Tahoe National Forest

Cultural Resources

Cultural Resources Overview

Part I: Prehistory

By
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and
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TAHOE NATIONAL FOREST
CULTURAL RESOURCES OVERVIEW

Introduction

National Forests are in the process of developing land and resource management plans which will provide for multiple use and sustained yield of goods and services from the National Forest System. The overall purpose of this planning effort is to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) and follow the procedures specified by the National Environmental Policy Act of 1969 (NEPA) to identify economic, social, and environmental impacts. Both RPA and NEPA recognize that cultural resources are an integral part of the National Forest environment and require that, as part of the planning process, a cultural resources overview be prepared.

The purposes of this overview are to:

1. Synthesize existing information and knowledge about the Forest's history, ethnography, and archaeology to identify gaps in knowledge and to direct the future course of cultural resource management on the Forest.

2. Analyze the current management situation. How, and with what degree of success, has the Tahoe National Forest complied with a variety of Federal, State, and local laws and National policies and procedures governing the management of cultural resources? What problems exist which hamper or impede sound management of cultural resources and integration of cultural resources into the overall Forest management program? What should be the future direction of cultural resource management within the Tahoe National Forest?

An extensive body of information has been compiled during 10 years of intensive cultural resource inventory and evaluation which exists in a plethora of documents, reports, and files. The Cultural Resources Overview provides an opportunity to bring these widely scattered bodies of information together into a coherent document for use by researchers in history, archaeology, and ethnography, and by Forest managers.

The Cultural Resources Overview is divided into four parts. Part IV was prepared by Jackson Research Projects of Davis, California and covers the period of time from 1840 to 1940. Parts I through III were prepared by the Forest Cultural Resources Staff.

Organizational Concepts and Theoretical Perspective

From the inception of the cultural resources management program within the Forest Service and through the early years, cultural resources were equated with archaeology, and archaeological sites were the primary focus of management. As the program has evolved, it has come to be recognized that cultural resources are more than just prehistoric sites. Cultural resources also include history (including historical sites and documents), Indian cultural activities (religious areas, traditional plant gathering areas, ceremonial locations, etc.), folklore, and historical architecture.

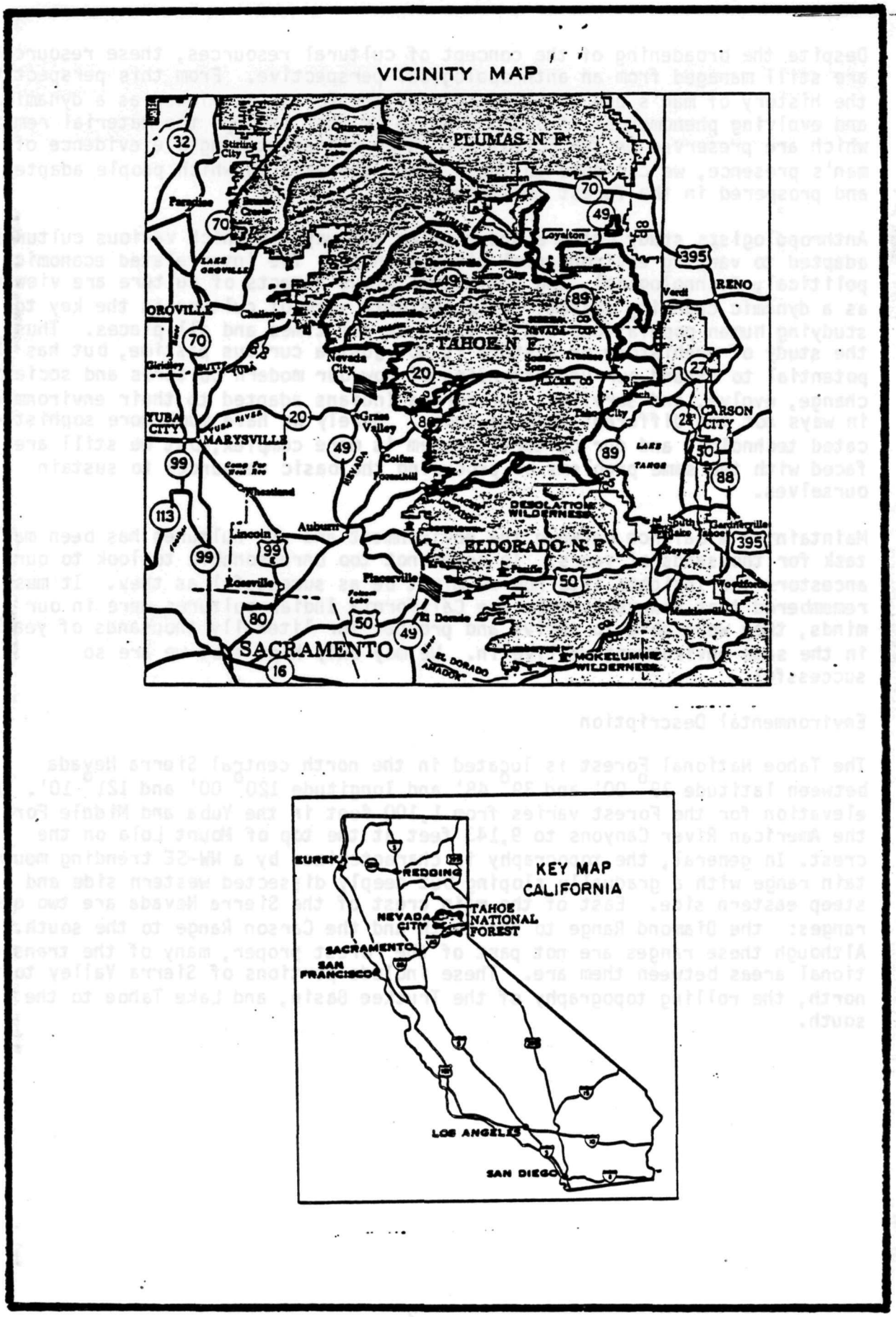
Despite the broadening of the concept of cultural resources, these resources are still managed from an anthropological perspective. From this perspective, the history of man's use and occupancy of the Forest is viewed as a dynamic and evolving phenomenon. A basic premise is that through the material remains which are preserved on the Forest and which represent tangible evidence of man's presence, we can come to learn about the ways in which people adapted and prospered in the forest environment.

Anthropologists study culture and examine the ways in which various cultures adapted to varying environmental circumstances. The interrelated economic, political, technological, and social/religious aspects of culture are viewed as a dynamic changing system. This systemic view of culture is the key to studying human populations and is valid at all times and all places. Thus, the study of prehistory or history is not just a curious pastime, but has the potential to expand our understanding of how our modern cultures and societies change, evolve, and survive. California Indians adapted to their environment in ways not too different than we today. Surely we have much more sophisticated technology and our cultural system is more complex, but we still are faced with the same problems of procuring the basic resources to sustain ourselves.

