal system near the city of Taft located several isolated finds.

In 1977 David Chavez surveyed a pipeline route from Port Hueneme to the Elk Hills Naval Petroleum Reserve #1. Four sites were located along the proposed pipeline, all had been previously recorded. These sites may be effected by proposed expansion projects of the Petroleum Reserve. Chavez (1978, 1979) conducted additional studies of the Reserve, including a survey of a pipeline from Elk Hills to Rialto. The 1978 study located and evaluated 12 archaeological sites. Several of these sites were rock cairns with associated rock ring features and bedrock mortars. Chavez (1979) completed another report on the Elk Hills Pipeline. Eight archaeological sites were reviewed in this report, several of which were discussed in his earlier reports.

Three sites were found during the investigation of a crude oil conversion facility by William Clewlow (1977). All three sites are lithic concentrations. Seven other previously recorded sites were relocated and their records updated. Two reports, one by Schiffman (1977d) and one by Cowan and his associates (1977) located no archaeological resources. The first report surveyed a proposed sewage treatment plant location on the Lerdo Sheriff's Facility. The entire area had been heavily disturbed by farming related activities. The second report surveyed a Transmission Line route for Southern California Edison.

A major study in the southern end of the valley investigated the pipeline route across Kern County for the Point Conception LNG project (King 1977). Several sites were located along the

pipeline route as it went from Maricopa across the valley, over the Tejon Ranch and into the Mojave area. Unfortunately, not all of the sites found were discussed or mentioned in the study as King (1977) concentrated on the coastal materials eastward to the Kern County line. Only cursory mention was given to selected sites. A short report was prepared on the results of a survey performed by Schiffman (1977e) along a portion of one of the alternate pipeline routes. While not mentioned in the report, this study located three archaeological sites. Two of the sites were aboriginal and contained significant milling and rock features. The third site was an early historic adobe foundation with a brick-lined well.

Four environmental reports were prepared in 1978. Three of the studies had negative survey results. One study by Spanne (1978) along a proposed canal for the Lost Hills Water District did not locate any archaeological resources. Two surveys by Schiffman (1978) investigated an area proposed for the expansion of Greenacres Park and a small parcel map. William Clewlow (1978) investigated the area proposed by Getty Oil Company for a Diatomite Mining Area near McKittrick. Surveying several square miles of land, this study found 54 unrecorded archaeological sites and relocated five others. The entire site region consists of flake scatters and quarries. Several milling tools were also found. No research questions were addressed in this study, however, the approval of Getty's project was made contingent on the mitigation of resources to be effected. It is foreseen that research problems will be considered during the mitigation effort.

In 1979 seven archaeological impact reports were filed. Based on field surveys, three of these studies resulted in the discovery or relocation of several archaeological sites while four studies did not locate any archaeological materials. Chavez (1979) filed a report on a study of a LNG pipeline from the Elk Hills Naval Petroleum Reserve #1 to a railroad loading area near the city of Taft. Four archaeological sites were relocated by this study but were determined to be distant enough from the project to preclude any impacts.

Two reports were prepared by William Clewlow (Ancient Enterprises 1979). The first was an archaeological assessment of alternate routes for an oil pipeline. Six archaeological sites were located. Five of the sites are lithic scatters with associated hand tools present. The sixth site was described as a major village. As a result of probable impacts to some site areas, test excavations took place. The test excavation recovered modified and unmodified lithic and faunal remains. No dianostic artifacts were recovered (Clewlow 1979).

The four remaining studies located no archaeological resources. Three of the studies by Schiffman were investigations of water resource projects. Two of these were for wastewater treatment plants and the other assessed proposed improvements by the Kern Delta Water District. An earlier appraisal of canals in the systems located site materials that may be disturbed by future water projects (Schiffman 1975). The fourth study (Schiffman 1979a) surveyed a proposed parcel map on the eastern edge of the valley.

Only one excavation project is in progress at the present time. Bakersfield College (Schiffman) is currently excavating test units at the Yokuts Village of Wawcoye. A long, narrow occupation area, presently under investigation, is located in the eastern portion of the site. Two excavation units have been initiated in an effort to determine site depth and to sample the subsurface deposit. Mapping and feature analysis is also in progress. A series of research problems and objectives is being developed based on the preliminary assessment of the site. The work began in December, 1979.

There is still a great potential for field work, surveys and excavation in the valley portions of Kern County. Although intensive agricultural and oil production along with their associated developments (canals, reservoirs,pipelines) have had far-reaching destructive impacts on cultural resources, many fairly

undisturbed areas have not been surveyed and many sites are relatively intact. In addition, it is suspected that if sites now under cultivation can be relocated and evaluated, undisturbed cultural deposits may be found beneath the agriculturally disturbed portions of these sites. An unfortunate observation is the extensive vandalism that has occurred in these areas.

Foothill Area: Palewyami Yokuts

A virtual absence of archaeological information exists for the foothill portion of Yokuts territory. At present there are only two reports covering this area. In 1965 the U.S. Army Corps of Engineers began investigating a five and one half mile stretch of Poso Creek for the construction of a proposed reservoir. Two sites were found, both consisting of light habitational debris and lithic scatter. This agency is still investigating this project (Anonymous 1965).

The second study of this region was by M. Holman (1970) who surveyed a transmission line route for Southern California Edison. This project surveyed selected areas between Shaver Lake in Fresno County and Bakersfield in Kern County. Nineteen archaeological sites were found in Fresno and Tulare Counties and one site was located in Kern County near the Tulare County line.

The only known excavation for the area was by Bakersfield College under the supervision of Robert Schiffman, and took place near Glennville, California. During a three year period, several portions of the site area were investigated. Numerous artifacts and ecofacts were unearthed. Radiocarbon dates and artifact typologies temporally place the site from 2000 years B.P. to 100 B.P. with the most intense occupation span from 2000 years B.P. to 600 years before present. Materials from this site are presently under analysis and the report is in progress. Projectile point and bead chronologies based on

materials from this site will provide important comparative data for the region.

In addition to these formalized studies, Bakersfield College has conducted several general surveys in the foothill areas. Numerous archaeological sites were recorded by these small scale surveys. Specialized studies evaluating the settlement/subsistence patterns and rock art of the area are currently being investigated.

Regional Research Design

With the exception of the excavation project, little problem-oriented research has been attempted in the Southern San Joaquin Valley and adjacent Sierran Foothills. Nearly all of the work for the region has been the result of the environmental impact process. These surveys have recorded numerous archaeological sites; however, most of the studies and reports do not include research questions, and do little more than briefly descirbe the sites found. These descriptive reports of field surveys can provide information dealing with topics such as settlement/subsistence, trade, prehistoric economies and more.

There appears to be a fundamental problem of getting developers and landowners to accept the cost of problem-oriented archaeology. Understandably, their primary objective is to have a parcel surveyed and to get archaeological clearance. In those cases requiring mitigation, resistance to any time-comsuming expenditures is commonplace. The omission of research questions and the time necessary to evaluate them is a combination of the reluctance of the archaeologist to incorporate research topics into a basic environmental research project and a reluctance by developers to pay for it. Communication between all parties, an understanding of what needs to be done, and the standardization of environmental reports and archaeological requirements are all needed to bridge this gap in the documentation and evaluation of cultural resource materials.

The following research questions and topics are some of the concerns and issues being considered in the southern valley and Sierra Nevada foothills areas. (Also see section on Chumash research interests.)

Cultural Anthropological Questions and Problems:

1. What is the nature of the settlement/subsistence networks within the Valley Yokuts areas and those of the foothill division and how are these inter-related?
2. The determination of ethnolinguistic boundaries separating the Palewyami and Yawelmani Yokuts from the Tubatulabal.
3. The dissemination of trade goods between Yokuts groups and non-Yokuts populations. What was the nature of the trade routes and what were the commodities traded?
4. What were the impacts of Euro-American settlements and contact among the Yokuts?

Archaeological Questions and Problems:

1. Comparative analysis between the shape and form of bedrock milling features.
2. The determination of culture history and temporal sequences.
3. What is the significance of rock art sites to the Palewyami and Yawelmani?

TEMBLORS AND COAST RANGE

The archaeological record from the Temblors and Coast Range has been virtually ignored in the quest for knowledge of early California cultures. With the exception of casual surveys resulting in an occasional site being recorded, few reports, excavations or indepth studies have been undertaken. And for the work that has taken place, only a fraction of the data has been written up. A review of the site records indicates the potential significance of more intensive investigations as some of the most impressive pictographs in North America (Grant 1965, 1978) are located in this region in addition to villages, rockshelters, milling sites and sacred places. (Bakersfield College Archaeological Record Files). The western and southwestern portions of Kern County are quite distinct from each other and will be divided into two subsections:

1) Temblor Range (Western Kern County); and 2) Coast Range and western tip of Tehachapi Mountains (South, Southwest Kern County). These two areas comprise the territory ascribed to the Interior Chumash with the Cuyama Chumash occupying the first area and the Castac Chumash occupying the latter area.

Temblors: (including the western slope of the Telephone Hills)

While several archaeological sites have been recorded in the Temblor Range, there is no record of any systematic excavation having taken place. And, with the exception of recent environmental impact reports, no indepth or comprehensive surveys are suggested by the site records filed for this region.

The Temblors are a low-lying mountain range characterized as having little available water, game animals or abundant biotic resources. Apparently unchanged for a considerable amount of

time, most portions of this region were generally unsuitable for permanent occupation. The kinds of activities most suitable would be special purpose in nature, exploiting localized resources. A review of the site records supports this assessment as most sites are small with very few sites appearing to warrant village status.

This might explain the lack of interest in site excavation for the Temblors as known sites do not, in most cases, appear to contain substantial midden deposits. Vandalism to many sites, however, has occurred.

To date only one systematic survey has taken place within this portion of Kern County. In 1977, Chester King surveyed a narrow corridor as part of the archaeological evaluation of the Point Conception LNG Project. The area surveyed was proposed for a LNG pipeline and passed through the southern portion of the Temblor Range. No sites were found in the Kern County portion of the study area (King and Craig 1978).

The lack of available data from this region prevents establishing any chronological sequence or culture history. It is also not known what the exact territorial boundaries separating the Chumash from the Yokuts was, or if an actual boundary existed. It is possible that this area was common territory used freely, or at least jointly by both cultures. It also is assumed that the locally-available chert materials present in several areas of the Temblors and Telephone Hills were used over a great period of time and may be the source of the chert artifacts found at the lower levels of the early sites at Buena Vista Lake. Fredrickson and Grossman (1977) suggest the early occupants of Buena Vista Lake were Hokan speaking which would place the Chumash presence in the Temblors back to around 9000 years ago. The early Hokan materials from Buena Vista Lake (see Yokuts archaeology) has been compared to such early cultures as Windmiller (Wedel 1941) and San Dieguito (Fredrickson and Grossman 1977). As research expands into this area and in the Cuyama territories

to the west it may be possible to develop a culture history dating from 9000 years before present to Euro-American contact.

At the present time Robert A. Schiffman at Bakersfield College is developing a site distribution map for the Temblor Range of Kern County. This map will assist in future studies of settlement-subsistence, archaeological sensitivity and resource utilization for the region.

Some of the most visually impressive sites in Cuyama territory are rock art sites where Chumash rock paintings reached their highest development. According to Grant (1978:532) the pictograph style of the Chumash appears to have its origins with the petroglyphs of the Numic speaking peoples of the Great Basin who influenced Yokuts rock art styles and who in turn gave the Chumash their rock painting tradition. Some researchers strongly disagree with Grant's position stating the evidence crediting the Chumash rock art tradition to Yokuts origins is inconclusive (Georgia Lee, personal communication). Most of the large sites are located in San Luis Obispo County; however, there are several pictograph sites in the Temblor Range portion of Kern County.

Coast Range

The territory of the Castac Chumash includes the southwestern portion of Kern County consisting of the upper foothills of the Coast Range from just above Maricopa where the Temblor Range ends, along the southern boundary of Kern County to present-day Interstate Highway 5 where the Tehachapi Mountains begin. Unlike the Temblor Range which has received little archaeological attention, the archaeological resources of the Coast Range Castac Chumash are now under investigation (J.Johnson and S.Horne, personal communication, 1979). Prior to this time only two known projects have been undertaken in this area. One study was a brief environmental impact report of an 80 acre subdivision adjacent to the town of Lebec. No archaeological remains were found during the survey of this parcel (Schiffman 1978). The second study currently in progress is an excavation of a Chumash village on the shore of the Castac Lake. This work is under the direction of

David Jennings of Los Angeles City College. This is the only known excavation of a Castac Chumash village.

Recently the U.S.Forest Service has begun assessing the archaeological resources in the Los Padres National Forest which includes a portion of the Coast Range region of Kern County. According to the Forest Service Office in Goleta, California the United States Forest Service has conducted, or is currently conducting, archaeological site surveys in Ballinger Canyon, the San Emigdio Mountains, Cuddy and Lockwood Valleys, Mill Potrero, Apache Saddle and upper Quatal Canyon. All of these areas are totally or partially in Kern County. In addition, the Forest Service has been researching Early Mission records and the J.P. Harrington notes in order to identify ethnographic and historic Chumash villages with archaeological sites. Additional resource information comes from the journal of Father Zalvidea, who visited several Castac rancherias (Grant 1978:533). A review of the area's resources including the ethnographic and mission records is currently in progress as part of the Los Padres National Forest overview. When this information becomes available, it will be incorporated into the Kern County overview. Some of the additional topics the Forest Service is investigating include the determination of archaeological manifestations of site types based on the existing record, and an evaluation of acorn camps, pinyon camps and summer village sites (Horne 1979 personal communication). From the early mission and ethnographic notes, a population estimate of several hundred is given for the Emigdiano and Castac Chumash.

The focus of Forest Service research "stresses non-consumptive archaeology, that is, those kinds of research which can be done without disturbing the sites themselves. Included are potential resource catchment analysis, subsistence/settlement systems, social networks and exchange networks" (Horne 1979 personal communication).

Regional Research Design

In the absence of available archaeological information from the Temblor Range within Kern County, there have been no previous attempts to develop a systematic, in-depth research strategy for the region.

For the Castac and Cuyama Chumash, a substantial amount of investigative inquiry into the archaeological and ethnohistoric record is currently in progress. In conjunction with these investigations, important research questions are being asked. A partial result is that we can now begin to develop a regional research design. Acknowledging that all topics, questions, problems, and concerns cannot be applied to all portions of the Interior Chumash territory, it is essential that present and future researchers working in any area incorporate research questions that will aid in developing a greater understanding of the regional archaeology. This will assist and enable the researcher to obtain as much information from the data available and provide continuity between archaeological investigations and the archaeological record. Most of the following research concerns were supplied by archaeologists intimately familiar with this region of Kern County and the archaeologically and culturally related Chumash areas in adjacent counties. These individuals include John R. Johnson (UCSB), Stephen Horne (USFS), and Michael Glassow (UCSB). Additional research considerations were developed as a result of a regional research design meeting for Kern County.

There are two perspectives that should be approached as part of any regional research scheme. We believe that it is important to draw....

> "the distinction between (1) research questions that deal with understanding regional developments (e.g., changes in subsistence, differences in political organization, degree of participation in regional trade) and (2) research ques-

tions that deal with understanding aspects of the archaeological record (e.g., differences in the number and shape of bedrock mortars, changes in projectile point forms and the chronological placement of particular complexes." (Glassow, 1979 personal communication.)

The first of these two concerns deals primarily with cultural anthropological problems which archaeology and ethnohistory can contribute in finding solutions. The second perspective is concerned with defining problems specific to the nature of the archaeological record.

It is recognized that these two different types of regional research questions are compatible and complimentary to each other. Developing and answering questions relating to the cultural anthropological record assists us in recognizing and answering questions in the archaeological record.

Cultural Anthropological Questions

Subsistence/settlement Systems

1. What similarities and differences exist between prehistoric Castac Chumash and Kitanemuk economic organization? The answer to this question involves comparisons of resource areas, midden constituents, and tool types in archaeological assemblages.
2. What kinds of settlement systems characterized the Castac Chumash and Kitanemuk areas prehistorically and how were these related to subsistence strategies?
3. What kinds of changes in subsistence and settlement took place in protohistoric and historic times and how did these compare with other groups which were closer to the Spanish missions?

Social organization/intergroup interaction.

1. What kind of political organization existed among the Castac Chumash and Kitanemuk? An answer to this question might involve the comparative frequencies of status-related shell beads and ornaments present at contemporaneous village sites.

2. How did linguistic and social boundaries affect the interaction between the Castac Chumash and other groups? An answer to this question would lie in comparing densities of trade items between sites located in different linguistic group areas.
3. To what extent did the Castac Chumash and Kitanemuk participate in the Chumash, Desert, and Central Valley interaction spheres? The answer to this question would involve the identification of trade items specific to each exchange system and mapping the distributions and densities of these items at contemporaneous village sites.
4. What kinds of amity/emnity relationships were present between southern San Joaquin Valley groups and between these groups and other areas of Southern California? Evidence necessary to answer this question might be difficult to infer from the archaeological record. The few ethnohistoric sources which exist will be most useful.
5. How did historic period changes affect social organization and inter-group relations? This question can be addressed with reference to ethnohistoric data primarily.

Additional topics include:

1. Ethnohistoric and historic ethnographic documentation
2. Social and exchange networks
3. Resource catchment analysis
4. Ethnolinguistic boundaries

Archaeological Data Base Questions:

1. What are the prehistoric sequences of the southern Kern County and southern Tehachapi/Tejon areas?
2. Are there characteristic stylistic traits (as opposed to adaptive traits) which are specific to Kitanemuk, Yokuts, and Castac Chumash traditions which are represented in archaeological contexts and which can serve to identify the territories occupied by each respective group?

3. Where are specific lithic source areas within the southern Kern County area? (e.g., Temblor Range chert and San Emigdio Mountain soapstone).
4. Which archaeological sites correspond to named villages known from ethnohistoric sources? Most historic period Castac Chumash village sites are still unrecorded.

Additional topics include:

1. Spacial distribution of sites
2. Distribution and extent of principal food resources and raw materials
3. Rock art investigation
4. Typological analysis of projectile points, beads and other artifactual remains

TEHACHAPI MOUNTAINS

The Tehachapi Mountains region is little known archaeologically. Fortunately the rich archaeological resources of this area are in fair condition since few major development projects have disturbed them. Very few archaeological investigations involving excavation have been conducted, and none have been reported through formal publication. Archaeological studies have been limited mainly to surveys necessitated by environmental impact sutdies and have been related to specific development projects.

The earliest excavation report (Price 1954a) involved a test of the Phillips Ranch Site (CA-KER-508) by the Archaeological Survey Association of Southern California. The site is located three miles from Tehachapi Pass and is reported to have been a major village. It consists of 16 to 20 house rings, approximately 300-500 bedrock mortars and a large stone outcrop interpreted as a sharpening device for bone awls. Excavation of one of the large rings revealed several late style projectile points, Olivella sp. disc beads, European glass trade beads, and the remains of a central wooden post used as a support for a structure. Additional rock rings were noted in the area, and on the top of a nearby peak a volcanic boulder contained a petroglyph with one of the images being a bighorn sheep rendered in a fashion similar to those found to the east, in Black Canyon, San Bernardino County.

The Archaeological Survey Association during this same time period excavated a small cave approximately one-half mile east of CA-KER-508 (Mark Sutton, personal communication 1980). The cave is reported to have contained perishables. Roger Robinson conducted further excavation at this site in 1971.

Roger Robinson (personal communication 1980) has also reported that he was involved in the work at CA-KER-508, and has a large collection of artifacts resulting from his work, now stored at Antelope Valley College.

Another test excavation conducted by the A.S.A. is reported by Price (1954b) for the area near Willow Springs. Numerous bedrock mortar holes, a large number of rock cairns and a polychrome pictograph were identified. Fragmentary mortars, manos and projectile points were revealed through excavation. It is noted that rock cairns were identified in several nearby areas.

No full reports on this work by the A.S.A. have been published since these early summaries.