Maintaining a balance between the environment and our cultures has been man's task for thousands of years. It seems not too unreasonable to look to our ancestors for insights into how we might be as successful as they. It must be remembered that however simple the California Indian cultures were in our minds, they were able to thrive and prosper for literally thousands of years in the same environment we live in. We may only hope that we are so successful.

Environmental Description

The Tahoe National Forest is located in the north central Sierra Nevada between latitude 39° 00' and 39° 48' and longitude 120° 00' and 121° 10'. The elevation for the Forest varies from 1,100 feet in the Yuba and Middle Fork of the American River Canyons to 9,143 feet at the top of Mount Lola on the crest. In general, the topography is characterized by a NW-SE trending mountain range with a gradually sloping but deeply dissected western side and a steep eastern side. East of the main crest of the Sierra Nevada are two other ranges: the Diamond Range to the north and the Carson Range to the south. Although these ranges are not part of the Forest proper, many of the transitional areas between them are. These include portions of Sierra Valley to the north, the rolling topography of the Truckee Basin, and Lake Tahoe to the south.



MAP 1. Location Map of Tahoe N.F.

Hydrology and Climate

The major rivers on the west side from north to south are the North, Middle, and South Forks of the Yuba River, the Bear River, and the North and Middle Forks of the American River. On the eastside, the Truckee and Little Truckee Rivers drain Lake Tahoe and the Truckee Basin, while the Middle Fork of the Feather drains Sierra Valley. There are numerous other tributaries of the rivers on both sides of the crest, giving the area its deeply dissected character. Numerous natural meadows and lakes are present in the crest zone, while a number of reservoirs have been constructed in former valleys and meadows at all elevations.

The climate for the westside of the Sierra is usually warm and dry during the summers and quite wet during the winters. Precipitation varies from 40-60 inches in the foothills to a maximum of 80-90 inches along the crest, dropping to less than 20 inches in the Truckee Basin and Sierra Valley. In the higher elevations, most of this moisture comes in the form of snow. The amount of precipitation in any given year is quite variable. Snowfall at Donner Summit, for example, has varied from 13 feet (winter of 1880-1881) to 65 feet (winter of 1951-1952) (Storer and Usinger 1963: 14-17).

Vegetation Zones

Five major vegetation belts are found more or less paralleling the main crest of the Sierra within the Forest. They are the yellow pine, red fir, lodgepole pine, subalpine, and sagebrush belts (Munz and Keck 1968:11-16 and Storer and Usinger 1963:23-30).

Moving west to east, the first zone encountered is the yellow pine zone. This zone ranges from about 1,000 to 6,500 feet on the west side of the crest. Plants indicative of this zone are yellow pine (Pinus ponderosa), sugar pine (Pinus lambertina), incense cedar (Calocedrus decurrens), white fir (Abies concolor), Douglas fir (Pseudotsuga menziesii), black oak (Quercus kelloggii), currant (Ribes nevadense), gooseberry (Ribes roezlii), thimbleberry (Rubus paroiflorus), greenleaf manzanita (Arctostaphylos patula), and deerbrush (Ceanothus integerrimus). Munz describes a typical climate as one which has an "average precipitation of 25-80 inches, partly as snow; growing season 4 to 7 months, with 90-210 frost free days; mean summer maximum temperatures 80-93°, mean winter minimum 22-34° F" (Munz and Keck 1968:15).

The next zone, the red fir forest, starts at an elevation of 6500 and continues up to 8,000 feet. This zone is found on either side of the crest. Species of plants associated with this zone are red fir (Abies magnifica), lodgepole pine (Pinus contorta murrayana), western white pine (Pinus monticola), Jeffrey pine (Pinus jeffreyi), bush chinquapin (Castanopsis sempervirens), whitethorn (Ceanothus cordulatus), and quaking aspen (Populus tremuloides). Munz describes the typical climate as "average precipitation 35 to 65 inches with heavy winter snows; growing season 3 to 4.5 months; with 40 to 70 frost free days; mean summer maximum temperatures 73-85°, mean winter temperatures 16-26° F." (1968:15).

Occasionally, especially in the crest zone, lodgepole pine becomes the dominant species, often with mountain hemlock (Tsuga mertensiana) associated. In general, the elevation of this forest is higher than the red fir forest and the climate more extreme. In this case average precipitation is "about 30 to 60 inches, mostly as snow; growing season 9 to 14 weeks, with frost free days as many as 40; mean summer maximum temperatures 67-75° mean winter minima 10-18° F (Munz 1968:16)."

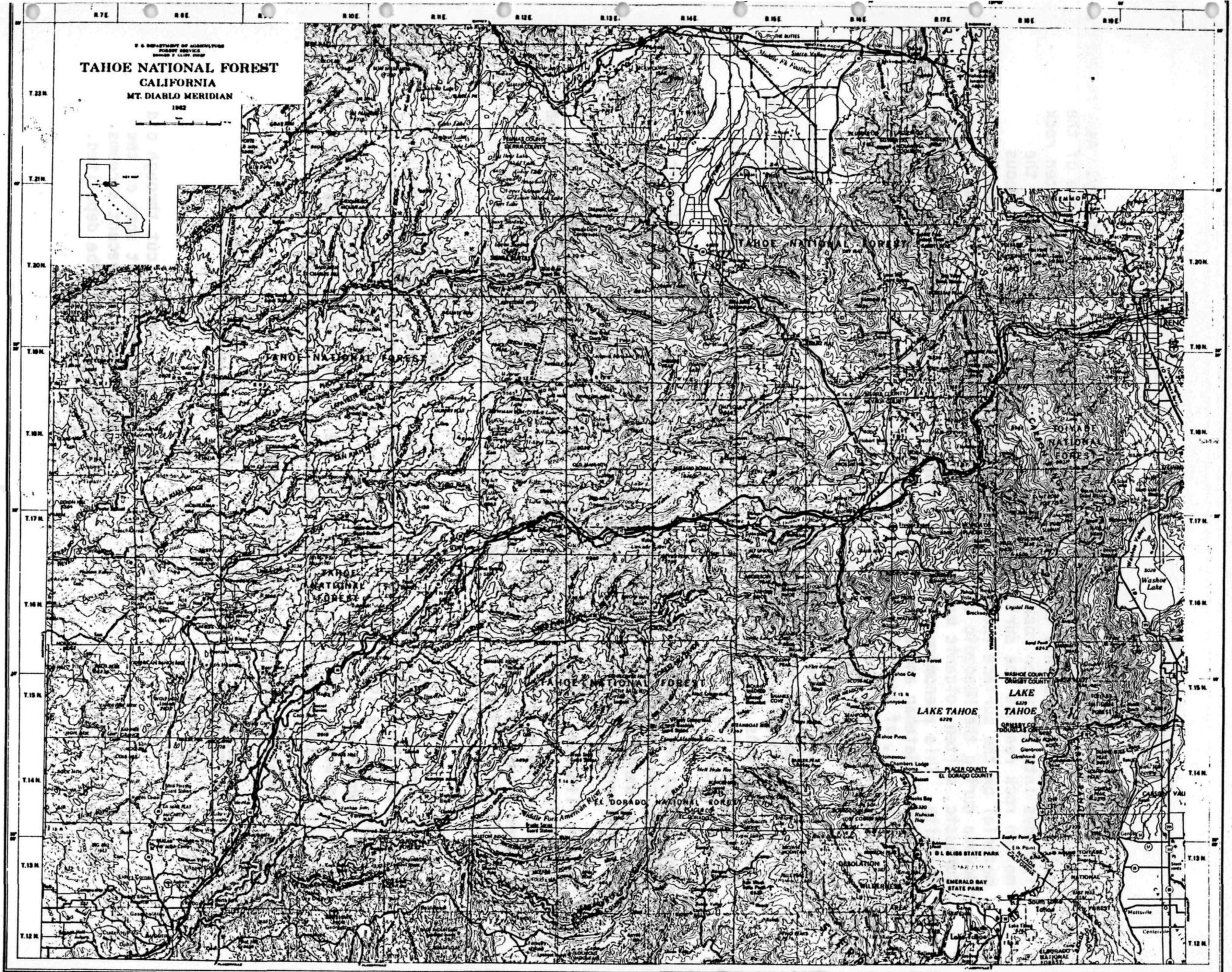
At the highest elevations on the Forest (7000+ feet), subalpine forests exist. Plant species characteristic of this zone include whitebark pine (Pinus albicaulis), lodgepole pine (Pinus contorta murrayana), mountain hemlock (Tsuga mertensiana), alpine willow (Salix petrophila), currants (Ribes cereum and montigenum), and white and mountain heather (Cassiope mertensiana and Phyllodoce breweri). Typical climate has "average precipitation about 30 to 50 inches, dropping as low as 15 inches on the east side of the crest, mostly as snow, with heavy snow cover in winter; growing season 7 to 9 weeks and killing frost possible in every month; mean summer maximum temperatures probably not over 65° F, winter minima unknown" (Munz 1968:16).