Environmental impact related studies began with the work of Mayhew (1969). A survey was conducted under the auspices of the University of California, Los Angeles, for a proposed recreational and resource development in Sand and Horse Canyons. He identified 14 sites, but does not elaborate on the characteristics of these localities, except to mention that several are worthy of excavation and one (CA-KER-272) is identified as the historic Paiute (sic) village of Ma'a'puts. In the summer of 1970 Chris Munday directed an excavation program at a number of sites including Ma'a'puts, funded through an undergraduate grant from the Department of Anthropology, University of California, Los Angeles (Richard Wessel, personal communication, 1980). A number of burials and a variety of artifacts were recovered from the late period village, but the location of this collection is uncertain at this time. No report of this work is available.

A survey which crossed the Tehachapi area was conducted through the auspices of U.C.L.A. for a Southern California Edison Transmission Line project (Coleman, Jones, and King 1969). The results of this survey indicated ten archaeological sites in the Tejon Hills and Tehachapi Mountains. The sites consisted of: large concentrations of bedrock mortars found near the mouths of drainages, small bedrock mortar sites without midden found

farther up the canyons, and one large site (CA-KER-282) near Tejon Creek containing several house depressions and interpreted as the Yokuts rancheria of Tol'teu. The sites are considered as a group to "constitute the physical remains of a discrete, organized human adaptive unit, the village-community Tol-chin'ne, including its central village Tol'teu and several outlying gathering and processing stations" (Coleman, Jones, and King 1969:13).

Two unusual finds were reported by the late William Stuart Glennan (1971, 1972). The first report identifies a concave-based lancealate fluted projectile point found northwest of Willow Springs in the Tehachapi Mountains. The features of the point identify it as belonging to the Clovis type, and it is suggested that the technology used to manufacture such points was fairly widespread in California and the Great Basin. This western fluted point tradition was tentatively dated between 8,000 and 12,000 years B.P. A second find of special significance was that of an L-shpaed steatite pipe found in the same area. Pipes of this sort are rare in occurrence and may have been a local attempt to copy Chumash style pipes or a trade item.

A unique burial (CA-KER-515) was salvaged through the efforts of Antelope Valley College instructor, Roger Robinson (1973a; Anonymous 1973) and members of the Antelope Valley Archaeological Society. The burial was recovered from a shallow tributary of Cache Creek in the Tehachapi Mountains five miles north of Mojave, where it was eroding out of the channel. The excavation was conducted to preserve the burial which undoubtedly would have been washed away by the next rain shower. The isolated burial was in a flexed position on its left side. The middle aged (25-35) adult male had been placed in a shallow pit, arms folded across the chest and hands open. The body had been adorned with two seperate folded strings of beads placed on the chest: disc beads of Olivella sp., Mytilus sp. discs, schist and steatite beads, cylindrical clam shell tubes, Haliotis sp. discs and columella tubes. A date of ca. 450 B.P. has been estimated for

the burial based on an anlysis of the time-sensitive bead styles.

Sand and Horse Canyons were again the subject for investigation when Robert Schiffman (1974a) surveyed the area for further development projects. He found a total of 34 archaeological sites, including 18 villages or camps containing house rings and milling tools, 11 workshop areas associated with agate quarry beds and containing cores, flakes, scrapers, knives, and projectile points, a cave/rockshelter with polychrome pictographs, and an aboriginal trail with associated rock cairn/trail markers. These results indicate the Sand/Horse Canyon area to be one of great significance to prehistorians. Native Californians of Kawaiisu ancestry have expressed their concerns over the continued destruction of these resources and the importance of this area for religious reasons (Carmen Peebles and Andrew Green, personal communication, 1979). Also the presence of an historic unmarked Indian cemetery is of prime importance to the local Indian community.

In 1976 Schiffman conducted an archaeological reconnaissance near the city of Tehachapi for the Soil Conservation Service. Three sites were identified: CA-KER-482, 483, 484. They are interpreted as temporary sites used seasonally for the milling of acorns. The area in which these sites were found is considered generally to be resource deficient and larger sites tend to occur in the foothills south of the town of Tehachapi (Schiffman 1976:4-6).

The bead assemblages from two sites in the Tehachapi area, McCarthy Ranch (CA-KER-478) and Sand Canyon (CA-KER-272) have received brief mention by Stephen Bass and Stephen Andrews (1977:18-19). The former site contained only a small number of beads, all of serpentine or steatite. As such, the site is suggested to date to the Late Horizon, Phase IIa or 200-500 years before present. The Sand Canyon site contained a larger quantity of beads and includes: serpentine and steatite beads, Olivella sp. saucers, Olivella sp. rough irregular, Olivella sp. cupped, and faceted glass trade beads. These bead types are

said to indicate a date for the site between 150-200 B.P. and possibly as early as 200-300 B.P.

David Chavez (1978) conducted an extensive survey for a proposed pipeline which crosses the Tehachapis in a northwest-southeast direction running from Grapevine Canyon in the southern San Joaquin Valley to Bronco Canyon at the western terminus of the Antelope Valley. The work resulted in the identification of a large site (CA-KER-810) in Live Oak Canyon containing several midden areas and over 200 bedrock mortars and a number of sites having rock cairns and bedrock mortars which are located on a ridge between Pastoria and Tunis Creeks.

In 1978 Schiffman (1978b,c) conducted two surveys: the first in the Cummings Mountain area, where no sites were identified; and the second in an area near Sand Canyon, which located 11 sites. These sites consisted mainly of flake and tool scatters, quarry areas, and a single short-term occupation site.

Schiffman (1979d) first reports on a study for the Hartford Company in the Twin Oaks area near Caliente Creek. Five sites (CA-KER-447, 448, 983, 984, 985) are reported and their significance assessed. They consist of numerous bedrock milling areas, and a surface scatter of artifacts. These sites have been the subject of subsequent test excavations as reported in a study by Garfinkel and Schiffman (1980). Further work on the Twin Oaks property was conducted by Schiffman (1979f). A mitigative excavation and mapping program took place prior to the sale of a parcel containing an extensive series of bedrock milling areas. Three sites were investigated: CA-KER-447, 716, and 717. CA-KER-447, located near the mouth of Back Canyon, consists of two surface features and a shallow midden area. Fifteen bedrock mortars and two bedrock metates were identified, as were a cache of four complete pestles. Subsurface tests revealed only six flakes. CA-KER-716, located north of Caliente Creek, was a large surface scatter of ground stone tools, flaked stone artifacts, beads, and fragments of pigment. The most frequent category of artifacts were pestles. Surface features at the site included four bedrock mortar complexes consisting

of 31 mortar holes and a cupuled boulder. Excavation of the site resulted in the discovery of an additional 46 mortar holes buried by soil creep. Two projectile points of the Cottonwood Triangular and a Desert Side-notched types were also found. From these temporally diagnostic points a date for the sites can be assigned between 100 and 650 years before present. Olivella sp. shell and European glass trade beads indicate a more recent occupation ca. 150 to 300 years before present. The site CA-KER-717, located opposite CA-KER-716 also contains numerous bedrock milling areas. Two complexes consisting of 24 bedrock mortars and one bedrock metate were identified. Also reported were a cache of nine pestles, some of which were fragmentary. No temporally-sensitive items were recovered from this site.

This site complex is interpreted as an area where the Kawaiisu, in late prehistoric times, did extensive fall acorn preparation. Habitation areas were not identified in this area, and more permanent sites were located to the west nearer Caliente Creek.

Schiffman (1979e) has also prepared an archaeological study of the Keene and Broome Ranch properties. An archaeological survey of selected portions of this property, mainly focusing on the Hart Flat area, identified 55 sites: 49 milling areas, a walled rockshelter, a hunting blind, rock rings, and two isolated finds. The sites are interpreted as representing a major acorn gathering area, most sites indicating a short seasonal use of the oak resources of the area, probably from August through November. Hunting activities are considered to have been a secondary pursuit.

Two studies by Garfinkel (1979c,d) report on surveys conducted in the Tehachapi Mountain area. An isolated bedrock mortar was recorded on a parcel proposed for subdivision in the Paiute Mountains. In Tehachapi Valley, the site of a proposed underground telephone cable was surveyed and an area adjacent to Brite Creek was reported as containing a small flaked stone scatter.

EL PASO MOUNTAINS

The El Paso Mountains area has a tremendous archaeological research potential, but unfortunately has been the subject of a small number of published accounts and a very few research investigations. The earliest report on the El Pasos appeared in the early 1930's (Johnston 1931) in an issue of "Touring Topics". The account gives a description of the surprisingly rich archaeological resources of the area and makes note of the great number (hundreds) of rock rings on Black Mountain. Petroglyph sites, one depicting a bighorn sheep, pottery sherds, stone tools and points of obsidian, and water jars covered with pinyon pitch are also reported as present. The brief note is significant in that it served to attract visitors to the area and in turn most likely fostered much illicit collection of artifacts and early vandalism.

Another popular account of the area appeared some 20 years later in Desert Magazine (Lawbaugh 1950). The topic under discussion was again the unusual rock structures dotting Black Mountain, but the report includes important ethnological information concerning the aboriginal activities conducted in the El Paso Mountains. Reported was the "legend" that a number of diverse ethnic groups traveled to Black Mountain, which was considered sacred and that certain ceremonies were performed there. Independent confirmation of such activity is available in the form of unpublished notes detailed by Bob Laidlaw for the Desert Ethnographic Study of the Bureau of Land Management, Desert Planning Staff (Bob Laidlaw, personal communication). Further comment will be made in this regard later in this section.

Clement Meighan's (1953) brief survey and identification of sites in the northern portions of the El Pasos represents an

initial attempt at formal archaeological inventory. Dale Ritter (1958) was the first to formally begin recording the numerous petroglyph sites in the area. In association with her work at China Lake, Emma Lou Davis documented two sites of special significance to early man studies. A site near Freeman Gulch (CA-KER-242) was identified which contained a unifacially fluted Clovis-like point of chalcedony. Also noted were a dozen or more Silver Lake, Lake Mojave, and Sandia-like points predominantly manufactured of basalt, but also of chalcedony (Davis 1961). Above Red Rock Canyon in the extreme western area of the El Pasos, Davis and Winslow (1965) have reported on the presence of a gravel figure/intaglio (CA-KER-244) carved out of the desert pavement in association with crude jasper scrapers and bifaces, perhaps affiliated with a pre-projectile point culture.

The area's first systematic and intensive study was conducted by Alex Apostolides. This research began in 1958 and resulted in the survey of a large area of the El Paso Mountains, the collection and excavation of several sites, the recording of more than 70 archaeological sites and the listing of a large portion of the area on the National Register of Historic Places (Apostolides 1963-67, 1968). A wide variety of sites were documented, including milling stations, rock ring complexes, large open-air campsites, quarries, rockshelters, rock alignments and rock cairns, burials, and rock art sites. Nineteen petroglyph sites and one pictograph site were identified. Unfortunately, the notes and records from this project have yet to be formally reported, but a detailed accounting of this study is in preparation (Alex Apostolides, personal communication). Apostolides has expressed his concern for the continued study and preservation of the area. He states,

> "The El Paso Mountains are a repository of archaeological information and importance whose resources have barely been tapped. The need for systematic study and preservation has been recommended for the past 12 years, but no

program of this nature has been seen to date. The need still exists and is more imperative now than ever." (Apostolides 1979).

Hilldebrand (1972a,b) conducted several surveys in the El Pasos and has suggested several lines of investigation for further inquiry. His research indicates that much of the archaeological record in the area represents late manifestations, postdating A.D. 500. Wesley Bliss, while an instructor at California State University, Norhtridge, conducted surveys and excavations north of Koehn Lake at the base of the El Pasos along the Garlock Fault. He identifies four rockshelters, all of which were excavated (Bliss 1971). These shelters contained a variety of remains, including perishables. Shelter 1 (CA-KER-298) was a small rockshelter which contained a well-preserved infant burial, wrapped in several carrying nets and a hide blanket. Also present was a hammerstone, basketry fragments, and some sections of Phragmites sp. Shelter 2 (CA-KER-299) was several feet deep and contained faunal and floral remains, flaked stone artifacts of chalcendony and obsidian, a stone pendant, Olivella rough-out and spire-lopped beads, and projectile points of the Rose Spring and Cottonwood series. Shelter 3 (CA-KER-300) was four feet deep and had preserved 12 Phragmites sp. stalks, cordage, quids, and a pit lined with bunch grass. Shelter 4 (CA-KER-301) contained a hearth, obsidian flakes and a hammerstone. Some of the materials retrieved from these investigations are housed at the Northridge Archaeological Research Center and presumably the remainder is in the hands of Dr. Bliss.

In Red Rock Canyon a salvage excavation of a small rock shelter was briefly reported by Roger Robinson (1973). Robinson found the deposit to be 1.5 to 2 meters in depth and contained a variety of artifactual and ecofactual remains including: glass, shell and steatite beads, late style projectile points, cutting and scraping tools of stone, Owens Valley Brownware pottery, manos, metates, a small sandstone bowl, a piece of

twisted Yucca sp. fiber attached to a wooden stick, a human infant burial, and a great amount of unmodified flake stone of jasper, chalcedony, chert, rhyolite and obsidian. The site was dated to 100-200 years B.P. by means of chronologically sensitive glass beads and is interpreted as a seasonal camp site with evidence of a wide variety of activities.

The Bureau of Land Management, as part of their comprehensive California Desert Plan, conducted systematic and unsystematic surveys in the area (Hanks and Garfinkel 1976). A systematic survey of a square mile section in the northern portion of the region revealed 16 new sites and a number of other sites were recorded through subjective areal reconnaissance. A general model was developed of the aboriginal land use patterns found and general predictions were reported which identified the relative density and types of sites to be found in specific sub-areas. Associated with the Desert Plan study was the production of an overview which detailed previous archaeological work, identified a tentative culture history, and made suggestions for future research directions (Hall and Barker 1975).

Ethnographic study has also been conducted through the auspices of the Desert Plan Program by Bob Laidlaw and is pertinent to the present treatment on archaeology. The results of his study (Laidlaw 1979) indicate that in the vicinity of the El Paso Mountains an aboriginal trading center existed which was seasonally employed by the Kawaiisu, Mojave, Paiute, and Chemehuevi. The area was also a primary hunting locality for bighorn sheep and deer and a collecting area for mesquite by the Kawaiisu and Kitanemuk. It is also reported that burials and ritually significant areas occur throughout (i.e., rock art localities) and that Datura was collected in the El Paso Mountains for ritual use. These comments indicate the wealth of information gathered by Laidlaw and support early reports of the El Pasos as a ritual/trading center for a number of ethnolinguistic groups. Much of the ethnographic material that has been collected by Laidlaw is considered confidential and its sensitive nature should be respected. The El Paso Mountains

area obviously appears to be one of substantial importance to a number of Native California peoples.

The numerous rock art sites located in the El Paso Mountains have been the subject of a number of papers. In the Coso Range rock art study, Grant and his associates make a passing comment concerning the Sheep Springs site (CA-KER-262) (Grant, Baird, and Pringle 1968:110-111). More detailed studies identify a petroglyph site on Black Mountain (Ker 33^{Aa}) composed of 31 boulder petroglyphs which are associated with rock rings, flake scatters, a small midden area, and pumice cave (Khalil 1973; Cohn and Khalil 1976). Heizer and Clewlow (1976) document three petroglyph sites in the El Pasos: CA-KER-133, 134, 135, which are representative of the Great Basin Petroglyph Style and contain both abstract and representational elements. Apostolides (1976) makes mention of the rich rock art tradition of the region and suggests a method of documentation for the glyphs. A large compendium of notes on the rock art of Kern County by Dr. J.J. Cawley (n.d.) identifies several sites in the El Paso Mountains but adds little to the data base already available. The most recent study by Giles (1979) is a preliminary report of her investigations which will include a more comprehensive treatment. Three sites are analyzed and important information on the location, stylistic attributes and methods of manufacture of the rock art sites is included. The illustrations of the glyph elements and the sites themselves, along with the discussion will be useful to future researchers. Of importance is the presence of "Coso Style" rock art elements not previously identified in this area. These identifications increase the known range for the peculiarly unique Coso Range rock art style (Grant et.al. 1968) and emphasizes the need for further investigations to clarify questions concerning this rock art style and its distribution (cf. Garfinkel 1978).

Most recently the Bureau of Land Management has accomplished an intensive survey of specific lands proposed for extension of the Red Rock Canyon State Recreation area (Wendell Strahan,

personal communication 1980). Approximately 2800 acres have seen intensive, systematic survey by a team of one to three archaeologists spaced at 50 meter intervals. A total of 71 sites and isolated finds were identified, including; a large number of quarries and flaked stone tool scatters of rhyolite, a rockshelter site, and a hunting blind. Surprisingly, no milling equipment or projectile points were identified, neither was there any flaked stone remains of chalcedony or obsidian. The rhyolite industry has been tentatively identified as having paleo-Indian affiliations and appears quite ancient.

ANTELOPE VALLEY AND EDWARDS AIR FORCE BASE

In the Southeastern section of Kern County, including Antelope Valley, Edwards Air Force Base and vicinity, very little archaeological work was conducted until the late 1960's (Stickel and Weiman, Roberts 1979; Greenwood and McIntyre 1979). Early studies were conducted in the 1930's by Arthur Woodward of the Los Angeles Museum of History, Science and Art and H.E. Edwards of the Southwest Museum. The latter excavated at Barill Springs (CA-KER-93) and Piute Butte in the Antelope Valley, but no formal report was completed.

W.S. Glennan (1971) provided the first published archaeological report on the area. His work at the Sweetser site (CA-KER-302) provided a thorough analysis of a substantial semi-permanent occupation site in the Rosamond Hills. No excavation was conducted, but analysis of the surface artifactual remains indicated the presence of a petroglyph, bedrock mortar, metates, manos, a variety of chopping and scraping tools, knives, hammerstones, punches and reamers, "chisels", cores blanks, and a number of different point types. Identified were points which were comparable to Lake Mojave, Silver Lake, and Pinto Shoulderless types. Extensive use of rhyolitic stone, almost to the complete exclusion of other types of raw material was reported. The date suggested for the site falls between 4000 and 6000 years before present.

Glennan (1970) reports that the use of rhyolite typifies an early cultural complex in the valley dating from 5000 to 7000 years before present. However, subsequent analysis of the data from the Sweetser site and CA-LAn-298 (Robinson,Sutton and Eggers 1976) led these researchers to the conclusion that the rhyolite assemblages represent much more recent remains of

Shoshonean peoples. But, additional work at CA-LAn-298 (Sutton 1978d) appears to support Glennan's original position.

Two scholars have been responsible for most of the research conducted in recent years: Roger Robinson, instructor of anthropology at Antelope Valley College at Lancaster and Mark Q. Sutton, formally Edwards Air Force Base archaeologist and currently working with the Bureau of Land Management, Barstow. Robinson has recorded 83 sites and excavated 13 sites in the Antelope Valley and vicinity, although the results of these endeavors in most cases await complete analysis and publications. Summary treatment of the general results of these studies can be found in several papers by Robinson (n.d., 1976, 1977). In these works Robinson suggests that although there exists a high potential for earlier types of archaeological remains in the Antelope Valley, substantial evidence for sites earlier than 3000 years ago has not been encountered. The prehistory of the area appears to begin with what is commonly termed the "Shoshonean" period in southern California or from 2-3,000 years before present. The character of aboriginal land use in the valley can be identified with a settlement pattern atypical of desert/Great Basin peoples and indicates an unexpected degree of economic and socio-political complexity. It includes large permanent/semipermanent habitation sites with midden deposits greater than a meter in depth, having house structures with packed earth floors, and associated cemeteries (in one case containing over 100 burials). Seasonally inhabited special-use sites at which ancillary sorts of activities were conducted are also reported.

Artifact types indicate connections with southern California and coastal/San Joaquin Valley people. Utilitarian items exhibit similarities with the former, while ornamental objects including those of soapstone, Haliotis sp., Megathuna sp., Mytilus sp., Tivela sp. and Olivella sp. bear origins to the latter. Human burials containing perfuse mortuary goods may indicate a wealthy and status conscious people.

The late dating for this complex is corroborated by a study of point forms from two sites CA-KER-508 in the Sand Canyon area of the Tehachapi Mountains and CA-LAn-488 near Fairmont, in the Antelope Valley, which are said to typify the point assemblages common in the valley (Robinson n.d.). Three point types and variants of these are well dated Great Basin styles: Cottonwood, Desert Side-notched, and Rose Spring series. The former two point types are largely contemporaneous and date from 650 years before present to historic times, and the latter point style dates from 650 to 1350 years before present (Bettinger and Taylor 1974).

Mark Q. Sutton's work at Edwards Air Force Base has resulted in a number of new sites being recorded through extensive survey work with additional information being gained on regional prehistory through excavation (Sutton, various publications and manuscripts 1976, 1977, 1978, 1979, 1980). Sutton has also detailed various aspects of the prehistory of the region through discussion of: the absence of antelope remains in aboriginal sites (1977q), the possible presence of paleo-Indian sites (Sutton, Forbes, and Robinson 1978, Sutton 1979b), time depths and culture history (1979c), the temporal dimension of a rhyolite industry (1979d), the presence and significance of baked clay figurines (1979e) and the use of obsidian hydration dating (1979).

Both Robinson and Sutton are continuing to concentrate on three critical research issues necessary to the elucidation of regional prehistory:

1. Settlement patterns and environmental exploitation
2. Contact and exchange with surrounding culture areas
3. Chronology and culture history

In this regard, Greenwood and Associates have been contracted by Edwards Air Force Base to complete a cultural resource overview which will include a synthesis of existing information on these research issues, a historical background to the area, an ethnographic study of Native Californian land use practices, and

(most importantly for our purposes) a field sampling program of intensive survey for the identification of previously unrecorded archaeological sites in order to make predictions on the nature and distribution of sites in their study area (Greenwood and McIntyre 1979).

Much of the work performed in the western Mojave Desert area is oriented to the analysis of the environmental impacts on cultural resources and contains little of value to the understanding of prehistory, but can be used to document areas surveyed for locational/settlement studies (Peak 1974a, b, 1976; Ritter 1975; Eggers 1976; Ivie 1976; Sutton and Robinson 1977; Robinson and Eggers 1974; Clewlow 1976, 1979; Ritter and Berg 1978; Robinson 1978; Schiffman 1974c, 1979g, h).

The following is a list of past projects which involved collection, excavation, or intensive recording and is provided to enable archaeologists and planners a ready guide to the previous work conducted in the area. The basic data is from Stickel and Weiman-Roberts (1979: 25-29) but has been altered slightly for present purposes.

LOS ANGELES COUNTY

CA-LAn-298 Pictographs were noted at this site. Also, one test pit at this site was excavated by M.J. Cobb and her students from Antelope Valley College. The collection is stored at Antelope Valley College. Sutton also dug there in 1977-78 (Sutton 1978b, 1979d: Robinson, Sutton and Eggers 1976). This site was first described in a paper by Robinson and Eggers (1974). Mitigation efforts followed this report involving some excavation. Partial results of this work are reported in a paper by Robinson, Sutton and Eggers (1976).

CA-LAn-483 This is a surface and slight subsurface deposit. Eleven 5 x 5 ft. test pits were excavated there by Roger Robinson of Antelope Valley College in 1968. Collections are stored at Antelope Valley College.

CA-LAn-484 This site consists of a small midden area between several bedrock mortars. The site has pictographs. Approximately 70% of the site area was excavated by Roger Robinson of Antelope Valley College in 1968. Collections are stored at Antelope Valley College.

CA-LAn- 485 A small midden and possible habitation site. It was excavated by Roger Robinson of Antelope Valley College in 1969. A depression 15 ft. in diameter was excavated with an aboriginal floor and a butchered calf recovered, thus suggesting an historic date for the site. Collection is stored at Antelope Valley College.

CA-LAn-486 This site consisted of a surface scatter of lithic material. Surface collections were made by Roger Robinson of Antelope Valley College in 1969. The collection is stored at Antelope Valley College.

CA-LAn- 488 This site is a habitation site and a cemetery. It was excavated in 1969-70 by Roger Robinson of Antelope Valley College. Three burials were removed and a C-14 date of 770± 90 B.P. was obtained. The collection and burials are housed at Antelope Valley College.

CA-LAn-679 The UCLA Archaeological Survey, under the direction of Tom Blackburn and James Toney, conducted a survey and excavation at this site. Notes are on file at the UCLA Survey.

CA-LAn-714 This site is a large lithic scatter. It was excavated and collected by A. Van Eggers in 1976. The site was partially destroyed by construction of the Space Shuttle Transport Road. The collection is stored at Antelope Valley College (Sutton and Robinson 1977).

CA-LAn-716 This site is a large lithic scatter. It was excavated and collected by A. Van Eggers in 1976. This site was partially destroyed by the Space Shuttle Transport Road. The collection is stored at Antelope Valley College (Sutton and Robinson 1977).

CA-LAn-720 This is an historic site which was tested in 1977 by Mark Q. Sutton (1980). The site was destroyed in 1977. Collection is stored at UCLA.

CA-LAn-721 A large midden site tested by Roger Robinson of Antelope Valley College in 1977-78 (AVC-34).

CA-LAn-764 This site consisted of only five millingstone fragments. The site was surface collected in 1977 by Roger Robinson of Antelope Valley College. The collection is housed at Antelope Valley College.

CA-LAn- 765 This site was a lithic scatter tested by Mark Q. Sutton in 1977 (Sutton 1979h).

CA-LAn-767 This is a cemetery site now buried under alluvium. It was excavated by Roger Robinson of Antelope Valley College in 1975. Eleven burials were removed. The collection is housed at Antelope Valley College.

CA-LAn-770 This site consisted of an isolated find of one flake. It was collected by Mark Q. Sutton in 1977. The flake is stored at Edwards Air Force Base (Sutton 1977c).

CA-LAn-771 This site is a dense surface lithic scatter. Surface collections were made by Mark Q. Sutton of Edwards Air Base. The collections are housed at Edwards Air Force Base (Sutton 1977g; 1978c; 1979g).

CA-LAn-772 This site was collected by Mark Q. Sutton. The material is stored at Edwards Air Force Base or UCLA.

CA-LAn-787 This site is a light scatter of lithic material. It was excavated by A.V. Eggers in 1976. The site was partially destroyed by the Space Shuttle Transport Road. Collection is stored at Antelope Valley Colelge (Sutton and Robinson 1977).

CA-LAn-788 A single projectile point was collected by A.V. Eggers (See Sutton and Robinson 1977).

CA-LAn-828 Some excavation was made at this site by A.V. Eggers in 1972 or 1973(?). Eggers has the notes. Chester King analyzed the beads and dated them from 2200 B.P. to 1350 B.P.

"Juniper Lodge" Site This site consisted of a still-standing brush hut located just south of Palmdale. It was investigated in 1961 by Dr. Charles Rozaire of the Los Angeles County Museum of Natural History as the site was to be destroyed by the construction of the then new Highway 14. Fortunately, the site appears to have been preserved (Rozaire, personal communication 1979). The main supports for the hut were made of juniper branches, and after being mapped, these were removed to the Los Angeles County Museum of Natural History where they are now stored along with maps, photos and some collected photographs. No analysis or published report was made. (Photograph of this site can be found in Glennan 1971).

KERN COUNTY

CA-KER-302 Site surface collected by W. Glennan, a graduate student at UCLA in 1970. Petroglyphs are present at the site. A full report is published (Glennan 1971a).

CA-KER-303 The site was excavated by R. Robinson from 1971-76. This site yielded the remains of two aboriginal structures. A badly vandalized cemetery was recognized where a minimun of 40 individuals were interred. Only five burials were found intact.

CA-KER-308 A dry cave excavated by R. Robinson in 1969. He found basketry, fiddleneck seeds, and tule matting.

CA-KER-322 This site was test excavated by A. Peak (1974a, b, 1976) and by Mark Q. Sutton (1979a). Collection is stored at California State University at Sacramento.

CA-KER-323 This site was test excavated by Mark Q. Sutton in 1978 (Sutton 1979a). Collection at Antelope Valley College.

CA-KER-470 This site consisted of an isolated find of one obsidian projectile point. The single specimen was collected by "Russel and Whitley" of the UCLA Archaeological Survey, where the specimen is now housed.

CA-KER-487 This site has a prehistoric component which was tested in the Space Shuttle Road project (Sutton and Robinson 1977).

CA-KER-495 A small temporary camp site excavated in 1977 and containing tortoise bones in some quantity (Sutton and Tremblay 1977).

CA-KER-504 A small temporary camp excavated in 1977 (Sutton and Tremblay 1977).

CA-KER-505 This excavated site (Sutton and Robinson 1977) includes an historic occupation and several early prehistoric components (indicated by Pinto Basin points). This site is on the National Register of Historic Places.

CA-KER-517 A special purpose site investigated by Roger Robinson in 1975 and found to contain an abundance of tortoise bones. Collection is housed at Antelope Valley College.

CA-KER-525 This site consisted of only one mano and one metate. They were collected by Mr. Earl Steward prior to 1976. Data and material are on file at Antelope Valley College.

CA-KER-527 A small pottery scatter. It was collected prior to 1976 by Mr. Earl Steward. Material stored at Antelope Valley College.

CA-KER-544 This site consisted of one obsidian projectile point base. Collected by Mark Q. Sutton in 1977.

CA-KER-554 This site consisted of a single retouched flake, collected in 1977 by Mark Q. Sutton. It is stored at Kern County Museum.

CA-KER-555 This site consisted of an isolated flake. Collected by Mark Q. Sutton in 1977.

M.Q. Sutton has also informed us that he has recorded some sites at Edwards Air Force Base as part of the NASA Space Shuttle Project (CA-KER-494, 495, 496, 497, 498, 499, 504). These are briefly mentioned in Sutton and Trembley (1977).

CA-KER-562 This site consisted of an isolated flake. Collected by Mark Q. Sutton in 1977. Material stored at Kern County Museum.

CA-KER-696 This prehistoric habitation site was test excavated by Mark Q. Sutton of Edwards Air Force Base. The collection is stored at Edwards Air Force Base (Sutton, Forbes, and Robinson in 1978, Sutton 1979b).

CA-KER-709 A single artifact comprising an isolated find. It was collected by Mark Q. Sutton in 1977.

CA-KER-733 Mark Q. Sutton excavated this site in 1977. Apparently it is a special purpose site (Sutton personal communication 1979). Several obsidian hydration measurements (Sutton 1979f) and C-14 dates of 460$\pm$ 75 R.C. years B.P. are also available indicating the temporal placement of the site.

CHINA LAKE BASIN

The area of the China Lake Basin is in the extreme northeast corner of Kern County and has been the area of intensive archaeological study.

One woman, Emma Lou Davis, is probably the most outspoken and eloquent proponent for the great antiquity of man in the Americas. She has spent the last ten years working in the dry and desolate basin of pleistocene China Lake methodically recording, mapping, and collecting the remains of very early cultures who adapted to a quite different environment than that characterizing the area today (David 1973, 1974, 1975, 1978).

China Lake is one of a series of pleistocene bodies of water, formed during periods of greater precipitation and a moister climate, comprising the runoff system in the area of eastern California. At two periods, from 2-6,000 years and 12,000 years ago, the lake contained substantial amounts of water and supported a lush vegetation community and associated fauna. Fifteen sites or areas of artifactual remains have been examined and a series of transects surveyed. Quadrants along the eastern shore of the lake were intensively mapped. Artifactual remains have been extensively described and include: burins, chopping tools, microblade cores, flakes of silicate, obsidian, basalt and rhyolite, blades, several varieties of ovate bifaces, several types of flake cutters, points of various forms including lanceolate square based, lanceolate concave based, and bifacially and unifacially fluted points, several varieties of scrapers, "beaks", crescents, pounding and grinding rocks, and resharpening flakes. Evidence for a Rancho Labrean Late Pleistocene/Early Holocene megafauna is also reported which includes the remains of mammoth, horse, camel, and

sabertooth cat. The bones of these animals are often found in close association with artifacts and are some of the most conclusive evidence linking human activity with megafauna in the Great Basin. Radiocarbon dates on calcareous soils and stratigraphic interpretations correlating sediments with the well-documented chronology of Searles Lake indicate a chronology going back an estimated age of 12-14,000 years before present, although so far the oldest radiocarbon date on data from China Lake is 10,275± 165 (Davis 1978:170).

Davis' chronology which includes the full range of material identified in the China Lake Basin is as follows:

Early Core Tool Tradition:	45,000-27,000 B.P.
Late Core Tool Tradition:	27,000-25,000 B.P.
Late Wisconsin Culture I:	25,000-20,000 B.P.
Late Wisconsin Culture II:	20,000-15,000 B.P.
Early Lake Mojave, Early San Dieguito-Proto Clovis:	15,000-13,000 B.P.
Classic Clovis, Sandia:	13,000-10,000 B.P.
Pinto:	6,000-3,000 B.P.
Desert Culture:	6,000-100 B.P.
Milling Archaic:	6,000-450 B.P.
Pottery Archaic:	450-100 B.P.

Davis readily admits that her scheme is highly speculative (especially for those periods antedating 12,000 years ago) but considers the framework as a working hypothesis worthy of adequate testing. The entire scheme is based on classifications of artifacts based on their provenience, weathering--none to extreme--function, shape (form), dimensions (length, width, thickness and weight), raw material, and technology.

Given the data presented, it has been suggested that a more reasonable time bracket for the most ancient activity at China Lake would fall between 7 and 14 thousand years ago (Weide 1979:205). The arguments for greater age are considered purely

speculative and although of value, await formal testing and substantial verifiable evidence (cf. MacNeish 1979).

Davis' work is of significance because it points to several research questions of continuing importance for study in the desert basins of eastern Kern County. The first is the possible extistence of pre-projectile cultures of great antiquity in the Americas (cf. Krieger 1962, 1964: Willey and Phillips 1955, 1958: MacNeish 1958, 1961, 1962, 1976; Jennings 1964; Irwin-Williams 1967, 1968; Cressman 1968; Warren and Crabtree 1969; Warren 1967; Stickel and Weiman-Roberts 1979). The argument considered is that, given the sophistication of verifiably early complexes, that is Clovis on the Plains, and with relatively ancient sites in Central and South America dating between 20 to 35,000 years before present, there should be evidence earlier than the generally accepted dates of 12,000 years B.P. for early cultures in North America (Krieger 1964:23; Cressman 1967:57-76). Evidence for these early cultures at this time is most tenuous and has yet to be generally accepted by the archaeological community (cf. Meighan 1978).

Fluted points were recognized by Davis in her China Lake study and have been found in other areas of Kern County. But these points have yet to be reliably placed temporally in the Great Basin and California. Associations with well-dated remains in the Southwest and Plains date the Folsom and Clovis points to ca. 10,000-12,000 B.P. Yet no stratigraphically controlled finds of these points have been made in the region under consideration, since they are almost exclusively surface finds. Further association with more recent complexes is still a distinct possibility.

A further problem of interpreting fluted points is the controversy concerning whether these items are representative of a "big game hunting complex" as represented on the Plains and Southwest. The argument concerns the validity of the presumed associations between fluted points and the procurement of

extinct megafauna, an association which has yet to be stratigraphically verified (Baumhoff and Heizer 1965:699; Wallace 1962; Heizer and Baumhoff 1970; Hester 1973:62; Cressman 19660. Critics indicate that a belief in a big game hunting complex in the Far West is one based on little supportive evidence and has been accepted largely on faith (Heizer and Baumhoff 1970). It has also been noted that cresents, also called Great Basin Transverse Points (Clewlow 1968:48), are often found associated with fluted points near pleistocene lake basins, which might suggest a more lacustrine rather than big game hunting emphasis. The work at China Lake may hold the greatest promise for the future resolution of this problem since detailed mapping and documentation of extinct megafauma and fluted points is on-going.

SOUTHERN SIERRA NEVADA

It is only recently that the rich and varied archaeological remains of this region have come under careful study. Previous to the 1970's very little archaeological work had been reported and no known excavations had been conducted. Extensive vandalism, however, has occurred throughout the entire region.

The brief mention by Julian Steward (1929) of the pictograph (CA-KER-17) at palakuc above the Kern River was the first published account of the area. Unsystematic survey work conducted during the 1920's by Dron (1925) identified numerous sites in the southern Sierra. Further archaeological survey was fostered by the construction of the reservoir near Lake Isabella. Franklin Fenenga (1947) surveyed portions of the area to be inundated and identified 14 sites. Unfortunately no further work was undertaken at these areas.

Sporadic archaeological work continued during the 1950's to the mid 1960's. Mark Harrington (1950) identified a small storage or cache cave near Walker Pass containing a variety of textiles--rush matting with cord wefts, a twined burden basket and a twined juniper bark textile. Heizer (1951), in a survey of cave archaeology in the state, identified two such areas for the southern Sierra Nevada. Georgianna Guthrie (1957) completed a short summary of the archaeology in the area to this date. Later, Elsasser (1960) presented a more generalized and definitive work on the archaeology of the entire Sierra Nevada. A further summary paper was that of Dorothy Griffin's (1963) on the prehistory of the southern Sierra Nevada, but added little to that small body of knowledge previously available.

A project conducted by Sanborn (1964) identified two sites to be disturbed through the construction of the Chimney Creek Campground by the Bureau of Land Management. Sanborn recommended

excavation be undertaken at both sites, but no further work took place. Both these sites (PCT 20 and 21) were the subject of recent investigations sponsored by this agency (Garfinkel, Schiffman and McGuire 1979).

Wallace (1970) reported on a reconnaissance made in the area of French Gulch Creek, west of Lake Isabella during November of 1964. Three archaeological sites were described and interpreted as the manifestations of limited plant procurement and processing. The sites were inferred to have been seasonally used by families harvesting acorns and digger pine nuts.

The year 1971 saw the first archaeological excavation conducted in the area. Contracted through the California Division of Transportation, Calvin Jenning (1971) completed work on a number of sites on the south fork of the Kern River to be destroyed by the widening of Highway 178. Although excavation took place and a rich artifactual inventory was discovered, no report of this work was ever completed. A portion of the total collection and field notes are now housed at Bakersfield College.

Herrick Hanks (1973) of the Bureau of Land Management reported on a very large archaeological site located on public lands planned for exchange. CA-KER-311 was identified and recorded and the exchange was cancelled. In response to continued vandalism of the Long Canyon Village site, as CA-KER-311 came to be known, Sally Salzman (1976) conducted an intensive study for the Bureau of Land Management, mapping the site in detail, interpreting its surface manifestations and developing recommendations for its protection. Due to her work, the entire site has been fenced and is being monitored to assure its preservation. The site is over a quarter of a mile square in area and contains extensive milling features, granaries, round and rectangular house foundations, substantial midden deposits, and surface artifactual material. The site has been interpreted as a winter village (hamlet) of the Tubatulabal dating to the late prehistoric and historic periods. It is very likely the largest and most

undisturbed village of the Tubatulabal remaining in the South Fork Valley.

Robert Schiffman (1974b) reported on an archaeological site located near the confluence of the Kern River and Bull Run Creek for a proposed land exchange by the United States Forest Service. The site complex is interpreted as the ethnographically described hamlet site, ho·lit, of the Palegewan (Voegelin 1938:42-43). It is composed of several areas of archaeological remains and revealed a midden with varying depths up to four feet. An extensive collection of artifacts and ecofacts were identified: mammal, bird, and fish remains, charred plant matter, stone tools and debitage of obsidian, basalt, rhyolite and chalcedony, Cottonwood, Desert Side-notched, and Sierra Concave Base type projectile points, steatite and serpentine pendants, pestles, manos, metates, clam disk and Olivella sp. beads and fragments of ochre. Also reported were several varieties of surface features: bedrock mortars, bedrock metates and an aboriginal trail. The site complex's age was estimated at ca. 500-2,000 B.P. Prior to this study extensive vandalism occurred at the cemetery associated with this site, virtually destroying it. Occasional vandalism to the site is on-going.