Descending eastward across the crest, the vegetation reverts to red fir forest with a high proportion of Jeffrey pine. Along the eastern base of the Sierra, the sagebrush scrub plant community is dominant. This plant community, which ranges in elevation from 4,000 to 7,500 feet, includes the following species: sagebrush (Artemisia tridentata, arbuscula, and cana), rabbit brush (Chrysothamnus nauseosus and viscidiflorus), salt bush (Artuiplex confirtifolia), and bitterbrush (Parshiu tridentata). Typical climate for this zone is described by Munz as follows: "Average precipitation 8 to 15 inches, mostly as winter snow; growing season 3.5 to 8 months with 70-130 frost free days; mean summer maximum temperatures 83-95°, mean winter minima 8-27° F."

Geology

The geology of the Sierra Nevada is important for understanding the cultural history of the Tahoe National Forest since many of the geological features of these mountains have played an important role in this history. Past geological events determined the location of economic minerals, primarily gold, which was important for early historic development, and basalt and other knappable stone which were important to prehistoric cultures. The recent topography of the region helped determine the boundaries of prehistoric people, determined emigrant routes to California, and the development of transportation, logging, and other historic economic activities.

Prior to the development of the current topography of the Sierra Nevada, another mountain range existed in this location. This mountain range was formed in early geological times by the scraping of sediment off the sea floor as the Pacific Plate subsided under the North American Plate. This process, which is still continuing, involves the Pacific Plate's slipping under the North American Plate and being melted in the magma of the earth's core (Alt and Hyadman 1975). The beginning dates of this activity are unknown, but the sedimentary rocks which compose parts of this older Sierra Nevada Mountain Range date to the Paleozoic and Mesozoic geologic eras (see Table 1).


U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
EDWARD P. CLIFF, CHIEF

TAHOE NATIONAL FOREST
CALIFORNIA
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1962

A typical geological feature of a subsidence zone is volcanic activity. As the subsiding plate is remelted deep beneath the earth's surface, some of the molten rock intrudes into the upper layers of the crust. As this molten rock intrudes into the upper rock layers, it may distort or melt them. If the molten rock reaches the surface, it forms volcanos, which extrude igneous material on the surface (Leven 1981). This apparently happened in the Sierra Nevada during the Mesozoic era. Beginning in the late Triassic or early Jurassic, molten volcanic material was intruded into the existing sedimentary deposits. This phenomenon continued through the Jurassic period and into the Cretaceous (Bateman and Wahrhaftig 1966:116-125). This intrusion, or series of intrusions, of granitic rocks formed the Sierra Nevada Batholith. During the time of this intrusion, fractures in the previously existing rock were filled with quartz and gold (Jenkins 1948: 21-20).

The final stage of the Cretaceous was a period of erosion in which up to two miles of sediment were removed from the Sierra Nevada and deposited primarily in the Great Valley. By the end of this period, portions of the Batholith and the quartz veins were exposed. This erosion continued into the next era, the Cenozoic. By Eocene times, numerous rivers had redeposited the quartz and gold into their gravel beds (Jenkins 1948: 21-30).

These quiet erosional times ended in the Oligocene when renewed volcanic activity covered the Eocene landscape. This period, and the following Miocene, were periods of building topography in the Sierra Nevada, and new river channels were formed (Bateman and Wahrhaftig 1966: 136-145).

In the Pliocene, following the Oligocene, the volcanic activity continued. The entire Sierra Nevada began to tilt as a unit to the west, which forms the basis for the existing topography. Also during this time, large blocks dropped along the eastern crest to form Sierra Valley and Lake Tahoe (Bateman and Wahrhaftig 1966: 145-149). New drainage patterns were established as a result of this tilting.