Schiffman (1976a) also conducted a study of the archaeological resources under the jurisdiction of the United States Army Corps of Engineers in the Lake Isabella area. Forty-six sites were identified on these lands and were briefly interpreted. Three types of sites were reported: habitation, milling and rock art sites. The latter included three pictograph sites and one petroglyph locality. Recommendations were made to assist in the preservation of these resources. Michael Glassow and Jerry D. Moore (1978) implemented some of these recommendations through site and feature mapping, auger tests, and updating of previous site records. General interpretations were based on their findings. The authors report that the bulk of sites studied date to

the Late Horizon or after A.D. 1000 to the historic period. Some evidence for more ancient occupation exists in the form of large dart points which may have been used to around 2000 years before present. Sites in the reservoir area generally cluster in areas which have greater access to Digger pine nut resources, although larger sites are relatively evenly distributed throughout the study area. A greater range of site types can be developed than the tripartite division that Schiffman had originally suggested, based on the available ethnographic information which would indicate that a wide variety of activities were conducted within the vicinity of Lake Isabella.

Minor projects producing environmental impact reports have also been conducted but generally are of little importance to the understanding of the regional prehistory. Their significance is in inventorying areas previously unsurveyed (Schiffman 1977a, 1978, 1979a, n.d.).

Of major importance to the region have been the systematic archaeological investigation in the upland pinyon forests of the Kern Plateau. These archaeological research projects were initiated in order to preserve the fragile archaeological record which would receive impacts through the development of the Pacific Crest Trail (cf. Bell 1975; Clough 1976; Montizambert 1978). The Bureau of Land Management has sponsored two field seasons of extensive archaeological study and to date 34 sites have been investigated. The results of these studies have been incorporated into two monographs (Garfinkel, Schiffman and McGuire 1979; McGuire and Garfinkel 1979) and are of sufficient importance to to summarize in detail here. Both studies are best presented as a unit since the second builds on the first and incorporates a similar problem orientation expanding and refining the results of the initial study.

Thirty-four sites in total have been investigated: nineteen were initially examined for the Morris Peak and Lamont Meadow segments and fifteen were evaluated during analysis of the Bear Mountain segment. A computer assisted (Discriminant Analysis)

functional site typology developed by McGuire and Garfinkel (1979) operationally defines three site types: pinyon base camps, pinyon stations, and hunting camps. These types can be reliably determined by other researchers for sites of unknown form through a simple numerical scaling. Since the typology has general utility, it is reproduced below for use by others:

Features	Site Types		
	Pinyon Base Camp	Temporary Pinyon Station	Temporary Hunting Camp
Projectile Points	-1.2	.9	3.9
Bedrock Milling Equipment	8.1	3.0	0.0
Portable Milling Equipment	7.7	6.7	-1.0
Midden	8.3	5.3	2.1
Rock Ring Features	3.8	3.7	-1.6
Site Size $\geq$ 8000 sq. m.	13.8	4.5	-1.9
Constant	-17.1	-8.4	-2.7

Each site of uncertain type receives a score for each of the above-listed features if it is present at the site. Scores for each feature are summed for each potential site type and a constant subtracted. The site is classified as the type for which it receives the highest score (see Bettinger 1979 for a detailed discussion of the manner in which such functional site typologies are used and developed).

The dating for these sites was based on chronologically diagnostic artifact types, source-specific obsidian hydration dating and two radiocarbon determinations. A tentative cultural sequence was formulated with the following divisions and associated artifactual inventories:

Phase	Artifacts	Dates
Chimney	Cottonwood Triangluar and Desert Side-notched points, Owens Valley Brownware, European glass trade beads, Olivella disc and stone beads, bedrock mortars, pestle, manos and metates	650 B.P.-Historic

Phase	Artifacts	Dates
Sawtooth	Rose Spring and Eastern points, stone and Olivella spire-lopped beads, bedrock mortars, pestle, mano, and metates	1350-650 B.P.
Canebrake	Sierra Concave Base, Humbolt Concave Base, and Elko points, manos and metates, ornaments absent	3200-1350 B.P.
Lamont	Pinto points, mano and metates, use of fine-grained basalt	6000?-3200 B.P.

Other substantive results of the Pacific Crest Trail studies include: the testing of a source-specific obsidian hydration rate for artifacts chemically characterized to the Coso source, the functional and technological analysis of flaked stone artifacts, the development of a model of aboriginal faunal exploitation for the study area, the description of a variety of ground stone implements, the identification of two variants of Owens Valley Brownware, the description of a variety of shell, stone, and glass beads, the identification of charred plant remains from the contents of a number of sites, the description and interpretation of nine pictograph sites found in the vicinity of the study area, and the source identification of 180 obsidian artifacts. The results of these studies have importance for further research in the southern Sierra Nevada and other portions of Kern County. Interested scholars are urged to consult the primary documents for further details.

Theoretical statements concerning the ethnic identification of the archaeological sites studied, the nature and antiquity of pinyon exploitation in eastern California, and the explanation of the character of human land use in the region were represented. These can only be briefly detailed here.

Results of the Pacific Crest Trail studies indicate that a dual land use pattern exists in the study area. The archaeological sites along and near the crest of the Sierra Nevada appear to have been used by desert-based groups (Numic speakers) identified as Kawaiisu and/or Panamint Shoshone. Tubatulabal

groups were more prone to use the area west of the Sierra Nevada crest and have an archaeological pattern which differs slightly from that of the Numic speakers. A variety of data is used to identify the differing archaeological patterns: settlement locations, flaked stone material, ground stone material, and the style and distribution of rock art sites. The time depth inferred for these archaeological patterns corresponds closely with reconstructions based on glottochronological studies which place the differentiation of Tubatulabic and Numic languages at from 2,000 to 3,000 years ago.

The exploitation of pinyon nuts is suggested, by the evidence collected during the Pacific Crest Trail studies, to have begun at least by 2500 to 2000 years before present. This contradicts the earlier work in the Owens Valley by Bettinger (1975, 1976) which suggested that the use of pinyon nuts as a formalized subsistence pursuit is of recent (ca. 1250-950 B.P.) development in eastern California. The southern Sierra Nevada researchers report that pinyon nut use may be a response to the ameliorating conditions of the Medithermal and the presence of larger stands of productive pine nut groves. A number of factors, including population pressure and changes in technology and resource zone productivity, are cited as the causal agents for the initiation of pinyon nut collection. Similarly, it is indicated that a number of studies in the southern Sierra Nevada and eastern California suggest an increase in land use dating to this same time period equivalent to the onset of the Medithermal.

Additional archaeological studies have focused on the identification and interpretation of the numerous rock art sites found in the southern Sierra Nevadas. Stephen Andrews (1977a, 1977b) has led these efforts by identifying and carefully recording many pictograph sites. Andrews offers a variety of observations and interpretations concerning the rock paintings found in the aboriginal territories of the Palegawan and western Tubatulabal. He reports that paintings in the Palegawan area

frequently contain realistic representations with many anthropomorphic and zoomorphic figures present. Sites in the Tubatulabal area have a paucity of zoomorphs and more forms were abstract being curvilinear, angular, and circular. In general, paintings are considered to have served a variety of functions: recordings of mythical or real events, calendrical or astronomical functions, markers for shaman's caches, directional devices along trails, simple decoration, warnings for dangerous phenomena in the area and hunting magic.

A further effort by Andrews (1979) identified nine pictograph sites in the vicinity of Lamont Meadow segment of the Pacific Crest Trail, both east and west of the Sierra crest. These sites were interpreted as having distinctive element configurations indicating the presence of an ethnolinguistic boundary within the general area. Two types of paintings were identified: sites having, in the majority, abstract elements, lacking realistic images and zoomorphs; and sites containing anthropomorphs and zoomorphs, notably bighorn sheep produced in a realistic fashion. The former were interpreted as rock art fashioned by the Tubatulabal, the latter those produced by Numic speakers, either the Kawaiisu or Panamint Shoshone.

Schiffman (1977b, 1979c) has reported on two rock art sites and inferred functions from an analysis of their method of manufacture, constituent elements, and locations. An initial study identified CA-KER-15 as a possible calendar used by the Tubatulabal. Numerical correlates and identification of elements with symbolic concepts suggests that the figures represent the sun and rain, the lunar cycle, and the Tubatulabal's seasonal hunting and gathering cycle of eight parts.

A pictograph (CA-KER-317) situated on a large east-facing boulder above a seasonal creek north of Canebrake Flat has been interpreted by Schiffman to be a solar observatory used to predict and record the summer and winter solstice. The panel depicts in red pigment the rays of the sun emanating from prominences and contains linear columns of horizontal lines inter-

preted as recordings of the passage of time. From the site one can view the sunrise at solstice time in the places along the horizon graphically depicted in the painting.

Lastly, Schiffman and Andrews (1979) have collaborated in a study at one of the two known petroglyph sites (CA-KER-25) located in the valley of the south fork of the Kern River. They attribute the production of the site to proto-Numic/Tubatulabic speakers, artisans presumed to have produced the glyphs in the Coso Range of the western Mojave desert. The glyphs are interpreted as dating later than 4000 years ago, but prior to 2200 B.P. The location of the site, in a highly suitable area for fishing, and the numerous depictions of bisected circles, interpreted as atlatls, and other figures, interpreted as fishing gear, lead the authors to the conclusion that the site served some magico-religious purpose associated with hunting and/or fishing.

The study of rock art in the southern Sierra Nevada is in its infancy and further research will undoubtedly add insights into the distribution, function, dating and authorship of these sites. It is important to note here that rock art sites have increasingly become the targets of thoughtless vandalism and destruction and are also actively damaged by the natural elements: rain, erosion, and chemical and physical weathering. Their preservation is of deep concern to archaeologists who desire to preserve these areas for their interpretive and scientific importance and to Native Americans who attach religious importance to this physical evidence of their cultural heritage.

REGIONAL RESEARCH DESIGN AND QUESTIONS OF PROCESS

The generally accepted objectives of archaeology are threefold: 1) to construct cultural chronology, 2) to reconstruct extinct lifeways, and 3) to define cultural processes (Thomas 1979). Cultural chronology provides a framework for the spatial and temporal dimension of human development and identifies the relative extent, antiquity, and course of this development. The reconstruction of extinct lifeways adds fabric to the outline indicating the various aspects of human existence: settlement, subsistence, technology, economy, social organization, ritual, art, and cosmology. The study of culture process traces the general factors and mechanisms responsible for cultural stability and change. The definition of culture process involves the search for the circumstances which provide variability in cultural adaptation and the formulation of explanations of prehistoric human behavior.

To date, most of the research in the study area has been oriented toward the first two objectives of archaeology and this is how it should be since these are the basic building blocks of prehistory. But there are higher order generalizations and grander research problems which should be attempted. When conducting archaeological studies, these should also be kept in mind, since all three levels of research are conducted simultaneously and each is interdependent on the others. In this regard, research topics of regional importance and questions of a processual nature will be delineated.

Regional Research Questions

In this section we sill examine the study area in two geographical regions: Southern Sierra Nevada-Tehachapi Mountains and Western Mojave Desert. These general areas will serve as

heuristic devices for the identification of research questions of a regional scope.

Southern Sierra Nevada-Tehachapi Mountains

A regional model which links changes in the archaeological record to alterations in the environment has been developed for the southern Sierra Nevada (Moratto, King, and Woolfenden 1979).

The coincidence of environmental and cultural changes are identified:

1. Settlement begins only after the amelioration of very warm/dry conditions around 2900 B.P. and was sporadic until very cool/moist climate prevailed around 1700 B.P. Between ca. 2800 B.P. and 1700 B.P., the area was sparsely inhabited by small, presumably mobile groups.
2. During the cool/wet period after 1700 B.P., the population became fairly sedentary and highly organized; settlements were large and extensive trade was carried out with both coastal and trans-Sierran proples.
3. After 1400 B.P., there was a period of social disruption in connection with the rapid warming and drying of the climate; nucleate villages broke up, the population became dispersed, political organization deteriorated and violence increased. During this arid interval, persisting until ca. 600 B.P., it is suggested the population centers were located at higher altitudes where environmental conditions previously typical of the lower foothills were replicated. The bow and arrow were introduced and acorn processing increased. Contact was maintained across the Sierra, but trade with the coast virtually ceased.
4. With the return of cool/moist climate around 600 B.P., the population increased substantially, social organization became more complex, and settlements proliferated. Status differentiation was marked and trade across the San Joaquin Valley resumed.

This reconstruction of regional prehistory and its concordance with reconstructed paleoenvironmental changes provides an eminently testable set of propositions for use by archaeologists working in this region. Various aspects of the model can be evaluated at many different types of sites of various ages, located throughout the area under consideration.

A slightly different model is available for examination, developed for the upland pinyon forests of the southern Sierra Nevada's Kern Plateau (McGuire and Garfinkel 1980).

McGuire and Garfinkel suggest that use of the upland pinyon area began between the period from 6000 B.P. to 3200 B.P. Substantial occupation of the area only begins during the period from 3200 B.P. to 1350 B.P. This intensification of aboriginal use of the area is hypothesized to involve a gradual transition from a predominant but sporadic hunting regimen to a pattern which emphasized the use of pinyon nuts. This change is also viewed as a climatically induced phenomena but the actual mechanism of the change is delineated. They see the cooler, moister climate of the Medithermal period, which evidences this transition, as having an important effect on the areal coverage of the pinyon zone. They propose that a downward shift in the lower limits of the pinyon-juniper zone expanded the areal extent of this zone dramatically and presumably increased its productivity making pinyon an attractive subsistence alternative.

This model, as well, may be further evaluated in a localized area centering on the upland pinyon forests of the Tehachapi Mountains and southern Sierra Nevada.

Western Mojave Desert

Although the culture history and prehistoric lifeways of the Mojave Desert are reasonably well known (cf. Hall and Barker 1975; Stickel and Weiman-Roberts 1979), as has been previously mentioned, little attention has been given that portion within eastern Kern County. We can expect that this area of

desert differs little in its archaeological manifestations from surrounding areas and can attempt to delineate those better defined archaeological complexes in this region and the changes concomitant with them.

The prehistory of the Mojave Desert can be summarized as follows. Aboriginal occupation probably initiated ca. 10,000 B.P., although earlier evidence for a postulated pre-projectile point horizon has been claimed. The period from 12,000 B.P. to 8,000 B.P. witnessed a subsistence pattern oriented toward the procurement of resources available along the margins of pleistocene lakes. Lacustrine or megafaunal food sources may have been primary dietary items, but more likely a wide variety of foods; seeds, tubers, berries, waterfowl, and small and large game were included in the subsistence base. The area was more well watered and rich vegetation surrounded the marsh areas. The corresponding archaeological assemblage for this period consists of fluted points and/or lithic assemblages containing the temporally diagnostic Lake Mojave and Silver Lake points.

From 8,000 to 6,000 B.P. a period of climate distinctly warmer than present has been posited and may have caused a depopulation of the less well-watered regions of the desert. An abandonment of low-lying areas may have been responsible for the hypothesized occupational hiatus or chronological break in the cultural sequence. Nevertheless, little data is available to characterize this temporal span.

During the next era (6,000 B.P.-3,200 B.P.) a generalized food collecting lifeway is established which continues to the historic period. Food processing tools appear such as manos, metates, mortars and pestles. An increase in population is seen as the area again becomes attractive for human settlement. Pinto or Little Lake series points date to this time span.

The period from 3,200 B.P. to 1,350 B.P. sees an increased emphasis on plant processing manifested by a greater dominance of milling stones in the archaeological assemblage. Elko series and Gypsum Cave (Elko contracting-stem) points characterize this period.

The transition from heavier dart points used with the throwing spear or atlatl to lighter arrow points of the Rose Spring and Eastgate series identifies the period from 1350 to 650 B.P. Increased contact with prehistoric cultures of the Southwest is noted. The most intensive period of trans-Sierran exchange in obsidian draws to a close at the beginning of this period and the production of rock art within the Coso Range discontinues.

The late prehistoric (650 B.P.-historic) is characterized by small triangular arrow points (Cottonwood and Desert Side Notched series), and Owens Valley Brown Ware Pottery. An increase in population is again noted. Hunting decreases in importance with smaller game animals being emphasized. Burial practices change from the previous style of inhumation to cremation of the dead. This simple culture historical outline can be used as a framework for study of the archaeological remains in the desert region of Kern County. Its validity may be evaluated through examination of the remains bearing on the various aspects and periods of prehistory.

Assuming that this general outline is reasonable, certain aspects of prehistoric culture change may be examined from a regional perspective and through models postulated to explain these developments. Several studies, although conducted outside the study area, bear directly on the regional prehistory of Kern County and may be usefully summarized here.

Bettinger (1975, 1976, 1977) has documented several changes in aboriginal land use patterns for the Owens Valley. One of these is pertinent for further study within the desert of eastern Kern County.

The archaeological record indicated a decrease in large game hunting between 950 and 650 B.P. This is manifested by a lack of temporary hunting camps in the upland and desert scrub areas during this time period. This change may have been linked, according to Bettinger, with a period of hotter and drier climate which may have reduced animal resources or possibly the intro-

duction of the bow and arrow which revolutionized hunting technology, perhaps leading to the depletion of large game.

In this light, Grant, Baird and Pringle (1968) have hypothesized that the introduction of the bow and arrow led to the decimation of bighorn sheep populations in the Coso Range located just north of the eastern Kern County border. They base their model on the development of an increasingly elaborate rock art style depicting stylized bighorn sheep and associated hunting paraphernalia. The termination of this rock art tradition appears roughly contemporaneous with the introduction of the bow and arrow and Bettinger's hypothesized decrease in large game hunting. Coso style rock art is found in eastern Kern County (Garfinkel 1978; Giles 1979) and archaeological data with which to test this model may be available from further studies.

Bouey (1979) suggests that this shift in hunting practices may be associated with increased population pressure (most likely caused by immigration), creating a population-resource disequilibrium. Such stress might cause a shift to smaller animals which, although less desirable by hunters and gatherers, are more ubiquitous and make up a larger percentage of the animal biomass in a region.

Demographic reconstructions are needed to test Bouey's explanation for this prehistoric subsistence shift.

Lastly, Garfinkel and Cook (1979) link a number of diverse changes in the archaeological record of eastern California to a population movement out of this area which has been inferred by historical linguists as the expansion of Numic-speaking peoples. This period of intense change (1350-950 B.P.) is speculated as, having been caused by a population-resource imbalance. Those changes as outlined may be delineated in archaeological research within the study area and the circumstances surrounding these changes can be further evaluated.

SITE TYPES

There has been very little research into typing archaeological sites in Kern County. Typically, archaeologists refer to site locales as villages, rockshelters, or temporary camps. This has created confusion within the archaeological record in Kern County, as no apparent standardized criteria has been employed by individuals recording archaeological sites.

Any attempt to quantify the recorded archaeological sites in Kern County must be viewed as tentative. Still needed is the reexamination of all recorded sites according to a regional standardized format for determining site types. In addition, future trinomial designations should only be given when site record forms have addressed these typological concerns.

Another approach is to avoid classifications that may prove too subjective and describe sites on the basis of features, artifacts and ecofacts present. It should be obvious that if archaeologists are going to effectively evaluate archaeological data, we need to standardize our definitions and terminology.

With this in mind, the following site descriptions are given. Site types were derived through the quantification of the site records at the Regional Office for Kern County and are only an indication of how sites have been described in the past. A more indepth appraisal of data from site records is in progress, which may provide more meaningful information than is presently available.

The accuracy of these figures are not absolute, but are given as an indication of how individuals have described the archaeological record in Kern County. The apparent omission of site types generally recognized is due primarily from the lack of a standardized criteria for typing sites. An example is where surveyors identify a lithic scatter, but label it a temporary camp.

ARCHAEOLOGICAL SITE TYPOLOGY

Archaeological Site

An archaeological site is defined as a loci for past human activities where evidence, in the form of cultural remains of these past activities are present and can be delineated. The primary components of sites include artifacts: objects manufactured by man, such as projectile points, grinding implements and bone tools; and features: any non-portable object, structure or remnant of a structure that was culturally produced, such as bedrock mortars and rock rings.