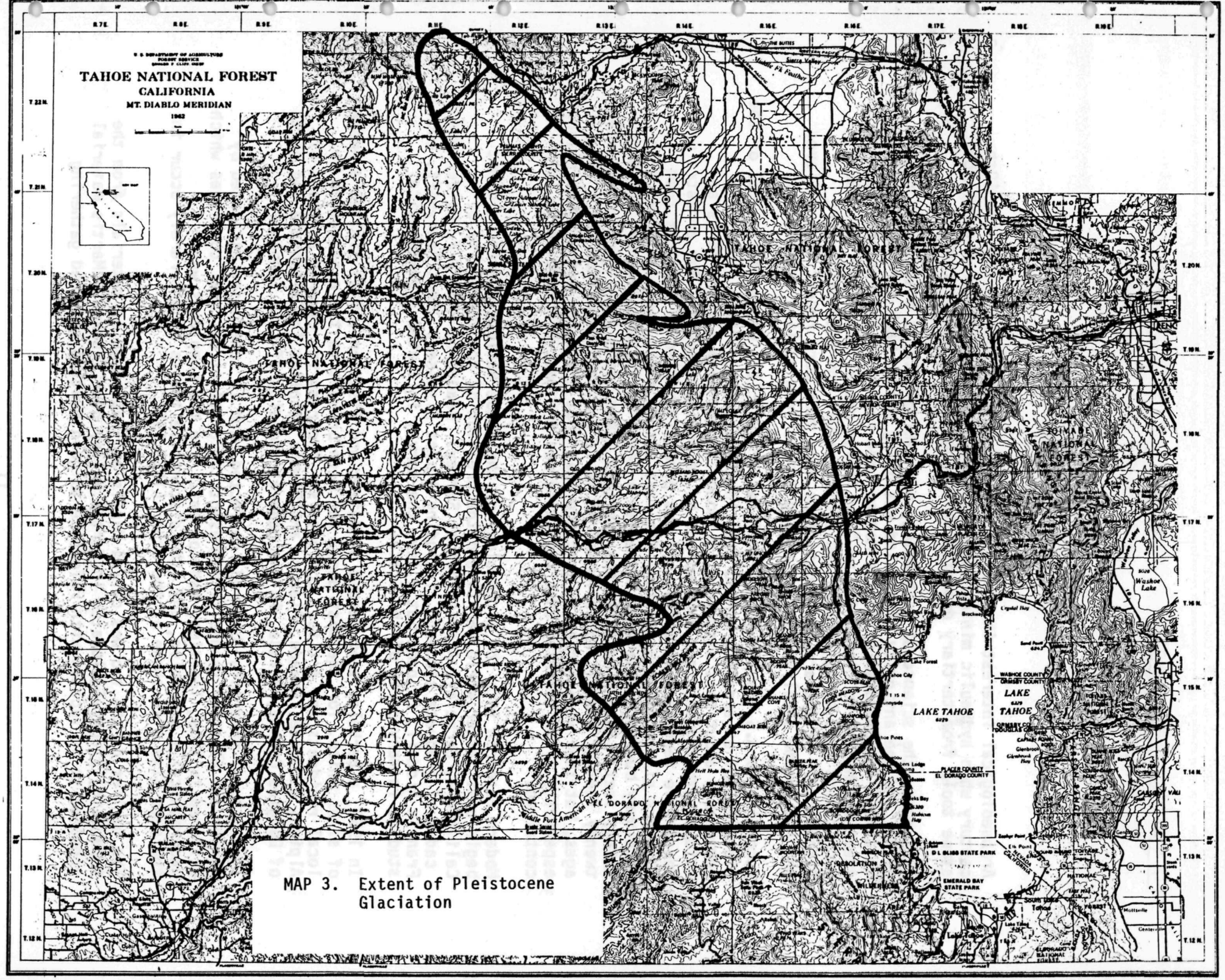
During the next geologic time period, the Pleistocene, the new river channels deeply dissected the western slope of the Sierra Nevada. These streams cut through the old tertiary streams and redeposited the gold and quartz in their own beds (Jenkins 1948: 20-31). Volcanic activity continued to extrude basalt, which was later used by prehistoric people for stone tools. Glacial activities sculptured the crest region of the Sierra through at least four glaciations, the last ending between 12,000 and 8,000 years ago (Levin 1981).

Table 1: Geologic Events in the Sierra Nevada

Era	Period	Epoch	Events in the Sierra Nevada
Cenozoic	Quartenary	Recent	
		Pleistocene	New stream channels cut through old gravels and redeposit some of the gold and quartz in recent streams. Basalt continues to be deposited. (2.5 million)

Era	Period	Epoch	Events in the Sierra Nevada
	Tertiary	Pliocene	At the end of this period, new volcanic activity fills the intervolcanic streams. The entire Sierra tilts upward from the east, increasing and changing stream runoff. The Sierra Valley and Lake Tahoe are formed. Basalt continues to be deposited. (7 million)
		Miocene	Volcanic activity continues. Gold is redeposited in intervolcanic streams. Basalt continues to be deposited. (26 million)
		Oligocene	Volcanic activity caps the Eocene topography. Intervolcanic streams form. Topography of Sierra increases. Basalt is deposited. (40 million)
		Eocene	Continued erosion of quartz and gold veins into tertiary stream gravels. Ione formation deposited. Great Valley occasionally inundated, (55 million)
		Palaeocene	(65 million)
Mesozoic	Cretaceous		Erosion of gold and quartz veins into tertiary stream gravels. Erosional period which removed up to two miles of sediments from the Sierra Nevada, exposing gold and quartz veins. Prior to this, last of the Batholith is deposited. (135 million)
	Jurassic		Volcanic activity and the deposition of the Batholith causes cracks and faults in the older sediments. Quartz and gold are deposited in the cracks. (190 million)
	Triassic		Deposition of the Granite Batholith begins. (225 million)

Era	Period	Epoch	Events in the Sierra Nevada
Palaeozoic			During this time, the sediments which will become the Sierra Nevada are deposited in the Pacific Ocean. As the Pacific Plate is subsumed under the North American Plate, these sediments are scraped off and form the ancestral Sierra Nevada. (600 million)



MAP 3. Extent of Pleistocene Glaciation

PREHISTORY

By Richard Markley

Archaeological interest in the Sierra Nevada first began in the late 19th century when hydraulic mining operations occasionally unearthed prehistoric stone tools from tertiary deposits which suggested great antiquity.

In Europe, the science of archaeology was taking hold as a scholarly discipline, and the antiquity of mankind was being pushed back farther and farther in time. The discoveries in the Mother Lode region of ancient artifacts at great depths led to claims for an "auriferous gravel man." By the 1890's, such claims were being scrutinized (Holmes 1901) and eventually were discounted. It appears that most finds were much more recent than believed and had become deeply buried by mining debris from earlier operations.

According to A.S. Taylor (cited in Elsasser 1960:11), who wrote in 1862 of the discovery of an arrastra buried deep in the gravels, "there is nothing remarkable about this discovery, although it has been alluded to as an evidence that gold mines were worked by an ancient people. The arrastra was found five feet deep in a flat and was probably buried by tailings from adjacent placer diggings, within the last six or eight years. I have seen machinery buried by the same cause, to a depth of fifteen, twenty, and even thirty feet. Some miners, on the American River, once found a penknife under twenty feet of gravel, which looked as if it had been deposited there for ages, but they were forced to conclude that that claim had been worked before, especially after learning that the knife was the most precious thing it contained."

Modern research into the archaeology of the Tahoe National Forest did not begin until after World War II and the creation of the University of California, Berkeley, Archaeological Survey. Headed by Robert F. Heizer and a cadre of graduate students, including Albert Elsasser, James Bennyhoff, and Francis Riddell, to name but a few, the survey initiated archaeological studies in many parts of the State.

In 1952, a Berkeley team headed by Heizer and Elsasser (1953) visited a number of sites which, for the most part, had been brought to their attention by local residents and artifact collectors. Their survey covered portions of Alpine, Eldorado, Nevada, Placer, and Plumas Counties in California and parts of Douglas County, Nevada, in the general vicinity of Lake Tahoe.

The cultural materials observed, collected, and in some cases excavated by Heizer and Elsasser seemed to represent two distinct cultural complexes which differed in time, location, and content. The two complexes were geographically exclusive, and "the distinctive traits of one rarely occur in the same site with those of the other (1953:19)."

The earlier of the two was called Martis and was based on materials from the type site, Placer-5, located in Martis Valley near Truckee. Martis material appeared to be located with reference to good hunting and seed gathering

areas. Artifacts associated with the later, Kings Beach, complex were most often found in good fishing locations. Site Placer - 9 on the shore of Lake Tahoe was the type site for the Kings Beach Complex.

Heizer and Elsasser (1953:19) recognized that the distinctions they made between the two complexes may have been more apparent than real and that as more sites were studied they may be proved wrong. As will be seen later, most of what Heizer and Elsasser had to say has held up after 30 years of scrutiny by archaeologists.

As was typical of the time, Heizer and Elsasser (1953) developed a list of traits which characterized the Kings Beach and Martis complexes. They are as follows:

Martis

-- Basalt preferred as a raw material for flaked stone tools
-- Obsidian and chert rare
-- Projectile points fairly large and heavy, roughly chipped and variable in form
-- Mano and metate used for seed grinding
-- Cylindrical pestles and possibly bowl mortars
-- Boatstones
-- Economic emphasis on hunting and seed using
-- Basalt flake scrapers with pressure retouch edges abundant
-- Expanded base finger-held drills or punches common

Kings Beach

-- Obsidian and siliceous flint for projectile points
-- Basalt very rarely used for chipped implements
-- Bedrock mortars
-- Small, light, side-notched projectile points
-- Economic emphasis on fishing and seed using
-- Probably represent late prehistoric Washo
-- Bow and arrow
-- Scrapers rare, drills absent

Regarding the Martis Complex, it was suggested that it may have been related to a wider group of cultures that used basalt for flaked tools, such as the Granite Point culture of the lower Humboldt Valley, the Fallon culture of the Carson Sink, the Mojave and Pinto cultures of the Southern California desert, and the Early Horizon culture of the Central Valley, and which flourished between 10,000 B.C. and A.D. 1 (Heizer and Elasser 1953:21). The apparent emphasis on non-obsidian materials suggested the existence of small, separate groups who had little contact with each other. Obsidian was used only by those who lived in the vicinity of the sources or by their immediate neighbors (Heizer and Elsasser 1953:21).

Based on admittedly slender evidence, Heizer and Elsasser suggested that the Martis Complex flourished some time in the first two millenia B.C., while Kings Beach could be pushed back no further than A.D. 1000.

Heizer and Elsasser concluded that both Martis and Kings Beach represented seasonal use of this high elevation area with the population moving to lower elevations in the fall. Artifacts from Placer-5 suggested that specialized activity sites were established in the Sierra. The abundance of projectile points (806), flakes, and broken and complete basalt bifaces led Heizer and Elsasser to suggest that it was a specialized point manufacturing site, the products of which were transported to the lower elevations in the fall (1953:12).

Archaeological investigations within the Tahoe National Forest continued during the 1950's. Both Ratchet Cave and Loyalton Rock Shelter were excavated during this time as was Sierra (Sie)-20, Nevada (Nev)-15, and a large site (SP-6) in Martis Valley.

Rachet Cave was excavated in 1957-58 by Brigham Arnold and Norm Wilson. Approximately 70 percent of the deposit was excavated with little return for the effort despite such indicators of promise as fire blackened roof and numerous flakes in the midden and on the surface (Wilson and Wilson 1966). The results of the excavation were never published.

Loyalton Rock Shelter was excavated in 1958 and 1959 by Norm Wilson and written up as an unpublished Master's Thesis at Sacramento State College (1963).

This large rock shelter situated high above Sierra Valley yielded a varied and interesting artifact assemblage. Fire hearths and cache pits were encountered frequently in the midden deposit. The remnants of two stone walls were identified which apparently served to partially enclose the shelter. The cache pits contained a number of artifacts (bone pins, pipe bowl, charmstone, etc.) which suggested the occurrence of ritual activity related to hunting.

Of particular interest were numerous skulls of bighorn sheep found in several of the cache pits. Bighorn sheep were not known to extend into this area of the Northern Sierra in historic times. Thus, the evidence from Loyolton Rock Shelter suggests a much larger range for these animals in prehistoric times.

The site contained numerous bone artifacts and bone refuse. Since most Martis period sites are open sites where bone preservation is poor, the assemblage represents one of the few opportunities to study a broader range of Martis material culture. The collection from Loyalton Rock Shelter has the potential to yield further information if restudied using modern analytical techniques and in reference to current hypotheses regarding northern Sierra prehistory.

Wilson and Wilson (1966) also reported that a large site was excavated in Martis Valley by Brigham Arnold in 1957-58. This site, designated SP-6 (Sacramento State College - Placer County #6), was apparently quite complex with an extensive midden which ranged from 2 to 3 feet in depth, housepits, and bedrock mortars. This work was not published, but Arnold apparently prepared a brief report.

Sites Sie-20 and Nev-15 were both excavated by U.C. Berkeley field schools in the 1950's. Neither investigation was published but Elsasser (1960) reported on both in his paper on "The Archaeology of the Sierra Nevada in California and Nevada."

Sie-20 was excavated in 1958 by Alex Krieger, then of the Riverside Municipal Museum. The site is located east of the Sierra Crest (Map 4) in Sardine Valley. It is quite extensive (lithic material may be found scattered over a one-half square mile area); however, excavation focused on a low knoll where the surface concentration was greatest (Elsasser 1960:61).

Four 10-foot square units were excavated. As the work was exploratory, no site map was made and only minimal records were kept.

The midden extended to a depth of 12 inches, but dark soil mixed with rocks continued to 18 inches, at which point excavation ceased. Elsasser (1960) noted that the site area had been heavily disturbed by historic users and no stratigraphy was observed. He was able to classify all but one of the 147 projectile points from the site using the scheme developed for Pla-5, the Martis type-site.

A large part of Elsasser's 1960 paper was devoted to a discussion of the results of the excavation of Nev-15. This site is located in the western foothills of the Sierra near the town of North San Juan. It was excavated by a U.C. Berkeley field school under the direction of Robert Heizer in 1954.