Archaeological Site Types

There were ten commonly used categories for typing archaeological sites in Kern County. These are:

1. Village
2. Temporary Camp
3. Rockshelter
4. Rock art: including petroglyphs and pictographs
5. Cemetery
6. Milling
7. Isolated Find
8. Quarry
9. Historic
10. Other: includes rock alignments, cairns, trails, and where the site record did not specify a site type and where the data was insufficient to make a determination.

The above terms are generally used designations and are not defined here. One reason for not defining them here is that in many cases we are not aware of the rationale used in labeling sites according to these types by the archaeolgoists filing the

site records. It is anticipated that the above list and the different classifications will be revised after a reexamination of the site records, and according to a new format now being developed. For information related to definitions of site types the reader is referred to Heizer (1973) and Meighan (1976).

Features Recorded in Kern County

Many types of features have been recorded in Kern County. The following list represents the features identified in the site records. No attempt to quantify these categories was made at this time. In a future revision of this document a table quantifying feature by type, site number and region will be included. The list is presented at this time as an indication to archaeological survey teams as to the kinds of features they are likely to find.

1. Bedrock Mortars
2. Bedrock Metates
3. Caches
4. Stone Cairns
5. Rock Alignments
6. Trails
7. Pictographs
8. Petroglyphs
9. Intaglios
10. Housepits
11. Granaries
12. Rock Rings
    a. House rings
    b. Hearths
    c. Cache pits
13. Stone Walls
14. Hunting Blinds
15. Burials
16. Roasting Pits
17. Canals

STATISTICAL SUMMARY OF RECORDED ARCHAEOLOGICAL SITES

The following is a statistical summary of the archaeological sites presently recorded in Kern County. Divisions of sites in each typology is based on site record information only and is designed to allow researchers to predict the kinds and possible frequency of different categories of cultural resource materials in an area. Site classifications presented are those used by the archaeologists responsible for recording the known site in Kern County. It is acknowledged that additional site types, both functional and according to features present, could be made by revisiting each site locale and evaluating them according to specific criteria. However, the current data base does allow us to obtain certain types of information such as site density, area sensitivity, settlement patterns, and enables us to project resource exploitation and utilization.

Totals were established on a county-wide basis and according to the four geographical/cultural areas defined in this study. A total of 1,028 sites were classifiable according to information contained in the site records. These figures will be revised annually. An expanded list of site features, artifactual and ecofactual remains will be prepared as part of a future up-date of the document.

Coast Range Mountains and Temblor Range:

Site Type*	Number of Sites	% of Sites
Occupation	36	28
Temporaty Camp	40	32
Rockshelter	4	3.2
Rock Art	3	2.4
Cemetery	1	1.6
Milling	5	4
Historic	9	7.2
Isolated Find	12	9.6
Quarry	1	0.8
All Others**	14	11.2
TOTALS:	125 sites	100%

* Based on primary classification according to site record.

** Includes sites not classifiable.

Valley and Sierra Foothills:

Site Type	Number of Sites	% of Sites
Occupation	73	40.6
Temporary Camp	43	23.9
Rockshelter	0	0
Rock Art	2	1.1
Cemetery	34	18.9
Milling	3	1.7
Historic	10	5.5
Isolated Find	5	2.8
Quarry	1	0.5
All Others	9	5
TOTALS:	180	100%

Sierra Nevada and Tehachapi Mountains:

Site Type	Number of Sites	% of Sites
Occupation	119	31
Temporary Camp	69	18
Rockshelter	23	6
Rock Art	32	8.2
Cemetery	4	1
Milling	106	27.9
Historic	8	2.0
Isolated Find	4	1
Quarry	3	0.8
All Others	16	4.1
TOTALS:	384	100%

Desert:

Site Type	Number of Sites	% of Sites
Occupation	36	10.6
Temporary Camp	122	36
Rockshelter	27	8
Rock Art	11	3.2
Cemetery	2	0.6
Milling	38	11.2
Historic	26	7.7
Isolated Find	30	8.8
Quarry	25	7.4
All Others	22	6.5
TOTALS:	339	100%

Archaeological Site Survey Record
Bakersfield College
Regional Office, Kern County

Site No. CA-_____

USGS_____ 7.5'_____ 15'_____ County_____

Previous Site Designation_____ Temporary Field No._____

UTM Coordinates Zone_____ E_____ N_____

TWP._____ Range_____ _____¼ of ____¼ of ____¼ of Sec.____

Location_____

Contour_____ Owner & Address_____

Site Description_____

Area NS_____X_____EW Meters_____sq. meters Depth of Midden_____

Site Vegetation_____

Surrounding Vegetation_____

Site Soil_____ Surrounding Soil_____

Nearest Water_____

Features_____

Burials_____

Artifacts_____

Faunal Remains_____

Comments_____

Published References_____

Date Recorded_____ Recorded by_____ Photos____

___completed site record
___site sketch map
___location sketch map
___xeroxed portion of topo.

Site No. CA-_____

Site Attributes (Prehistoric)

___unknown
___lithic scatter
___ceramic scatter
___BRMilling features
___petroglyphs
___pictographs
___architectural feature
___stone feature
___burials
___caches
___hearths/pits
___quarry
___lineal feature
___rock shelter/cave
___habitation debris
___other

Site Attributes (Historic)

___unknown
___foundations
___machinery
___mines
___roads/RR beds
___privy pit/dump
___water conveyance
___wells/cisterns
___walls/ fences
___graves/ cemetery
___standing structure
___other

Prehistoric Site

Date _____-_____(range)

Historic Site

Date _____-_____(range)

Ethnic Association:

___Native American
___Asian-American
___Euro-American
___Hispanic
___other
___unknown

Era:

___unknown
___ethnographic
___historic
___prehistoric

Current Information Base:

___surface collection
___subsurface testing
___previous excavation
___current excavation
___surface survey
___analysis
___other
___unknown

Condition of Site:

___unknown
___vandalized
___inundated
___buried
___partly eroded
___destroyed
___partly disturbed
___no impact
___other

Destruction Possibility_____

SITE SKETCH MAP

ECONOMIC RESOURCES

Kern County provided numerous stone and other inorganic natural resources to early aboriginal peoples in the region. These materials were used locally and as trade items to other areas. Through the analysis of the materials present at different archaeological sites and information on the distribution of these resources inferences can be made concerning exchange patterns and resource utilization. At present there have been no in-depth research studies on the economic resources of Kern County.

Acknowledging the need for more data, the following list is designed to provide an insight into the existing knowledge concerning the types and distributions of natural resources. The information comes from archaeolgical site records, archaeological and geological reports and from the data files at Bakersfield College.

Each region of the county, as defined in this document, is further divided into subareas more closely approximating the location of the resource specified.

AREA	RESOURCE
Coast Range-Temblors:	
Coast Range Foothills	various pigments
San Emigdio Canyon	soapstone (exact location unknown)
Temblors	asphaltum-tar seeps
Temblors	chert quarries
San Joaquin Valley and Adjacent Foothills:	
McKittrick area	chert quarries asphaltum-tar seeps
Maricopa	asphaltum-tar seeps
Mouth of Kern Canyon	chert outcrops (low quality)
Kern River Drainage	fine grained basalt fine grained quartzite
Southern Sierra Nevada and Tehachapi:	
Horse Canyon	chert
Sand Canyon	rhyolite
Caliente area	limonite hematite
Twin Oaks	limonite hematite
Bartolas Country	fine grained basalt
Eastern Sierra Foothills and Mojave Desert:	
Antelope Valley	rhyolite
Jawbone Canyon	obsidian
California City	chert/jasper
El Paso Mountains	chalcedony jasper talc
Koehn Lake	salt

TOPICS FOR FUTURE RESEARCH

This section of the monograph is devoted to short treatment of specific topics which can be addressed through research taking place in Kern County. Also included are questions of broader significance in a regional perspective and questions of a processural nature pertinent to the development of anthropological theory. These topics will be identified here in order to outline some of the possible avenues for further research.

Much of the material presented here is a symopsis of discussions taking place on December 8, 1979 at the Regional Office in Bakersfield and represents the contributions of a number of individuals.

Early Man

The potential for early man studies in many portions of Kern County is quite high. In the desert areas, early material has been identified intensively at China Lake and in other areas more marginally. Mountain areas (i.e., Tehachapi Mountains) have been the location for isolated occurrences of fluted projectile points. On the shores of Buena Vista Lake, buried material dating to a very early horizon is associated with crescents, basally thinned or fluted points, and atlatl spurs.

It is highly likely that other early material will be identified in Kern County. Good data may be obtained from buried material in the San Joaquin Valley and there is a high potential for early man studies, perhaps associated with the Rancho La Brean fauna found in the tar seeps near McKittrick and Maricopa. The definition, distribution and dating of these early occupations is an important area for further inquiry. The determination of the economic patterns reflected by these archaeological remains and their temporal relationships are topics in need of clarification.

The Pluvial Lakes Tradition, as represented by San Dieguito, Lake Mojave and Hascomat lithic assemblages, are in need of better definition and refinement.

The period of prehistory between 8,000 and 6,000 B.P. needs classification in terms of its diagnostic assemblages. This period would date the transition from lake-margin adaptation to a lifeway more oriented toward a wide variety of resources classified by the presence of milling tools (manos and metates). This period is identified with a post-pluvial timespan of heightened aridity (altithermal) and may be tied in with a poorly defined lowland/highland relationship.

Linguistic Prehistory

Models derived from historical linguistics detail prehistoric population movement and expansion and can date these events in a relative fashion through glottochronology. Archaeologists can begin to define cultural patterns coincident with linguistic units and can test the archaeological record with linguistically derived models of prehistory.

These topics have been addressed in the southern Sierra Nevada for Tubatulabic and Numic peoples of the upland pinyon forests. A study of the style, dating and distribution of rock art in this area provides valuable archaeological information for the evaluation of linguistic models. A petroglyph site on the Kern River in the South Fork Valley has been the subject of discussion using pertinent data on the linguistic prehistory of the southern Sierra Nevada and western Great Basin.

In an as yet unpublished study, Levy (n.d.) provides comparative linguistic data with which to model the prehistory of central California and its Penutian-speaking populations.

The archaeology of the Penutian-speaking Yokuts of the southern San Joaquin Valley can be used to assess these models both from a temporal and a spatial perspective.

The model of Numic expansion developed by historical linguists and dated by lexicostatistics at ca. 950 B.P. may be examined using archaeological data from the eastern portion of the study area.

Chronology

The development of cultural sequences and the direct dating of archaeological assemblages is a primary step in archaeological inquiry. Without culture history, little can be accomplished at the level of higher order generalizations. Dating is the mainstay of archaeology and for large portions of the county, work in this area is sadly lacking.

More research is especially needed to establish the chronological sequence of cultures in the southern San Joaquin Valley. But in all areas there is a need for more direct radiocarbon dates on organic remains, more information on temporally-sensitive artifact types--beads, points, ceramics, and other artifacts---and a greater use of source-specific obsidian hydration dating.

Local sequences need to be established, their characteristic assemblages identified, and the character of land use practices over time detailed.

Rock Art

In the aboriginal territories of Numic, Tubatulabic, Chumashan and Penutian speakers, there exists a large number and wide variety of rock art sites. These sites need to be documented carefully and recorded in a permanent fashion since, they are being destroyed by natural and cultural forces.

The study of rock art allows inferences concerning prehistoric ethnic identities and boundaries, astronomical observances, cosmology, associated subsistence practices, and communication networks. With such a rich collection of primitive art in the county, emphasis should be placed on identifying known and unknown locations of rock art, recording these in detail, and preserving them for future generations.

Exchange and Interaction

Kern County forms an east-west transect across California which contains much of the physiographic and environmental variability to be found within the state. Trade and interaction was mainly channeled in an east-west manner and was facilitated by a number of trails linking diverse ethnolinguistic groups.

The examination of aboriginal trade networks has been a fruitful area of research for prehistorians. A highly developed trans-Sierran exchange system has been documented within the county (Jack 1976; Ericson 1977a,b) and contacts with the Southwest have also been noted (Kroeber 1925). Archaeologists can discover new information on prehistoric trade by identifying the places of origin of raw materials, such as obsidian or flint, and finished items such as shell beads and ornaments, and determining their age. Through this analysis the nature of this exchange and interaction can be monitored through time and note can be taken of any changes which have occurred.

This type of analysis would appear to be very productive for the Antelope Valley region where evidence for trade is extensive and contacts with coastal, interior valley, and desert peoples are manifested.

Settlement Patterns

Delineation of the types of sites to be found and their areal articulations should be of primary concern for all archaeologists working in the county. This type of data can be retrieved within the scope of cultural resource management studies and is crucial to the development of a framework for prehistoric data collection and analysis.

As yet much of the area remains quite undefined in this regard. Settlement typologies are few and large areas remain to be surveyed.

Subsistence Patterns

The reconstruction of the diet of prehistoric populations in the study area has just begun. Faunal and floral analysis are necessary ancillary studies which are now becoming commonplace in excavation reports. The use of flotation for the retrieval of micro-floral and faunal samples from hearths adds a new dimension to the study of prehistoric subsistence practices. Charcoal and carbonized plant matter can be identified as to genera and sometimes species. Pollen analysis is sometimes useful in the identification of prehistoric dietary components. Since all of these analytic techniques are becoming widely available, it is hoped that as funding allows, they will be used to a much greater degree.

Pottery

Pottery from Kern County has been classified under a single type: Owens Valley Brown Ware. This type is rather loosely defined and may include a number of variants. No attempt has been made at a better definition of this ware nor has its spatial distribution been adequately delineated. Also uncertain is the temporal placement of this pottery and its typological variability. An effort can be made to illuminate these through the study of currently known collections of Owens Valley Brown Ware within the county. Inferences can be drawn through this study concerning antique ethnolinguistic boundaries and trading patterns.

Beads

Information pertaining to trade networks, culture histories and the temporal placement of specific cultural horizons can be acquired through the detailed examination of beads found in the county. Stephen Bass and Stephen Andrews (1979) developed a typology to classify, describe and date beads found in Kern County, although their system is suitably adapted to other areas of the state. To date they have examined several bead collections

from site excavations where the cultural deposit had stratigraphic integrity. More attention should be devoted to bead studies, as these artifacts can be as temporally sensitive as projectile points and can, through contextual relationships, add immensely to our knowledge of culture sequences and assemblages.

Tests of Ethonological Data

Good ethnological data is available for a large majority of the aboriginal peoples who occupied Kern County. Archaeological tests of propositions generated on the basis of ethnological data can be conducted. Such efforts are possible for the areas occupied by the Tubatulabal, Panamint Shoshone, and perhaps Yokuts people. The Indian Wells area and Kern Plateau would be especially suited for archaeological modeling of the ethnographically described seasonal round of the aboriginal peoples who inhabited these areas. The results of these studies would aid in the assessment of patterns of site location and density and would have significance for long-range planning studies.

Quarry Analysis

A number of sources for stone used by prehistoric flint knappers are found in the county. Some are in good to excellent state of preservation and would allow detailed study of the technological procedures used to quarry and produce finished tools. The nature of the lithic reduction sequence could be monitored at these sites and would be useful for comparison with lithic assemblages at other types of sites.

Development of Pinyon Exploitation

An opportunity exists for the continued study of pinyon exploitation, an important aspect of the subsistence practices of the Tubatulabal-Kawaiisu who inhabited the southern Sierra

Nevada-Tehachapi Mountain area.

More data is needed to firmly establish the date for the initiation of this aspect of aboriginal subsistence. Direct dating of plant remains (pinyon wood, cone parts, and seeds) found in association with archaeological features would be most suitable to the resolution of this problem. Further clarification of the circumstances which led to the initiation of pinyon nut use is also needed.

Function and Dating of Rock Ring Features

The opportunity exists in the eastern half of the county to study the widespread phenomena of aboriginal rock ring features. These features occur in great numbers in the desert area of the El Paso Mountains and also in the Sierra Nevada and Tehachapi Mountains. The features located in the pinyon zone have received preliminary treatment but little or no work has been conducted on those found in desert settings. Researchers disagree as to their use and dating. Studies suggest that a variety of functions were served by these features, including cache pits, the bases for brush houses, and fire circles.

Archaeoastronomy

A recent development in archaeology has been the attention researchers are giving to the significance of astronomical phenomena to aboriginal peoples. It has been discerned through an examination of California Indian ethnological data that observations of the movement of the sun was an important part of native cosmology (Hudson, Lee and Hedges 1979).

One site which may have served as a solstice observatory is found in the eastern portion of the county (Schiffman 1979c). Other sites may also exist. These may be rock art localities where one can view the sun against the horizon or alignments of rocks oriented toward the rising or setting of the sun during solstice time. Mountain summits make good observation points and these can be checked for the presence of rock art and possible solstice alignments.

Lithic Analysis

Work is needed on the technological and functional aspects of lithic analysis. Microscopic studies of edge damage patterns has yet to be conducted on stone tools from the study area. Technological analysis of tools as to their stages of manufacture and the reconstruction of lithic reduction sequences sould be valuable.

Disagreement among researchers concerning analytic methods for the study of functional lithic analysis has hampered development in this field and made comparison of sites difficult.

Paleoclimatic Reconstructions

Accurate reconstruction of the patterns of climate for the past 12,000 years are needed to help assess changes in the archaeological record. Pollen analysis, sediment coring of marshes and bogs, and the sampling of wood rat middens are some of the means for developing further data on this topic.

Acculturation

Studies of archaeological deposits spanning the pre-contact to post-contact time period would aid in the determination of the nature of interaction between Native Americans and Euro-Americans. The nature of the dramatic culture changes which took place during this very short time period have not been determined and its study has been generally neglected.

Historical Archaeology

Sites of the historic period need to be given greater significance in cultural resource management studies. Some contain valuable information (which has not been documented) that is pertinent to the history of our ethnic minorities.

This study should be conducted in association with a program of folk or oral history and suitable archival research.

Nevada-Tehachapi Mountain area.

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Private Collections

Private collections are a resource for archaeological research which has been neglected. In some cases suitable provenience data is available on this material and can be used for comparative purposes or as a data base for further research. An attempt should be made to document these collections before they are broken up or sold and their usefulness diminished.

Study of Township Plattes

Early surveyors' notes and township plattes are available for inspection from Sacramento or Washington, D.C. This valuable archival material can help identify prehistoric village locations, trails, and ancient geographic features no longer extant. They should be used as tools for research when possible.

Population Movements

The hypothesized expansion of Numic-speaking peoples out into the Great Basin at ca. 950 B.P. can be reasonably examined through archaeological studies in the northwestern Mojave Desert area of Kern County.

The abandonment of Lake Cahuilla (Wilke 1978), suggested to date to ca. 450 B.P., may be responsible for a change in settlement pattern in the Antelope Valley. This proposition should be further examined in studies in this area.

CULTURAL RESOURCE MANAGEMENT AND PLANNING

CULTURAL RESOURCE MANAGEMENT AND PLANNING

INDRODUCTION

Increasing public concern over the environment during the past decade has resulted in a series of laws, regulations and ordinances on the federal, state, and local levels which mandate the protection of specific portions of the environment. One such segment of the environment includes cultural resources-prehistoric, protohistoric, historic, and recent cultural materials, and the natural resources that figures significantly in cultural systems.

The result of these laws and regulations has been that many local planning agencies are obliged to include the protection of cultural resources within their already overloaded schedules and budgets. This is often particularly difficult because the management of cultural resources is a specialized field, and the location, identification, evaluation, determination of significance, preservation, and mitigation of damage to cultural resources such as archaeological resources almost always requires expertise beyond that available within a local planning group. To compound the problem, the preservation or mitigation of damage to an archaeological site often cannot be accomplished easily (i.e. through relocation of the resource, or cancellation of a project) as on one hand archaeological resources are fragile and totally non-renewable, while on the other hand, planning groups are often under pressure from landowners and local politicians to approve projects with few conditions, and the cancellation or relocation of a project for "a few bones" is often politically difficult. Because of these and other difficulties involved in dealing with cultural resources, many local planning and regulatory agencies do not know precisely where their responsibilities lie, nor how best to fulfill them.