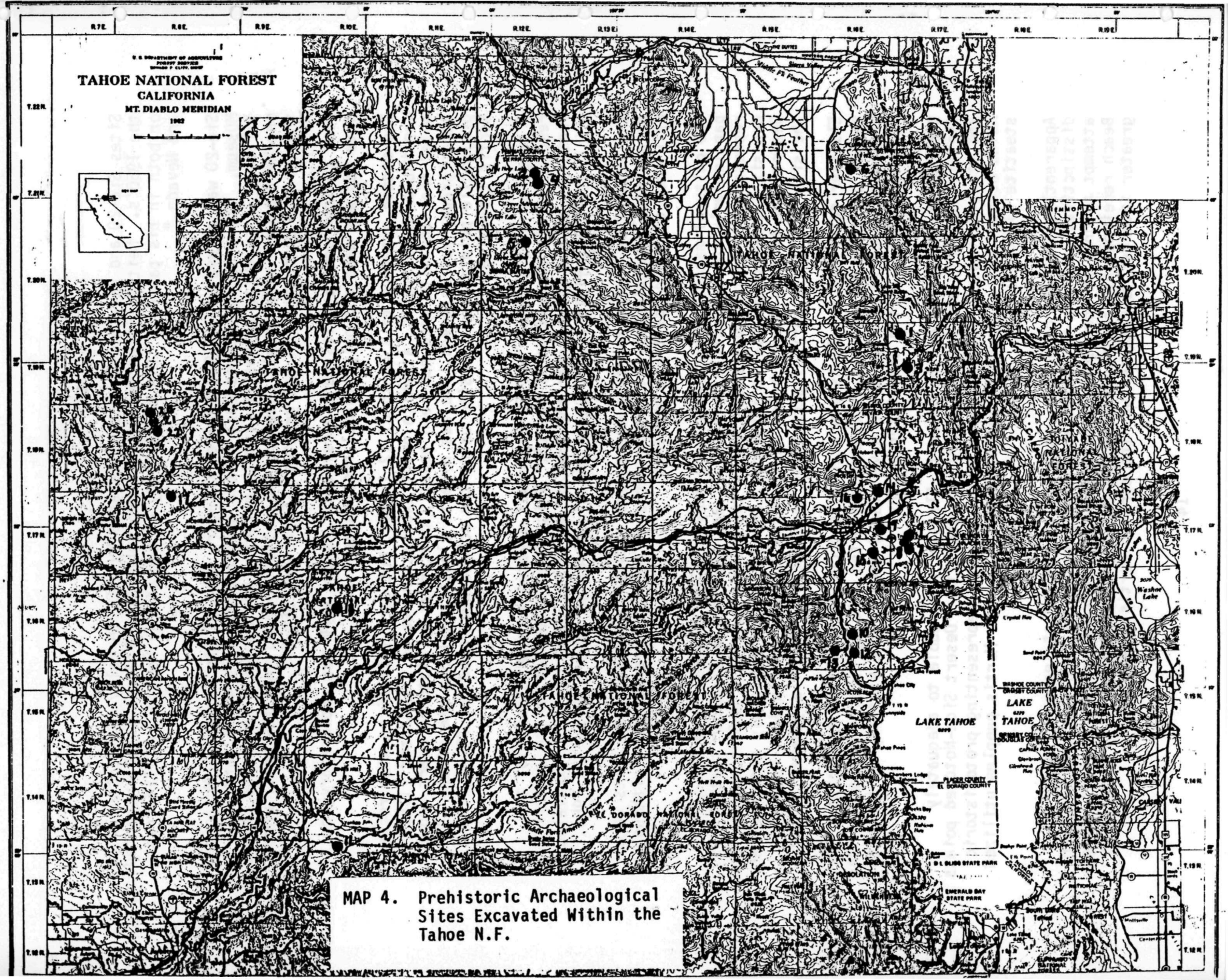
The excavation lasted for five weeks, and a total of 75 5x5 foot units were excavated. Approximately 140 cubic yards of deposit were removed, although only some of the deposit was screened.

The cultural materials recovered were very similar to those from Pla-5, particularly the projectile points. It was apparent to Elsasser that Nev-15 represented a western manifestation of the Martis Complex. Unfortunately, the deposit lacked observable stratigraphy, and mixing had obviously occurred (eg. Desert Side-Notched points below Martis types); thus, conclusions regarding the site and its history of occupation were necessarily of a general nature.

Elsasser described Nev-15 as a winter site occupied from fall to spring. The number of projectile points recovered suggested a heavy hunting emphasis. The transhumance cycle of deer would have placed them in the vicinity of the site in great numbers during the winter months.

Because of the mixing of the deposit, Elsasser was unable to adequately isolate the early and late components in the site. Desert Side-Notched points and steatite vessel fragments were interpreted as representing protohistoric Maidu occupation, although it was not certain whether Martis peoples utilized steatite (1960:43).

Apparently, the late component was quite sparse, or at least not very distinctive, as there is little attention given to it. Neither did Elsasser attempt to draw any comparisons with the Kings Beach Complex. In fact, Kings Beach received only passing mention in Elsasser's 1960 paper. Of apparently greater interest to Elsasser was the earlier Martis Complex.



MAP 4. Prehistoric Archaeological Sites Excavated Within the Tahoe N.F.

Referring to Martis, Elsasser (1960:67) suggested that the "concept of an extremely high altitude culture complex should be altered in favor of one referring to what may be called a mid-altitude optimum, which varies from 2,500-6,000 feet, and depends upon which side of the range is under consideration." Similarities among artifact styles from the eastern and western flanks of the Sierra were viewed by Elsasser as suggesting the existence of regular trans-Sierran trail routes during the Martis times. He felt that the likely routes may have followed the north, middle, and south forks of the Feather River, and the Middle Yuba River. He also suggested that the eastern groups would have followed antelope into the higher elevation areas while the western groups would have pursued deer in the same manner.

Elsasser (1960:72) offered three possibilities to explain the areal distribution of the Martis Complex.

1. It was a higher altitude or summer manifestation of a culture which was centered farther out in the Great Basin to the east; this perhaps had ultimate roots in the Southern California deserts.
2. The same as above, except that the center or point of origin was in central California, during Middle Horizon times.
3. It was an essentially autochthonous culture, i.e., one which developed in the Sierra Nevada without strong reference to cultures on either side of the Sierra.

In support of the first possibility was the great number of Martis sites on the eastern side of the Sierra and the presence of Pinto type points, which have a wide distribution in the Great Basin. Elsasser (1960:72) also saw Martis and the early culture identified by Bennyhoff (1956) in Yosemite Valley as having derived from the same tradition. Evidence of Martis west of the Sierran Crest was in part a result of groups following large game animals over the crest.

Elsasser felt that "....the second possibility (above) forces us to confront the evidence of the strong resemblance of Martis Complex points with those recovered from the middle archaeological horizon of central California. Furthermore, investigation to date of the foothills on the western side of the Sierra has not been carried on so intensively with regard to the Martis problem as on the eastern side of the range. Thus it remains possible that the known high or mid-altitude Martis sites represent a summer occupation of a basically central California culture."

In support of the third possibility was the fact that, while California and Great Basin influences were apparent, Martis artifacts, particularly projectile points, constituted reasonably distinct assemblages. Elsasser was unable to resolve the problem with the data then available, but felt that with additional excavation, especially of sites located on the western flank of the Sierra, the nature of Martis would be more clearly defined.

Elsasser (1960:74) saw Martis as representing the earliest occupation of the Sierra and placed its beginning at about 2500 years BP, thriving in the Northern Sierra until about 500 or 600 A.D. The apparent uncertainty of the

initial dating of the Martis Complex is underscored by the fact that Elsasser (1960:74) refers elsewhere in the same paper to Martis beginning ca 1500 B.C. or 3500 years B.P.

Of perhaps greater significance was the identification of a gap of about 500 years before the appearance of late prehistoric evidence (i.e., Desert Side-Notched points).

Elsasser offered no particular explanation for the gap other than suggesting that the presence of Desert Side-Notched points and steatite objects in association with Martis artifacts at Nev-15 may indicate a survival of Martis into a later time period than the bulk of evidence would suggest.

Elsasser's work has formed the basis for virtually all that has followed in the past 20 years. The implications of his contribution for future archaeological research will be further considered in a later section of this paper.

Archaeological work within the Tahoe National Forest intensified during the 1960's, in part due to the passage of the Reservoir Salvage Act of 1960 which required archaeological studies as part of reservoir construction projects. French Meadows, Bullards Bar, Stampede, Martis Creek, and Auburn reservoirs all received some degree of survey and/or excavation.

Work at French Meadows began in 1964 with a brief survey of the area by William Beeson of Sacramento State College (Rackerby 1965). The survey focused on the river banks, not up the sides of the valley, however, and no sites were recorded.

By the time a team from San Francisco State College, led by Frank Rackerby (1965), commenced surveying the reservoir area in July 1964, many sites had been destroyed by construction activities which were already in full swing. Rackerby recorded 25 prehistoric sites in and about the project area, including large sites at Greek Store, Big Oak Flat, and Little Oak Flat.

One site, the Craig Site, located far downstream from the above mentioned sites near Auburn, was excavated. The artifact assemblage suggested a Martis Complex affiliation, however slate was the preferred material for chipped implements rather than basalt. A formal report was never published, and it is not certain whether an unpublished manuscript exists.

An intensive survey of the proposed Martis Creek Reservoir was conducted by Norm and Jeffrey Wilson (1966) in the summer of 1965. A total of 28 separate occupation areas within the reservoir was identified and the investigators suggested that there were at least twice that many more in the Martis Creek drainage (1966:5-6).

The data gathered during the survey pointed to seasonal use of the area over a long period of time. The authors suggested that one of the largest sites, SP-6, excavated in 1957-58 by Arnold, may have been occupied year-round.

The sites appeared to be located with reference to good gathering areas and served as base camps for hunters who would go out from there in pursuit of game (Wilson and Wilson 1966:7).

Both California and Great Basin influences were recognized by the Wilsons among the artifacts found. The authors suggested, based upon ethnographic data and newspaper accounts from the 1870's, that the Maidu, Washoe, and Paiute may have used the area at various times in the pre-contact period (1966:8).

In the late 1960's, archaeological work began within the area of the proposed Stampede Reservoir, located east of the Sierran Crest between Truckee and Sierraville.

In 1969, Louis Payen and William Olson reported on the work which included excavation of several sites and investigation of a rather unique stone structure.

A variety of sites had been recorded in the valley which ranged from bedrock mortars and petroglyphs to substantial occupation sites. Site's Sie-28 and Sie-S44 were selected for intensive work. Further investigation of three other sites (Sie-21, -S45, and -S46) was ruled out because surface collections and test excavations had indicated the presence of several badly mixed components.

Site Sie-S44 originally appeared to represent a "pure" Martis site and therefore receive the most attention. Thirty 2x2-meter units were excavated which averaged 15 to 30 cm. in depth. The site proved to contain evidence of later period use, though earlier materials dominated the collection. Milling tools were frequent (38 manos and 110 metates), as were projectile points and a variety of chipped stone tools.

Excavation was also performed at Sie-S28. Unfortunately, the results provided little to explain this enigmatic circular stone structure. Following a survey of the available literature, the authors concluded that the structure may have served as an antelope corral or impound.

Payen and Olson found the projectile points from the sites to be similar to those from Sie-20 in nearby Sardine Valley (excavated by Kreiger) and to those from SP-6 and Pla-5 in Martis Valley. Fewer similarities were noted with the Nev-15 points and they suggested that Nev-15 was more like foothill assemblages (those from Oroville, Bullards Bar, and Auburn Reservoir) than the higher Sierran assemblages then known.

Concerning the Martis Complex, they proposed that it was but one expression of what they preferred to call the Sierra Basalt Tradition (1969:69), the latter being characterized by stemmed and side-notched points, mano and metate (shaped manos rare), cobble pestles, shallow slab mortars, flaked cobble core tools, and flake scrapers. Boatstones, atlatl engaging spurs, lemon-shaped charmstones, and polished stone objects were viewed as suggesting relationships with adjacent areas, or a reflection of the much wider use of these objects in the west (1969:69).

The presumably ancient Martis Complex could not be separated into distinct phases with the data at hand, and the authors felt that the Martis Complex was simply a collection of basalt points of uncertain antiquity found within the same geographical area. They expressed concern (1969:70) that the present two-fold scheme (i.e., Martis and Kings Beach) seemed to be lumping and compressing the early materials into one entity - Martis.

Payen and Olson (1969:71) disagreed with the existing view that there was a shift towards increased use of plant and fish resources during Kings Beach times. "If anything, we see indications at Stampede that a rather full utilization of the area's resources took place at an early date. Problems of survival imposed by the Sierran environment seemed to have been solved in ways quite similar, if not identical, to those observed for the Washo in historic times."

Bullards Bar Reservoir, located in the western Sierra foothills, had been built in the 1920's, long before the advent of archaeological salvage work, but when it was proposed to construct a new, larger reservoir in the mid-1960's, archaeological studies were initiated.

Francis Riddell and William Olson (1966) conducted a survey of the Garden Valley area which was soon to be inundated. This effort resulted in the discovery of 12 prehistoric sites.

In October 1966, Stephen Humphreys began excavations at three of the sites recorded by Riddell and Olson. Based on this work, Humphreys developed a three phase chronology for the Bullards Bar locality.

Humphreys offered the following tentative dates for the three periods based on obsidian hydration readings:

Bullards Bar I	:	500 B.C. - A.D. 1
Bullards Bar II	:	A.D. 1 - A.D. 1000
Bullards Bar III	:	A.D. 1000 - A.D. 1500

The two latest periods were represented at Yub-24, which was the largest of the three sites investigated. Surface features included a large number of bedrock mortars (136) and a pitted boulder. The midden averaged 40 cm in depth and yielded examples of 8 of the 12 projectile point types identified in the locality.

The artifact inventory also included drills, gravers, scrapers, knives, cores and core tools, bowl mortar, pestles, and various ground and polished items. Fragments of steatite vessels were abundant, and Humphreys (1969:28) theorized that vessel manufacture occurred at the site. Yub-19 was represented by bedrock mortars and a midden deposit which ranged from 40-100 cm. in depth. Projectile points indicative of Bullards Bar II and III were relatively rare while those associated with Bullards Bar I were most common. Points of the latter period (particularly Type 7) were observed by Humphreys (1969:45) to be similar to Martis specimens from Nev-15.

The early materials at the site included manos and metates which were concentrated in the 40 to 70 cm. levels, as were most of the 13 features encountered. As at Yub-24, obsidian occurred only in low frequency.