This document is designed primarily to assist local planning groups in Kern County in dealing with cultural resources. In particular, this document concentrates on prehistoric archaeological resources, as it is within this area that planning groups most need assistance (although historic resources do exist, and must be dealt with). This document seeks to provide background information on some of the basic goals, practices, and techniques of archaeology, and hopefully will assist planners and other administrative groups in protecting archaeological resources. While the discussion centers areound prehistoric archaeological resources, many of the techniques discussed apply also to historic resources.

The Importance of Archaeological Resources

The story of the human occupation in Kern County goes back at least 10,000 years, and probably earlier, and constitutes an important segment of the total history of mankind. The faint traces of that history which lie written in the earth can be properly read and interpreted through the skilled application of modern archaeological techniques, aided by the knowledge of cultural patterns throughout the world, both past and present. But regrettably, with each year that passes, more and more of the archaeological record is sacrificed to further the economic growth of our expanding society.

Kern County was first populated by European settlers less then 150 years ago. But this period of time, great as it seems, represents less than one percent of the total story of human occupation of western North America.

Our information and knowledge of the past 150 years comes from many sources, including written records, books, songs, photographs, paintings, legends, folk tales, historic archaeology, and other types of documentation. But our knowledge of the remaining 99% of the history of human occupation in Kern County comes only from archaeological and anthropological research!

All of us, as well as our environment and civilization, are the products of history. By studying this history we can begin to understand the forces which operate on us and in us to make us what we are. In this way. knowledge of our past, like knowledge of our environment, is essential to our well-being. Access to this knowledge can be viewed as one of man's basic rights (McGimsey et al. n.d.), as well as a human necessity. In recognition of this, conservation of the archaeological record, and dissemination to the public of the results of archaeological studies are two of the primary goals of modern archaeology.

Archaeological resources are a valuable part of our history, and contain information not available from other sources. Their value is not limited to scientific or cultural values, but can be used to solve practical problems which confront us today. But this irreplaceable record is being destroyed at a tremendous rate, and estimates have been made in some areas that as much as 75% of all archaeological information is forever lost.

In addition to being a source of valuable scientific information, archaeological resources are also of tremendous cultural and social importance. One measure of this has been termed ethnic significance. "A cultural resource that holds religious, mythological, spiritual, or other symbolic importance for a discrete group is said to be ethnically significant" (Moratto and Kelly 1978:10).

Many groups which played major roles in the development and settling of the west have been largely ignored in the historical records. For example, Chinese, Blacks, and other ethnic groups are almost totally omitted from the historical records of California. Because of this, the materials which are preserved in archaeological sites are important sources of information on these groups.

Native Americans have a deep concern for the preservation of their spiritual and traditional places. This is not limited to burial sites and other sites of obvious importance, but

would apply to many other kinds of sites, including traditional ceremonial areas, places with spiritual or cultural values, and sites where raw materials were gathered. The raw materials needed to produce traditional baskets, for example, are becoming harder and harder to obtain.

Burial sites are considered to be hallowed ground by our culture, and many of the cemeteries in California may have grave markers which date to over 100 years ago. Native American burial sites, however, are often not considered to be important, even though it is highly possible for such a site to contain burials from a tribe or family for a continuous period of 2,000 or 3,000 years. While some people may not consider these sites important, to Native Americans they are of extreme importance and indeed are considered to be an integral part of Native American life.

Native Americans have expressed concern over the destruction of their heritage, just as other Americans are when monuments or remnants of important events in American history are destroyed or threatened.

Another measure of the importance of archaeological sites has been termed public significance. This includes all of the benefits which the public can derive from the wise stewardship of archaeological resources. Some examples of the benefits which archaeological sites can contribute to the public are:

Education: Archaeological sites are important sources of information on segments of mankind's history, and as such are important in education on several levels. Museums, for example, almost always contain archaeological or historical displays of various kinds. Interpretive displays set up at important historical or archaeological sites are widely visited both by school children and tourists. The National Park System has found that "...the public interest in prehistoric resources and the demand for visits to prehistoric sites is growing, and at a faster rate than the demand for the recreational services of the parks" (Green n.d. cited in Moratto and Kelly 1978:13).

Economic: The tourists who come to an area to visit museums, historical and archaeological interpretive centers, and other such facilities are important to the economic well-being of an area. In addition, there are usually many sources of outside funding which can be brought into an area to assist in restoration, museum displays, preservation or interpretation of archaeological sites, publication, and research, and this is also of economic importance to local areas.

In addition to the social or human values cited above, archaeological resources are of practical value to society. The following section presents some examples of the practical uses to which archaeological resources can be put:

Archaeological deposits fill an important gap in our records of natural events. As an example, our written records of rainfall and floods do not extend far enough into the past to provide the time perspective needed for adequate projections of possible long-term trends. A good example of this is a recent case in southern California. The Army Corps of Engineers wanted to provide flood-control to protect valuable property at the mouth of Tahquitz Canyon in the Coachella Valley. As the area is a fan deposit it is subject to periodic flooding, but the historical records were not adequate to indicate the magnitude of the floods which could occur in that area. The Corps estimated the flood potential, based on information from a location 20 miles away, at 17,500 cubic feet per second, even though the greatest flood on record for the Tahquitz Canyon itself was 2,900 cubic feet per second. Nearly one million dollars was spent in planning a dam before an archaeological study of the project area was sponsored by the Agua Caliente Band of Cahuilla Indians. The study found that archaeological sites existed in the direct path of the canyon's outflow. The upper levels of these sites, containing fragile and intact archaeological deposits, were dated to over 300 years ago. For a very small sum, archaeological information was gathered which

indicated that for over 300 years the sites located three feet above the flood channel had not been subjected to a major flood. The plans for the dam have since been abandoned, although for different reasons (Dixon 1977).

Moratto and Kelly (1978:24) write "...archaeology has a particularly important role to play in the development of national policies for land use and resource exploitation. No other discipline controls so much real and potential data on long-term man-environment relationships." By their strategic locations and the evidence of past environmental conditions which they contain, archaeological sites often are the only sources of data available to solve some very critical problems (Dixon 1977).

A perhaps more critical use of archaeological information is in learning of long-term trends in our climate and weather. With the increasing stress being placed on our food and water supplies by larger populations and denser occupation of marginal areas, the knowledge of past variation, leading in turn to more accurate predictions of future conditions is increasingly critical. Moratto and Kelly (1978:24-25) summarize the problem:

"We can illustrate why archaeological input is critical in land-use planning, especially where long-term projections are needed. The adaptation of the Pacific states depends upon vast quantities of water for irrigation, industrial and domestic use, and power generation. Enormous reservoirs and canals, a multi-billion dollar agribusiness, and a population of 30 million people are operating on the assumption that historic climatic conditions, especially precipitation levels, are 'normal'. Recently, data from archaeology, palynology, dendroclimatology, and allied sciences have shown that this assumption is doubtful. The data indicate that the far west experienced repeated cycles of climatic change during the past 10,000 years, and that the changes were of sufficient magnitude to greatly affect former cultures (Moratto, King, and Woolfenden 1978). The climate now

appears to be shifting from a 600-year period of relatively high moisture to an interval of dry conditions. To the extent that projections based on a long archaeological and climatic record prove valid, the region seems destined for a sustained future--possibly centuries--of drought."

The examples of the importance of archaeological sites cited above are only a few of the many that could have been cited. As a result of the importance of archaeological resources, there are (and have been for many years) legal mandates for the preservation or management of archaeological resources. Some of these are discussed in the Appendices.

The basic law which covers the non-federal preservation of archaeological resources in California is the California Environmental Policy Act of 1970. This specifies that state and local projects must include an environmental review to identify the impacts which a project will have on the environment, and to identify alternatives to adverse impacts. This law, as it applies to archaeological resources, was upheld in the case of Brown vs. Department of General Services, in which it has ruled that environmental impact reports prepared without the inclusion of an archaeological evaluation are deficient.

BASIC CATEGORIES OF ARCHAEOLOGICAL RESEARCH AND DOCUMENTATION

The following are the most commonly performed types of archaeological investigation, research and documentation in the field of cultural resource management and are often used in complying with the requirements of the California Environmental Quality Act and other state and local regulations.

1. Literature Review/Archival Search (usually included in a Phase I project)
2. Preliminary or Intensive Archaeological Reconnaissance (Phase I)
3. Subsurface Testing and/or Evaluation of Significance (Phase II)
4. Mitigation/Preservation Plans and Procedures (Phase III)
5. Presence/Absence survey
6. Nomination to the National Register of Historic Places

While each archaeological project must be designed for the specific problem at hand, usually the project will fall into one of the above categories. The following section is designed to provide a basic introduction to these types of archaeological investigation or research, including what is involved in each, when they should be required, how they might be used, and what each should contain.

LITERATURE REVIEW/ARCHIVAL SEARCH

This type of archaeological investigation is designed to provide background information on an area prior to a field reconnaissance, or as a part of a research project such as the preparation of an overview or sensitivity map, etc. In addition, property owners or planning agencies can contact the Regional Office of the State Archaeological Site Survey for a literature review/archival search of a particular parcel which they own or must deal with. This type of research can provide basic information on the following:

1. Has the parcel previously been surveyed for archaeological resources?
2. Are there known archaeological sites on the parcel?
3. What is the probability of finding archaeological resources on the parcel?
4. Should additional archaeological research be required?

A literature review/archival search can be as basic as the Regional Office record search, or it can be as complex as a complete historical reconstruction of a particular parcel, which might include tracing land use patterns, determining the modification of the parcel through time, tracing the chain of title, tracing the construction history, identification of each ethnic group or economic activity associated with the parcel, and learning of any other significant occurrences in the parcel's history.

Examples of the types of literature review/archival search which might be conducted by an archaeological or historical consultant could include the following general project types:

1. An initial literature review to identify potential development constraints (this cannot replace a field survey)

2. Detailed research leading to the preparation of large-scale sensitivity maps for use by planning agencies
3. A records examination to provide information on land use or settlement patterns
4. Ethnographic and historic information on the cultures that occupied various areas and historical data on events taken place in given areas
5. Information on previous archaeological research or survey in the area of a specific parcel

Basic archival research at the appropriate Regional Office should always be included in a preliminary archaeological reconnaissance, and is usually included in other types of archaeological investigation. Archaeologists are expected to file a copy of each completed report with the Regional Office. These reports become a part of the data base used in the literature review/record searches performed by the Regional Office.

Mitigation plans and other more specialized forms of archaeological research should always include detailed examinations of certain portions of the archival record, although this will vary greatly with the nature of the project and the amount or type of information that is required.

The literature review/archival search cannot take the place of a field reconnaissance. It is designed to provide specific information which is available in the records, but as most areas of the state have not been adequately surveyed, the information available is almost never sufficiently detailed to substitute for a field reconnaissance.

When Required: Generally this type of archaeological investigation is not required separately, but rather is included as a part of another project and often provides the foundation on which to base surveys and sensitivity studies.

There are a few instances, however, where the information gathered by a literature review/archival search is the end product. The preparation of an archaeological sensitivity map, for example, is often a project primarily of this type (although in some cases field reconnaissance is necessary). His-

toric, prehistoric, natural resource, conservation, or open space elements, or other works of a similar nature, should include background research into archaeological resources and their distributions, the nature and quality of the previous research which has taken place, and the procedures and guidelines which should be followed. If the literature review/archival search finds that an adequate previous survey of an area has been conducted, with negative findings, additional reconnaissance is usually not necessary.

In a literature review/archival search project it is usually necessary either to contact the Regional Office or to work through a qualified archaeological consultant. In general, people lacking archaeological training should not attempt to work directly with unsynthesized archaeological data, as the interpretation of such data is a process which should be approached with caution.

Evaluation of the Report: For the most part, the evaluation of the literature review/archival research data should center on its inclusiveness and its utility for the specific project. A preliminary archaeological report, for example, which does not include an archival search, or which includes an archival search which did not utilize the resources at the Regional Office of the State Archaeological Site Survey should not be considered adaquate. In addition, it must be remembered that a literature review/archival search should not be used to provide information which is beyond the scope of such a technique. It cannot be used in place of a field reconnaissance, nor can a records search make use of negative data. If data are lacking it does not indicate that there is a lack of cultural resources, it merely indicates that the data have yet to be collected.

PRELIMINARY OR INTENSIVE ARCHAEOLOGICAL RECONNAISSANCE (PHASE I)

In general, a preliminary or intensive reconnaissance project must include 1) a literature review/records search at the appropriate Regional Office of the State Archaeological Site Survey, 2) a field reconnaissance, and 3) the preparartion of a report detailing methodology, findings, and recommendations. (Definitions of various types of archaeological field reconnaissance after King, Moratto, and Leonard 1973 are found in Appendix II.)

For almost all projects, this will be the initial (and the only) stage of archaeological investigation necessary. It is designed to provide an inexpensive examination of an area to determine if that area contains archaeological resources. If the preliminary survey determines that archaeological resources are present or strongly suspected, the report will usually also include general recommendations for subsequent archaeological investigation and project planning. If the results of the preliminary reconnaissance are negative, it is normal to recommend that the proposed project not be delayed for archaeological reasons. Many archaeologists will also include a recommendation that if buried or otherwise undiscovered archaeological resources are located during subsequent construction the work should be halted in the area of the finds until they can be evaluated by a qualified archaeologist and appropriate mitigation measures are formulated and implemented.

When Required: The preliminary archaeological reconnaissance is usually required for a project when 1) there is specific information that the area contains archaeological resources, 2) the archaeological sensitivity of the area is listed as medium or high on a sensitivity map, 3) the project is in an area in which there is no information as to whether or not archaeological resources might be present, 4) there is a request from the Re-

gional Office of the State Archaeological Site Survey, the State Office of Historic Preservation, or the Native American Heritage Commission, or other such agency, and/or 5) the project is of sufficient magnitude to require an environmental impact statement.

It is less expensive to conduct a preliminary survey and to locate archaeological resources early in the planning stage than to have a project halted after work has begun. The preliminary archaeological reconnaissance is designed to provide the initial information for the planning process at a minimun cost, and it should be required if there is any doubt at all as to whether or not an area contains archaeological resources.

Evaluation of the Report: The preliminary archaeological reconnaissance must be prepared by a qualified archaeologist. An updated list of qualified archaeological consultants is available from the Regional Offices of the State Archaeological Site Survey. When there is any doubt about an individual's qualifications as an archaeologist it is strongly recommended that those qualifications be verified. Archaeology and cultural resource management have become highly specialized fields requiring that their practitioners have formalized training and experience. It is not possible to become an archaeologist by merely going out and conducting excavations, any more than it is possible to become a member of any other profession without meeting specific and formal qualifications. The qualifications for archaeological consultants which are utilized by the State Office of Historic Preservation are those found in federal guidelines (36 CFR 66). These qualifications are listed in Appendix I.

If the author of an archaeological report is not known to the individual or agency involved, it should be required that a current resume be included with any bid, proposal, or report, and that these credentials be verified through the appropriate Regional Office.

A preliminary archaeological reconnaissance report should generally provide the following information:

1. Why was the project conducted?
2. The details of each step in the project methodology
3. Who was involved at each stage of the project?
4. What are the areas involved in the project?
5. What are the results of the project?
6. What are the recommendations, and what is the justification for each?
7. What are tha qualifications of the investigators?
8. Was the appropriate Regional Office contacted?

Guideline questions for a major cultural resources survey have been prepared by the State Office of Historic Preservation. The guidelines can be used to evaluate the completeness and usefullness of archaeological reports. These are reproduced in Appendix I.

It should be kept in mind that while all projects or investigations cannot necessarily answer all possible questions, certain essentials must be dealt with and evaluated. If an archaeological report appears to lack many of these types of information, or if there appears to be problems with a report, it is possible to request an evaluation by the Regional Office of the State Archaeological Site Survey or by the State Office of Historic Preservation. This should be considered mandatory for reports prepared by individuals who are not included on the list of approved archaeological consultants issued by the Regional Office.

SECONDARY TESTING AND DETERMINATION OF SIGNIFICANCE (PHASE II)

When an archaeological site has been found during a preliminary survey, or is known to exist on a parcel, it is usually necessary as a part of the permit process to determine the precise location of the archaeological site and often necessary to investigate its nature, composition, and significance. This is the information which is required by the planning process so that project impacts and the significance of the resource can be evaluated allowing preservation or mitigation measures to be included in subsequent planning decisions.

In some cases, an archaeological site may be located on a project parcel, but in an area which will not be impacted by the proposed project. If it can be documented that there will be no project impacts, it is often possible to avoid secondary research and testing. In such a case, the preservation of the resource should be formalized through the inclusion of the archaeological resource as a part of an open space, scenic, or archaeological easement, or through a deed restriction which guarantees its preservation.

If a project cannot be designed so as to avoid impacts to an archaeological resource located within its boundaries, it will usually be necessary to obtain certain types of information about the site. This is usually done through secondary archaeological testing (and/or other appropriate types of archaeological investigations). This usually leads to the formulation of a mitigation plan. Some of the following types of archaeological investigation may be utilized at this time (as necessary) to provide the required information:

1) Boundary location: A series of techniques designed to locate

as accurately as possible the boundaries of an archaeological site. These techniques may include the following:

1. detailed surface examination and mapping
2. systematic surface collection (or sampling) and mapping
3. systematic auger sampling or other subsurface testing of site peripheries
4. chemical analysis and testing

2) Subsurface testing: A series of techniques designed to provide detailed information about the composition and integrity of an archaeological site, while keeping the disturbance of the resource to a minimum. This is usually accomplished through the hand excavation of several archaeological test units and detailed analysis of the data, but the exact details of the subsurface testing will depend a great deal upon the specific information which is needed and the nature of the archaeological resource.

Subsurface testing is not always necessary to document the significance of a site. When such testing is employed, it is usually used to supplement existing information on an archaeological resource, and to provide additional details on the nature of the archaeological site, its composition, the time periods during which it was occupied, whether or not it includes human burials, and other details. Proper documentation of an archaeological resource is necessary in order to estimate the significance of the resource.

There are numerous techniques which might be utilized in conjunction with subsurface testing, depending upon the information required, but almost all such tests will include the following:

1. Preparation (and review) of a research design prior to the fieldwork
2. Gathering of the data needed to answer the questions specified in the research design
3. Detailed analysis of the data which was gathered
4. Provisions for curation of the data gathered

5. The preparation of a report outlining all procedures, and including:
    1) Description and discussion of the data gathered
    2) Discussion of project alternatives
    3) Conclusions and specific recommendations
6. Submission of the report to the Regional Office and the appropriate regulatory agencies.

3) Determination of Significance: Determining the significance of an archaeological site is a process which may require a detailed knowledge of 1) the archaeological resource, including knowledge of the time period(s) during which it was occupied, and its contents, 2) previous archaeological research in the immediate area and in the general vicinity of the resource, 3) the nature of the archaeological record as it survives in the immediate area, the general vicinity, and the region, 4) research questions which are or may be applicable to the site, and 5) current legislation, guidelines, and professional practices which pertain to the estimation of significance (of Moratto and Kelly 1978).

Some archaeological resources are of such obvious significance that their importance is easily recognized by all. An example of this type of resource would be the extensive rock painting sites of the Chumash, Yokuts, Tubatulabal, Kawaiisu, Kitanemuk, or Panamint Shoshoni tribal areas.

Other archaeological resources have been located that are in such a damaged condition that they are of limited significance. It is rare, however, for an archaeological site to be so damaged or so disturbed that no archaeological information can be obtained.

The significance of most archaeological resources which are found, however, will fall somewhere between the two extremes cited above. While most archaeological resources will possess significance, the degree and the nature of the significance will usually have to be determined and documented through archaeological research and/or testing. The significance of the resource must then be taken into consideration during the

planning and permit application process. The planning decisions and preservation or mitigation measures which are formulated can then be brought together into a mitigation plan, which (after review and approval) will specify the conditions under which the project may proceed. (The mitigation plan is discussed below.)

The determination of archaeological significance is a process which may require detailed research and documentation. Some of the specific traits which may be used to estimate significance are listed below:

(Scientific) Research Potential: Research potential is one of the primary federal standards (36 CFR 60.6) of significance. Does the site contain data which are important to history or prehistory, and if so, to what degree? This is determined (in part) by reference to existing or potential research questions. For discussions of this see Moratto and Kelly 1978: Schiffer and Gumerman 1977: and King, Hickman and Berg 1977.

Integrity: All other factors being equal, a site which is intact is more significant than one which is not. It is not just the individual items or artifacts which cause the site to be significant, it is also the interrelationships between these components. For this reason, even minor disturbance to an archaeological site can result in the loss of important information.

Temporal affiliation: Sites of some time periods are more significant than sites from other periods (partly based on relative abundance or scarcity of the sites of the time period), although this varies greatly with the area and the type of site. As a general rule, however, if all other factors are equal, a site increases in significance as it increases in age.

Relative scarcity: Some types of archaeological sites are extremely rare while some types are more common (although this varies with the area and the amount of site destruction which has taken place). Other factors being equal, sites increase

in significance in proportion to their relative scarcity, and those sites that are uncommon, rare, or in some important way unique, are of greater significance because of their uncommon characteristics.

Community significance: An archaeological site which is a member of a group of interrelated sites will have a greater significance, just as pages from a book are of greater significance when considered together than individually.

Ethnic significance: This applies to an archaeological site which has religious, mythological, social, historical, or other special importance to a discrete population.

Legal significance: A federal or federally entailed site which is in (or eligible for inclusion in) the National Register of Historic Places is afforded specific legal protections. There are numerous other federal, state, and local laws, regulations, and ordinances which apply specifically or in general to archaeological resources.

When Required: A secondary research or testing project should be required when additional information is needed to determine the location of a site (it cannot be assumed that the surface manifestations are the same as those below the surface), the potential significance of a site, or any other specific data which is needed for a realistic evaluation of a site during the planning process. It is normal for the preliminary archaeological reconnaissance report to include recommendations for subsequent testing or research, but if this has not been done, a qualified archaeologist can provide the required expertise.

Evaluation of Secondary Testing Reports: A secondary testing report is difficult to evaluate outside of the archaeological profession, as many of the topics and techniques with which a reviewer must be familiar are technical in nature and specific to the discipline of archaeology. The review and evaluation of such reports can best be accomplished by the Regional Office of the State Archaeological Site Survey or by the State Office of Historic Preservation.

MITIGATION/PRESERVATION PLANS AND PROCEDURES (PHASE III)

One of the primary goals of modern archaeology is to preserve the rapidly vanishing archaeological record. This, and the public's increasing awareness of the value and non-renewable nature of archaeological information, has led to the development of the field of cultural resource management. It is under this framework that the mitigation plan has been devised as one of the primary tools for the protection of significant archaeological sites which are threatened by adverse project impacts. The following discussion applies primarily to state and local projects. When there is federal involvement the procedures are often different.

When an archaeological resource has been determined to be significant, the planning and other management decisions which specify how it is to be dealt with are formalized in a document called a mitigation plan. This document is usually prepared by a qualified archaeologist, and is submitted for review to the appropriate regulatory agencies, the appropriate Regional Office, and to the State Office of Historic Preservation. When approved, this document specifies in detail any constraints and conditions which will apply to the proposed project, and details the steps which will be taken to preserve the site or to mitigate damage which cannot be avoided.

Mitigation Procedure: There are numerous techniques which can be utilized to reduce or eliminate damage to archaeological sites. The goal of these techniques is to allow a proposed project to be completed essentially as planned, but in such a manner as to preserve the archaeological resources that exist in the project area. In most cases, it is possible to accomplish this goal.

Some of the specific mitigation techniques which may be

used to preserve an archaeological site are discussed below. Which (if any) of these are used in a particular project will depend upon the nature of the project and upon the nature and significance of the archaeological site.

No Project: The best alternative from an archaeological viewpoint would be no project. This could be accomplished by moving the proposed project to another location, or by cancelling it entirely. This alternative should be realistically considered, although it will seldom be implemented. In some cases, however, this alternative will be necessary, particularly when the site is found to be extremely significant.

Relocation of Project Impacts: If an archaeological site is known to be located in one specific area, it may be possible to avoid the site by minor redesign of the project. This might be done by placing the site in an open space area, in an area to be landscaped, or in some manner relocating project impacts to avoid damage to the site. For example, a site could be covered with a thin layer of fill and covered over with asphalt, creating a parking lot (see below). This is one way to preserve the site from damage while permitting development.

Burial of the Site: If a structure cannot be relocated, it is often possible to place it on top of an archaeological site with minimum impact. This might be accomplished by covering the site with a layer of fill sufficiently thick to insulate it from the impacts of foundations, utility lines, etc. The amount of fill will depend upon several factors, but in many cases may be about 12-18 inches. Sampling of the site is usually required before burial.

Partial Archaeological Excavation: In some cases there is no way to avoid partial damage to a site. If the 'no project' alternative is considered, but rejected, the next alternative will be for those portions of the site which must be damaged to be excavated by archaeologists. As an example, a project

might be able to avoid all damage from foundations, landscaping, and grading, but may not be able to avoid damage created by a sewer line. One mitigation alternative would be to have the sewer trench excavation done by archaeologists to recover the information that would otherwise be destroyed.

Archaeological Salvage: If a project cannot be avoided or relocated, and the impacts will be extreme, it may prove necessary to conduct a large-scale archaeological salvage operation. This is seldom done, as it is a poor alternative from an archaeological viewpoint (next to total destruction without any data recovery), and as it is very expensive. But it must be realized that society has a claim on information about man's past, and that any project which will cause damage to archaeological resources must also be responsible for the recovery and preservation of the information that those sites contain.

Archaeological Monitoring: When construction is to take place near an archaeological site or in a potentially sensitive area, it is often required that an archaeological monitor be present. If archaeological resources are located, the monitor will halt work in the area of the finds until they can be evaluated by a qualified archaeologist, and appropriate mitigation measures can be formulated and implemented. Unless the find is extensive, construction work would usually be halted only within a small area near the find, and work on the rest of the project can continue uninterrupted.

PRESENCE/ABSENCE SURVEY

This category of archaeological investigation is not often used, as the cost can approach that of the preliminary reconnaissance, while the information return is usually very limited.

The presence/absence type of survey usually includes a field reconnaissance, and often includes the preparation of a brief written report. The level of examination and documentation of archaeological resources which are located is usually very restricted, and may be limited to a statement that archaeological resources are present in a particular area. If an archaeological site is found, the responsible planning body still needs information on such things as the boundaries of the site, the type and composition of the site, and most importantly, its significance, but none of these questions are within the scope of a presence/absence survey. For these reasons, the base level archaeological study is the preliminary archaeological reconnaissance, and the presence/absence survey is used only in special circumstances.

When non-archaeological members of an administrative agency or other untrained or minimally trained individuals examine a parcel, they are performing a type of presence/absence survey. It must be realized, however, that such a survey can only be used in the positive sense, not in the negative. If the survey finds archaeological resources, professional expertise will be required to provide the rest of the information that is necessary. If the survey is conducted by someone other than a trained archaeologist, and no archaeological resources are found, the results of the survey cannot be utilized to satisfy legal requirements, nor can they be used to indicate the lack of archaeological resources. If an adequate survey is conducted by a qualified archaeologist, the results, whether positive or negative, can be used to satisfy legal requirements.

When Required: The presence/absence survey is rarely required by administrative agencies, as the preliminary archaeological reconnaissance is the primary reconnaissance tool.

One example of when this type of survey might be required would be the case of a construction project already in progress (with an archaeological condition in the permit). If there are rumors that archaeological resources have been uncovered during construction, a presence/absence survey is entirely justified to verify compliance with the permit condition that work be halted if archaeological resources are located.

Evaluation of the Report: The report from a presence/absence survey should be evaluated in terms of its methodology and completeness. It should include a statement of how the report was prepared, who prepared it, the background research which was performed, and the degree of confidence which should be placed on the report.

If the report is prepared by or under the direction of a qualified archaeologist, it may be used to indicate the lack of archaeological resources. If it is conducted by untrained individuals, it may be used only to indicate the presence of archaeological resources, and may not be used to satisfy archaeological requirements. If there is any doubt about the qualifications of an individual to prepare such a report, or the use of the report, contact should be made with the appropriate Regional Office of the State Archaeological Site Survey.

NOMINATION TO THE NATIONAL REGISTER OF HISTORIC PLACES

The National Register of Historic Places is the official list of the Nation's cultural resources worthy of preservation (see Appendix VIII). Listing in the National Register:

1. Makes private property owners eligible to be considered for Federal grants-in-aid for historic preservation through State programs.
2. Provides protection by requiring comment from the Advisory Council on Historic Preservation on the effect of federally assisted projects on these resources.
3. Makes the owners who rehabilitate certified historic properties eligible for Federal tax benefits.

Details on nomination of properties to the National Register can be obtained from the State Office of Historic Preservation.

THE MANAGEMENT OF ARCHAEOLOGICAL RESOURCES

For the lands which are not under federal or direct state control (i.e , a state park) the management of archaeological resources in Kern County is primarily the responsibility of various county, city, and other local regulatory bodies. These agencies have been required to comply with the provisions of the California Environmental Quality Act, and to formulate on the local levels various general plans, natural resource, open space, historic, or conservation elements, and other planning documents which deal in part with archaeological and other cultural resources. As a general guide in the preparation of these plans, the following section will discuss some of the goals and techniques of archaeological resource management which might be implemented at the local levels to satisfy some of the legal requirements.

Intensive Surveys of the Planning Areas: For those planning agencies responsible for relatively small areas the easiest solution to the problem of archaeological resources would probably be to sponsor complete intensive cultural resources inventories of their jurisdictions. Once a professional inventory has been established, most of the planning decisions may be greatly simplified, as the vast majority of projects may be in areas known to be free of archaeological resources. In those areas in which archaeological resources are located, landowners and developers will be aware of the problems from the earliest planning stages, and will be able to plan and design their projects accordingly. This will eliminate two chronic problems that are often faced today. These problems are first, the necessity of requiring small landowners to

conduct many small and relatively inefficient surveys, or even worst, gambling that an archaeological survey is not necessary. This may lead to the second problem, the possibility of a total shutdown of an ongoing construction project in order to deal with, for example, a three thousand year old burial site which was located and mostly destroyed by bulldozers.

The cost of conducting a professional preliminary archaeological reconnaissance survey on a single small parcel is usually minimal. It is much more efficient, however, to conduct cultural resource reconnaissance surveys on a large-scale administrative level than to require them to be conducted individually by the owners of numerous small parcels.

When an administrative agency is responsible for a very large area, as in the case of a county government, it would be prohibitively expensive to conduct preliminary archaeological reconnaissance surveys for the entire area under their jurisdiction. In such a case, it would be more productive to conduct either large-scale predictive reconnaissance surveys (those designed to sample the data base and predict the probable locations of archaeologically sensitive areas) or to have archaeological sensitivity maps produced periodically from existing data at the Regional Office. Archaeological sensitivity maps attempt to identify potential areas of high, (medium), and low archaeological sensitivity. Based on such a sensitivity map, preliminary archaeological reconnaissance surveys would have to be conducted for all projects in those areas identified as high or medium sensitivity. In areas identified as having low archaeological sensitivity, small projects could be allowed without a survey being required (with a condition that work be halted if archaeological materials are found), but projects which are of sufficient magnitude to require an EIR would have to include cultural resources in the EIR. One of the problems with this approach is that the arch-

aeological data base is usually extremely limited in most areas, and as a result, as much as 50% to 75% of a county might have to be designated archaeologically sensitive in order to insure that potential archaeological sites in relatively unknown areas are not missed by the sensitivity maps.

The large scale predictive reconnaissance survey can be used to generate more accurate sensitivity maps. This technique allows a narrowing of the potentially sensitive areas on the basis of more accurate data which is generated by the systematic field survey and detailed modeling research. While these surveys are expensive, the resulting data should repay the initial cost, as numerous minor surveys might be eliminated, the data base would be expanded, and more accurate sensitivity maps could be made on the basis of the systematic data and predictive models. This would lead to much greater accuracy in the prediction of sensitive areas, and would allow the possible deletion of many areas which are currently included on sensitivity maps only because there is no data available from those areas.

A tool which is little used on the local level for the preservation of archaeological resources (and which is especially useful for preserving historic resources) is the inclusion of significant cultural properties in historic districts with special zoning. While many local planning groups allow such zoning, it is rarely used. To make this a viable tool in historic preservation it will be necessary for local agencies to provide realistic tax benefits or other incentives which encourage individuals and organizations to make use of the zoning. For example, such a zoning has been available in Monterey County since 1975, but has never been used because there are no benefits which the landowners can obtain, while there would be several restrictions placed on the use of the parcel. For example, the owner would have to apply for a special use permit to make even minor changes in signs, plumbing, or landscaping on the property. Until local historic zoning ordinances can be for-

mulated which offer significant tax incentives or other advantages to landowners, this tool cannot be regarded as a viable alternative in many areas of California. (There are, however, significant tax benefits which can be obtained on the federal level for certain types of historic/prehistoric properties.)

Probably the best and most efficient technique for the management of archaeological resources by a planning group would be to include archaeological resources as one part of a well thought out and systematic procedure for handling permit applications. Some suggestions for this are included below:

(1) The decision as to whether or not an archaeological survey should be required should be systematic, and based on accurate information. The best source of this is the Regional Office of the State Archaeological Site Survey. If planning agencies make use of archival searches and up to date sensitivity maps to determine the necessity for archaeological surveys, the majority of archaeological resources should be located early in the planning stage. If the method for determining when an archaeological survey will be required is clear, straight forward, and known to the applicants in advance, there should be a minimun of confusion and resentment.

(2) The archaeological survey should be required before the permit application is considered complete, rather than as a condition of the permit. If the archaeological information is obtained early in the planning process any changes which might have to be made on the basis of the archaeological data can be made when there is maximum flexibility in the project plans.

(3) The procedures for dealing with archaeological sites which are located during the preliminary surveys should be clear and relatively standard. If the project will take place well away from the archaeological site, a deed restriction or an archaeological easement should be utilized to insure that the site is preserved. If the project will have any possibility of im-

pacting the site, or if the boundaries of the site are not known, then secondary testing, boundary location, and the determination of significance, leading to the formulation of a mitifation plan, should be required automatically.

(4) Categorical (or other) exemptions for single-family dwellings are causing a tremendous amount of damage to archaeological resources. In areas of known archaeological sensitivity there should be absolutely no exemptions for projects which will cause impacts to the ground.

(5) When dealing with projects with federal involvement, the cultural resources requirements are often different, and usually more detailed. Compliance with state and local regulations does not necessarily provide compliance on the federal level.

(6) There are some sites whose locations cannot be predicted with current archaeological knowledge. One example of this would be a deeply buried site located on an alluvial fan. In many cases, this type of site would be of extreme age and of tremendous significance. Provision should be made in local planning codes for dealing with such sites.

APPENDICES

APPENDIX I

MINIMUM QUALIFICATIONS FOR STATE ACCEPTED ARCHAEOLOGICAL CONSULTANTS

The minimum standards endorsed by the State Office of Historic Preservation are those of the Department of the Interior, as found in 36 CFR 66 (Appendix B) and in 36 CFR 64 (draft). The minimum professional qualifications pertaining to archaeologists and other specialists are quoted below:

Professional Qualifications

1. It is essential that any location and identification study be staffed by qualified persons. While students, interns, trainees, and volunteers are commonly and effectively used as team members, it is vital that they be properly supervised by persons with appropriate training and experience.

2. A wide variety of specialists may be appropriate for work in particular kinds of location and identification studies. Geologists, geographers, ethnographers, ethnohistorians, folklorists, art historians, and marine survey archaeologists are among the specialists quite commonly employed in such studies. In general, however, the core disciplines represented in location and identification studies are history, architectural history, architecture, historical architecture, and archaeology, and it is for these disciplines that the Secretary has developed qualification standards. Standards for other professional disciplines may be issued from time to time as the need arises.

3. In the following definitions, a month of professional experience need not consist of a continuous month of full-time work but may be made up of discontinuous periods of full-time or part-time work adding up to the equivalent of a month of full-time experience.

a. History. The minimum professional qualifications in history are a graduate degree in American history or closely related field: or a bachelor's degree in history or closely related field plus one of the following: (a) at least two years of full-time experience in research, writing, teaching, interpretation, or other demonstrable professional activity with an academic institution, historical organization or agency, museum, or other professional institution; or (b) substantial contribution through research and publication to the body of scholarly knowledge in the field of history.

b. Archaeology. The minimum professional qualifications is archaeology are (a) a graduate degree in archaeology, anthropology, or a closely related field, or equivalent training accepted for accreditation purposes by the Society of Professional Archaeologists, (b) demonstrated ability to carry research to completion, usually evidenced by timely completion of theses, research reports, or similar documents, and (c) at least 16 months of professional experience and/or specialized training in archaeological field, laboratory, or library research, administration, or management, including at least 4 months experience and/or specialized training in the kind of activity the individual proposes to practice. For example, persons supervising field archaeology should have at least 1 year or its equivalent in field experience and/or specialized field training, including at least 6 months in a supervisory role. Persons engaged to do archival or documentary research should have had at least one year of experience and/or specialized training in such work. Archaeologists engaged in regional or agency planing or compliance with historic preservation procedures should have at least 1 year of experience in work directly pertinent to planning, compliance actions, etc., and/or specialized historic preservation or cultural resource management training. A practitioner of prehistoric archaeology should have had at least 1 year of experience or special training in research concerning archaeological resources of the prehistoric period.

A practitioner of historic archaeology should have had at least 1 year of experience in research concerning archaeological resources of the historic period.

c. Architectural History. The minimum professional qualifications in architectural history are a graduate degree in architectural history, historic preservation, or closely related field, with course work in American architectural history; or a bachelor's degree in architectural history, with a concentration in American architecture; or a bachelor's degree in architectural history, art history, historic preservation, or closely related field plus one of the following:

(1) at least two years of full-time experience in research, writing or teaching in American history or restoration architecture with an academic institution, historical organization or agency, museum, or other professional institution; or

(2) substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.

d. Architecture. The minimum qualifications in architecture are a professional degree in architecture plus at least 2 years of full-time professional experience in architecture; or a State license to practice architecture, plus one of the following:

(1) at least 1 year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field and at least 1 year of full-time professional experience on preservation and restoration projects: or

(2)at least 2 years of full-time professional experience on preservation and restoration projects. Experience on preservation and restoration projects shall include detailed investigations of historic structures, preparation of historic structures research reports, and preparation of plans and specifications for preservation projects.

APPENDIX II

CATEGORIES OF ARCHAEOLOGICAL FIELD RECONNAISSANCE

(after King, Moratto, and Leonard 1973)

I. Preliminary Field Reconnaissance: a relatively superficial examination of the impact area for the purpose of gaining a general understanding of the kinds of cultural and related phenomena present there.

a. Uncontrolled Intuitive Reconnaissance: "spot check" of "likely" areas for human habitation based on general criteria like slope, nearness to water, etc.

b. Controlled Intuitive Reconnaissance: "spot checking" of areas known to be "likely" ones for archaeological resources based on intimate familiarity with local settlement patterns.

c. Controlled Sample Reconnaissance: survey of a stratified random sample of the area, or use of some other device for insuring statistical predictability.

II. Intensive Field Reconnaissance: comprehensive examination of an area to gain detailed information on all classes of archaeological and related phenomena occurring there, including test excavation where necessary to define site boundaries or other critical characteristics.

a. General Surface Reconnaissance: inspection of all land surfaces that can reasonably be expected to contain visible archaeological resources. Every portion of the study area whose surface can be seen without major modification of the vegetation or structural cover, and where it is reasonably possible that human activities that would leave traces might be carried out, is inspected in a general surface reconnaissance. Every foot of ground is not necessarily covered. A general surface reconnaissance is the functional equivalent of a complete reconnaissance (IIc) in areas where soil, vegetation, or other conditions

make it highly unlikely that some kinds of archaeological phenomena would be preserved, or where surface conditions obscure such phenomena to a point at which they could not be observed without undertaking large-scale brush clearing, grading, etc.

b. Controlled Sample Reconnaissance: same as Ic above; appropriate for intensive field testing surveys of very large areas only, and never adequate for determining the specific kinds of impact of particular installations.

c. Complete Reconnaissance: an investigation of every visible portion of the impact area.

d. Subsurface Reconnaissance: excavation of test units, extensive auger-boring, mechanized cutting, or other methods of exploring beneath the surface of the ground (other than routine small auger-boring, inspection of stream cuts, etc.).

III. Mixed Strategy Reconnaissance: in some areas it may be appropriate to utilize different approaches in different parts of the study, e.g., complete reconnaissance of the project area itself, controlled intuitive reconnaissance of indirect impact areas; or complete reconnaissance of all fairly flat land, controlled intiutive reconnaissance of grassy slopes of more than 25%, etc. The different kinds of reconnaissance utilized should be specified, as should the reasons for employing them.

APPENDIX III

LEGAL MANDATES FOR CULTURAL RESOURCE MANAGEMENT

The following are some of the main laws and regulations which apply to cultural or archaeological resources. This list is not complete, and some of the most recent laws are discussed only briefly as guidelines for their implementation have not been established.

FEDERAL

Antiquites Act of 1906. Empowers the President to proclaim National Landmarks, establishes permit requirements for archaeological work on federally owned and/or managed land, and establishes penalties for violation of the law.

Historic Sites Act of 1935. This establishes as national policy the preservation of historic sites, buildings, and objects of national significance for public use.

Reservoir Salvage Act of 1960. Provided for the expeditious recovery of archaeological data threatened by federal impoundment projects.

Historic Preservation Act of 1966. This establishes the "National Historic Preservation Policy," establishes the National Register of Historic Places, provides for inventories, and establishes the Advisory Council on Historic Preservation.

Federal-Aid Highway Act of 1968. Requires the Secretary of Transportation not approve any project or undertaking that adversely effects historic sites (among other things) unless there is no "prudent and feasible" alternative, and the negative effects have been minimized during the project's design phase.

National Environmental Policy Act of 1969. Establishes a national policy to protect and enhance the environment, both natural and cultural. It requires full consideration of a

project's impact on the environment, provides for state and federal environmental review, and requires the consideration of alternative mitigation measures for preservation.

Council of Environmental Quality, proposed regulations for implementing the National Environmental Policy Act, June 9, 1978.

Executive Order 11593 (Protection and Enhancement of the Cultural Environment, 1971). Requires federal agencies to provide leadership in protecting the nation's cultural heritage. Requires a survey of all federal lands, and the nomination of eligible properties to the National Register of Historic Places.

Archaeological and Historic Preservation Act of 1974. Revises the Reservoir Salvage Act of 1960 to require inventories of cultural resources, and provides funding for archaeological data recovery at sites impacted by federal undertakings. Authorizes appropriation of funds for the archaeological administrative activities of federal agencies.

Federal Land Policy and Management Act of 1976. States that it is the policy of the Unites Sates that:

1. the public lands be retained in federal ownership unless as a result of the land use planning procedure it is determined that disposal of a particular parcel will serve the national interest.

2. the public lands be managed in a manner which will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values.

Advisory Council of Historic Preservation, final amendments, January 30, 1979. Guidelines for the implementation of the National Historic Preservation Act of 1966 and two Executive Orders.

Archaeological Resources Protection Act of 1979. Increases the protection afforded some archaeological resources, and redefines the age criteria for the National Register from 50 to 100 years old. The detailed guidelines for implementing this law have not yet been finalized.

STATE OF CALIFORNIA

California Environmental Quality Act of 1970. Provides for state and local environmental review, and requires the consideration of alternative mitigation measures for archaeological site preservation. This has been interpreted to mean that "public agencies should not approve projects as proposed if there are feasible alternatives or mitigation measures available which would substantially lessen the significant environmental effects of such projects" (Robinson 1979:548). County of Inyo vs. City of Los Angeles held that "the underlying policy and express provisions of CEQA limit the approving agency's power to authorize an environmentally harmful proposal when an economically feasible alternative is available."

California Coastal Act of 1976. Section 30001.5 states that the basic goals of the state for the coastal zone are to: (a) Protect, maintain, and, where feasible, enhance and restore the overall quality of the coastal zone and its natural and man-made resources. This has been held to include archaeological resources. (This is currently resulting in the preparation of numerous Local Coastal Plans, each of which will have to include the protection of cultural resources.)

California Public Resources Code, Chapter 1.7, Section 5097.5. Provides for protection of archaeological and historical resources on public lands (lands owned or administered by the state, or any city, county, district, authority, or public corporation, or any agency therof.)

California Public Resources Code, Chapter 1.75, Section 5097.93. Provides that Indian burial sites abandoned less than 200 years shall not be disturbed.

California Penal Code, Title 14, Section 622 1/2. Prohibits the injury, disfiguring, defacing or destruction of any objects of archaeological or historical value on public or private lands by anyone but the owner.

California Penal Code, Title 14, Section 623. Prohibits (without prior written permission of the owner):

1. damaging or disturbing any natural features of a cave
2. disturbing or altering any archaeological evidence in a cave, or
3. removal of any material found in a cave.

California Penal Code, Title 15, Section 642. Prohibits the removal of articles of value from a dead human body.

California Health and Safety Code, Section 7052. Prohibits the removal, disinterment, or mutilation of human remains.

California Health and Safety Code, Section 7500. Prohibits the removal of human remains from a cemetery without authority of law.

California Health and Safety Code, Section 8100. Defines as a cemetery any graveyard with six of more buried human bodies.

Brown vs. Department of General Services, Sacramento Superior Court No. 236723. Declares to be "deficient" any environmental impact report prepared without the inclusion of archaeological evaluation.

APPENDIX IV

ESTABLISHMENT OF COUNTY ORDINANCES

The establishment of ordinances, by local governments, designed to protect cultural resource materials is regarded as a valuable tool for the preservation of those resources. At present there are no specific antiquities ordinances in Kern County. While it is hoped that such legislation will be developed in the near future, it is not an intended goal of this overview to write or develop laws of this nature. This matter is regarded as separate from the present endeavor and will be considered more fully at a later date.

APPENDIX V

CULTURAL RESOURCE SURVEY REPORT CHECKLIST

I. Table of Contents

II. Summary of Report

III. Where is the project area?

- A. Describe the project.
- B. Give the location and size of the project, including project boundaries and the area of potential environmental impact.
- C. Provide map(s) showing the above information.

IV. When was the study or survey conducted on which this report is based?

V. Why was this report prepared?

- A. Which local, state or federal laws regarding cultural resources apply to this project?
- B. Why was this study deemed necessary? Was it preceded by a preliminary assessment, field reconnaissance report or other related work? If so, please attach.

VI. Who was involved with this project?

- A. Who was the principal investigator for the study? Who assisted?
- B. Who served as investigators during the study?
- C. In which phases of the study did the above actually participate?
  1. design
  2. research and contact with interested parties
  3. survey
  4. analysis
  5. review
  6. other
- D. What are the qualifications of the principal investigator and field supervisor?

E. Have all appropriate special fields (disciplines) been included in research teams? For example, historic archaeologist, architectural historian, etc.?

F. Has this report been reviewed by other persons? If so, please attach their comments.

VII. How was the information gathered for this report?

A. Was a records and literature search conducted?

1. How was this research done?
2. How comprehensive was the research? What types of values, (e.g. prehistoric, historic, architectural, sacred or other cultural values) were investigated?
3. Has the project area been previously studied in terms of cultural resources? In what local, state or federal inventories are the project area's cultural resources listed?
4. What sources (written and oral) or depositories were consulted? This should be listed in a biography.

B. How have the results of the records and literature search been put together?

1. Provide a brief regional history and/or cultural overview of the area.
2. What survey expectations were developed?
3. What research questions were developed at this stage?

C. Discuss the field survey.

1. What type of survey was used? How was it conducted, i.e., discuss the methodology in specific terms following common professional practices. How many person-days were spent in the field?
2. What was the rationale for the selection of survey methodology?
3. What was the coverage, i.e., the geographic extent of the survey?

a. What project areas were not inspected and why?
b. What project areas received less than intense inspection and why?

4. Was cultural material removed from the area in conjunction with the survey? If so: (a) Why was it removed? (b) What was collected? (c) How was it recorded? (d) Where is it now?
5. Provide appropriate map(s) showing surveyed areas in relation to project area.

D. Were interviews conducted? With whom? What were the results?

E. Were other field activities, such as testing, carried out? If so: (a) Why? (b) Where? (c) What were the results?

VIII. What are the results of the survey?

A. What cultural resources were identified? What criteria were used to identify them? Discuss the cultural resources individually and collectively. Survey forms with detailed sketch maps and State of California trinomial numbers should be included for archaeological sites.

1. What types of resources are present?
   a. archaeological
   b. architectural
   c. historical
   d. other cultural values, including Native American
2. Briefly describe the resources and their cultural and natural environmental settings. Are there intrusions on these resources?
3. What is the estimated age of the resources?
4. What are their locations?
   a. Provide a verbal description and justification for site boundaries. Describe the resource's placement with respect to other cultural and natural features.
   b. Provide UTM and other appropriate locational data, i.e., township/range, parcel number, street address, etc.

5. Are the resources in public or private ownership? If public, which agency owns them?
6. In what condition are the resources?
   a. Have they been altered? How?
   b. Have they deteriorated? Describe and give causes.
   c. Are the resources currently endangered? How?
7. Provide representative photographs and drawings of the identified cultural resources.
8. What is the significance of the resources?
   a. Do any of the resources meet the National Register criteria and why? Which do not and why?
   b. Do some or all of the resources constitute a district? Is this district eligible for the National Register?
   c. Does the cultural or natural environment contribute to the significance of the resource?
   d. Does the property have historic or cultural significance to a community, ethnic or social group? For example, with regard to prehistoric sites, have local Native American groups and the local Native American Heritage Commission been contacted?
   e. Are there other factors that make the resources significant, such as use for housing or recreation potential?
   f. Relate the survey results to the research design. How have or how will these resources contribute to knowledge in appropriate professional fields?
   g. Is further study necessary to determine significance? If so, what is recommended?

B. Evaluate the potential effect(s) of the project on cultural resources in keeping with local, state and federal regulations. Will there be:
   1. "No effect"; give rationale for this opinion, or
   2. "Effect but no adverse effect"; give rationale for this opinion, or
   3. "Adverse effect"; give rationale for this opinion.

a. Could there be direct adverse effects, such as destruction, alteration, isolation, etc.?

b. Could there be potential adverse effects such as growth facilitation, increased use, etc.?

C. What preservation or other steps to mitigate adverse effects are recommended by the professionals who participated in the study? What is their rationale?

1. Should there be no project?
2. Should the project be redesigned to minimize adverse impacts?
3. Should the project be undertaken elsewhere?
4. Should partial preservation measures be undertaken such as data or material recovery, or relocation and enhancement of the resource?
5. What other measures are recommended?

Adapted From: Draft Archaeological Overview of the Central Coast Counties, Breschini, Gary S. and Trudy Haversat, 1979.

APPENDIX VI
NATIVE AMERICAN CONCERNS

Native Americans have special concerns towards some classes of cultural resources--these attitudes differing to some degree from the scientific community and the general public. The natural landscape is seen by Native Americans as filled with ritually and symbolically important aspects significant only to themselves, the people who have maintained this land as their homes for many generations. The land, as such, has a special quality and meaning.

Through discussion, interaction, and formal correspondence, we have learned how some Native Americans view the cultural resources of Kern County. These views are probably representative of a majority of the Indian community living in the confines of the artificial geo-political boundaries of Kern County but is meant only to be a sampling of such views.

Of principal importance to Native Americans is the land itself. It is the belief of many Indians that portions of Kern County "belong" to the Indian people or were set aside originally in the past solely for Indian use, but through illegal maneuvers title was secured by Euro-Americans. Further, they feel that access to Indian allotments have been blocked illegally, by private Euro-American land owners. These assertions have not been investigated, but are offered here for the reader's consideration. Since such underhandedness and unscrupulous dealings are part of a long history of Indian-White interaction, these statements probably are not completely unfounded.

Of continuing concern to Native Americans is the effects of man-induced disturbances to the natural environment. Especially in the mountain and desert areas where development has not been great, the destruction of fairly pristine natural areas by off-

road vehicles and recently by land developers, is the cause of much concern. Areas of ritual importance to these people and sites figuring prominently in their mythologies have been and are continuing to be disturbed.

Places which are considered sacred to the Native American community have been delineated for the desert areas of Kern County (Laidlaw 1979). However, the majority of the county has not been the subject for such an inquiry. In this regard the Native American Heritage Commission has offered guidelines to archaeologists for securing information concerning cultural resources from the local Indian community. Of concern here is that even in the instance when no archaeological sites can be identified from visible evidence on the surface of the ground, local Indians may have knowledge of areas of special significance to them which were not prehistoric Indian sites or areas where unmarked graves exist containing no visible surface manifestations.

Archaeological sites of all types are important to Native Americans. These are valued as visible evidence of their past and serve as tangible reminders of their cultural heritage. California Indian culture is now experiencing a sort of renaissance, where traditional practices are gaining in importance and nearly forgotten aspects of religious behavior have begun to take on crucial meaning to Indian people. This has been translated into the explicit concern that archaeological sites be preserved, protected, and conserved so that Indian children can retrieve some of their traditional values. Sites are viewed, in this way, as not simple repositories of knowledge, but as areas which contain spiritual, ritual and religious importance.

Lastly, an issue of major concern to all Native Americans and one which is very emotionally charged is the protection of Indian cemeteries. The Native American community can no longer tolerate the off-handed treatment given the disturbance of their dead. Indian graves are many times unmarked, yet knowledge of the location of these cemeteries is shared by the local Indian community. These sites are often on private land and are pro-

posed for development by public agencies before consulting the Indian community in the area. The Society for California Archaeology includes in its statement on ethics a provision against the excavation of any grave younger than 100 years old. The Department of Parks and Recreation has developed guidelines which assure the preservation of Indian graves and only allows the excavation of burials in consultation and with approval of the Native American community. Although county, state and federal legislation prohibits the willful disturbance of cemeteries, little in the way of enforcement in regard to Native American graves has taken place. Furthermore, Native Americans should be consulted when conducting cultural resource studies since in many cases they bring special expertise to the study of the past and offer valuable insights into the archaeological record. It is also believed that cultural resources are not the sole property of the academic community. With Native Americans becoming more involved in the preservation, protection, and conservation of these cultural resources, their concerns should be addressed.

APPENDIX VII
ARCHAEOLOGICAL COLLECTIONS

Artifact collections from Kern County are held by many museums and private individuals. Some of these are the result of systematic field surveys or excavations. However, it is believed that the majority of cultural remains held by individuals are the result of vandalism and indiscriminate collecting. Although not included in the present document, it is hoped that collections from museums and private parties will be reviewed in the near future and that valuable cultural information can be obtained from these collections.

A problem facing any researcher into artifact collections is the wide dispersal of cultural remains over the state. While part of these materials are in various museums as far away as the Smithsonian, many other items have been removed in recent years by archaeologists conducting casual, as well as systematic surveys, and in the process of doing environmental impact studies. It is the position of the Regional Office for Kern County that cultural remains should stay in the region of origin as often as possible. This not only provides for easier access and reviewing of materials, but it also facilitates comparative analysis of artifactual and ecofactual remains. The Anthropology Department of Bakersfield College, through its archaeological program, has the facilities to curate cultural materials collected and encourages the depositing of items found and collected in Kern County with it or the Kern County Museum as regional repositories.

APPENDIX VIII
National Register of Historic Places

There are seven properties in Kern County listed with the National Register of Historic Places. They are:

Walker Pass
Fort Tejon
Ignacio Valencia
Last Chance Canyon
Bandit Rock (Robber's Roost)
First Baptist Church
Long Canyon Village Site (KER-311)

APPENDIX IX

HISTORIC RESOURCES

The evaluation of historic resources is viewed as an important concern of the Regional Office. A section specifically relating to Kern County history and historical remains will be added in the future.

APPENDIX X

FUTURE ADDITIONS TO THE KERN OVERVIEW

Future revisions planned include:

1. A listing of Historic Markers in Kern County
2. A guide to museum and private collections of cultural resource materials
3. Identification and quantification of site features according to feature type, site number and region
4. Maps
   a. Sensitivity map of Kern County
   b. Geographical and Environmental regions
   c. Ethnolinguistic cultures
5. Continual updating of all portions of this document, including an annual review of each years reports.

APPENDIX XI

GLOSSARY

Archaeology-A social science concerned with understanding human behavior by studying how social groups have responded to situations in the past. California archaeologists tend to study relationships between Man and environment. One group of archaeologists in southern California, for example, is studying what happened to people living around a large lake in the desert, when the lake dried up about 500 years ago. They hope to be able to test general ideas about human responses to rapid environmental degradation.

Archaeological Resources-All evidence of past human occupations which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental and all other relevant information and the contexts in which they occur. Archaeological resources are found in prehistoric and aboriginal sites, as well as historic Indian and European areas of occupation and activity.

Conservation-An approach to archaeology based on a philosophy stressing the protection, preservation and/or managed use of the cultural resource base for future generations. Protection of representative sites and preservation of data through scientific study are major aspects of this approach. It differs from salvage archaeology which stressed the immediate recovery of material from threatened sites.

Cultural Resource Management-The development and maintenance of programs designed to protect, preserve and scientifically study and manage cultural resources (including evidences of prehistoric, protohistoric, historic, and recent remains) and the natural resources that figured significantly in cultural

systems. Developers of such programs may include governing bodies or agencies of government, academic and research institutions, and private corporations. The goal of such programs should be the conservation of cultural values and the maximum effective conservation and utilization of these resources for the public good.

Cultural Resources-Districts, sites, structures, and objects and evidence of some importance to a culture, a subculture, or a community for scientific, traditional, religious, and other reasons. These resources and relevant environmental data are important for describing and reconstructing past lifeways, for interpreting human behavior, and for predicting future courses of cultural development.

Culture History-The chronological and spatial framework for describing the development of human societies and cultures, and the documented processes of change involved in this development. Studies in culture history are primarily concerned with defining the geographic extent, relative age, and course of development of cultures.

Ethnographic Resources-All evidences of identifiable ethnic lifeways dating in historic or protohistoric periods which may be used for describing, reconstructing, and interpreting cultural systems. These include sites, artifacts, ethnographic records, documentary records, informants, environmental data, and all other relevant information. Ethnographic resources are cultural resources and may be considered archaeological resources when they provide needed information relative to the scientific study of archaeolgoical resources.

Feature-Any non-portable object, structure, or remnant of a structure that was culturally produced.

Literature Search-An examination and review of all written records (including published, unpublished, reproduced, and manuscript forms), books, articles, etc., pertinent to the investigations carried out for a cultural resource management study. Literature searches differ from record checks in that the latter usually are limited to formalized recorded information which are maintained as reference files.

Mitigation-The alleviation of adverse impact by avoidance through project redesign, by protection or by adequate scientific study of cultural resources.

Preservation-All realistic efforts to conserve and maintain the cultural resource base. This may include the protection of archaeological and historical remains and their preservation through stabilization, reconstruction and care of artifacts, and the establishment of federal, state, and municipal archaeological preserves. When such measures are not feasible, preservation of information, though a less desirable measure, should be accomplished through scientific excavation and study.

Research Design-A plan for conducting an archaeological investigation preparatory to undertaking a particular study. It includes a statement of the problem, basic assumptions, activities and techniques, including strategies and methods required for problem solution and hypothesis testing, and a specification of the relevant data and how they will be utilized for a full understanding of the resource. A research design is usually in sufficient detail to permit the evaluation of its methodological sophistication and feasibility.

Sensitivity-The potential of an area to contain cultural resource materials. Sensitivity evaluations are normally based on an evaluation of known sites and projected probable site areas for any given region.

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