Yub-18 was a small site which yielded only 65 artifacts. It was more similar to Yub-19 than to Yub-24 and lacked a number of artifact types characteristic of Bullards Bar III.

Three additional sites (Yub-S27, -S28 and -S29) were surface collected during the project. They yielded a small array of chipped and ground stone tools but did not contribute much to the overall interpretation of the archaeology of the locality.

Humphreys' report emphasized chronology and sought to compare projectile point types with dates obtained through obsidian hydration analysis of selected artifacts.

Obsidian hydration was a new technique, however, and at the time nothing was known about the rate of rim formation in the Sierra Nevada; thus, Humphreys viewed the dates derived from the method with skepticism.

For example, using the obsidian method, dates of 3918 ± 219, 5275 ± 200, and 3041 ± 170 years B.P. were obtained. Yet the beginning date for the earliest period, Bullards Bar I, was set at 500 B.C. There is some confusion as to this date as elsewhere in the report Humphreys indicated Bullards Bar II began at 500 B.C. (1969:89) and refers to a 4,500-year time span for occupation in the area (1969:40). The relatively young date for the beginning of Bullards Bar I was probably selected in order to be more in keeping with the Oroville Locality sequence (cf. Olson and Riddell 1963 and Ritter 1968, 1970) which had many similarities in the artifact assemblage. The beginning of the Oroville sequence had been defined as A.D. 1, even though there were radiocarbon dates from site But-157 suggesting occupation by about 1000 B.C. (Olsen personal communication).

A stemmed, indented base projectile point which would be classified as "Pinto" from Bullards Bar had a rim measurement which equated to 3638 ± 200 B.P. and which falls nicely into the recognized time span for that type.

Humphreys' (1969:87) suggested that the earliest dates may indicate "earlier use" of the area or represent reuse of older artifacts found elsewhere and transported to the site. The relative dates obtained via obsidian hydration were "well supported by the stratigraphic layering of the dates from early to late" (Humphreys 1969:90).

Ignoring the apparent confusion regarding the beginning date for Bullards Bar I, Humphreys recognized similarities with Martis materials from adjacent Sierran areas. He also suggested (1969:91) that cultural influences came from the east and southeast with primarily a northerly flow of influence. A north-south trade system appeared most likely. Central Valley influence was not ruled out but was seen as affecting the later periods more so than the earlier one.

The question of whether Auburn Reservoir will ever be built is still up in the air today, but in 1966 when archaeological studies of the proposed reservoir area began few could have predicted that it would be at least 16 years before construction was completed.

As originally planned, the archaeological work was to be accomplished in three phases beginning with surveys in 1966-67 and with final salvage work completed by 1969 (True, n.d:2).

Most of the survey work for Auburn Reservoir, and the smaller Sugarpine Reservoir located in Shirttail Canyon northeast of Foresthill, was accomplished in 1966-67 (True, n.d. and Childress and Ritter 1967).

Jeffrey Childress and Eric Ritter (1967), both graduate students at U.C. Davis, directed the fieldwork which resulted in the recording of 89 prehistoric and 45 historic sites. Test excavations were initiated at several sites while the survey work progressed (True n.d.).

In 1968, test excavations were conducted at Eld-90 and Eld-93 near Cool and at Pla-101 in Spring Garden Ravine (Ritter 1971:294). Ritter also reported that two historic structures were excavated during the 1969 season.

Apparently no further archaeological work was conducted until 1975 when a resurvey of the Auburn and Sugarpine Reservoirs was requested by the Bureau of Reclamation (True n.d:4).

This work, also conducted by U.C. Davis, was accomplished over a four year period ending in 1979. In the end, 1,589 historic and 117 prehistoric sites had been inventoried. The final evaluation and mitigation work on these sites has not yet been completed.

By far, the most extensively reported site is Pla-101 (Ritter 1971 and Ritter and Matson 1972a). It is located in Spring Garden Ravine near the town of Foresthill. The excavation occurred during the summers of 1967 and 1968 and resulted in sixteen 2x2 meter units being excavated.

The investigation was directed towards achieving several goals (Ritter 1971). The first was to reconstruct the cultural history of the site and attempt a reformulation of the framework for northern Sierra prehistory developed by Heizer and Elsasser. The second was to reconstruct past lifeways in evidence at the site and compare them with the ethnographic pattern. The third objective was to study the relative stability and/or change evidenced by the archaeological record. Underlying each goal was an interest in the ecological adaptations of the prehistoric populations which could be studied through the identification of economic activities and the analysis of the artifactual and paleoenvironmental components of the system. The earliest occupation of Pla-101 was some time prior to 3350 B.P., and remained sporadic until around 1000 B.P. when there is evidence, in the form of a dense concentration of artifacts in 10 of 16 units at a depth of between 30 and 50 cm., of more intense occupation. This dense occupation layer was associated with C14 dates of around 900-1000 years B.P.

Ritter (1971:303) observed that the artifacts from this living surface corresponded closely with those from the level of most intense occupation at Nev-15, which had a C14 date of about 600 B.P.

The cultural materials in both instances were typical of the Martis Complex, and this prompted Ritter to suggest that Martis extended in time to at least A.D. 1340 and possibly A.D. 1500 (1971:303). Because of this expanded time period for Martis, Ritter proposed that the term "Martis Complex" be changed to "Martis Tradition." The Martis Tradition, according to Ritter, was followed by a shorter Kings Beach period in the higher Sierra and by a poorly known Nisenan or Northern Maidu analog in the western Sierra.

A major economic shift appears to have occurred about A.D. 1000-1350 as evidenced by the replacement of the mano and metate by the mortar and pestle. Ritter suggests that this change marks the presence of a new group entering the area that used Desert Side-Notched points and used Pla-101 as a hunting camp. He also suggested that a change in the climate may have occurred at this time, but the data in support of such a claim are not substantial (cf. Ritter and Matson 1972a).

Ritter drew upon a variety of models of hunter-gatherer social and political organization and economics to characterize the occupation of Pla-101 and the Martis area in general. For example, he suggested (1971:532) that a band level sociopolitical organization existed during Martis times which included regional and local bands. Regional Martis bands had a territorial focus, while local bands had a kinship focus. According to Ritter, specific projectile points might be attributable to specific regional bands, and certain forms may indicate a patrilocal residence pattern, but group flexibility, diffusion, and regional band contact tend to obscure such patterns (1971:532).

Ritter concluded that Martis groups were more fluid and flexible than later Nisenan groups and that the area of greatest occupation was the ecotone between the pine forest and oak-chapparal zone, whereas in later times occupation was most intense in the lower, acorn-rich foothills. The reason for the change may have been climate, but may just as well have been due to a change in adaptive response where acorns became the plant food mainstay.

Regarding the origin of the Martis Complex/Tradition, Ritter (1971:530) saw the evidence at Pla-101 as supporting Baumhoff and Olmsted's (1963) theory of a Penutian intrusion around 2000 B.C. which pushed the earlier Hokan population into fringe positions. However, he went on to state "If the Washo represent the late Kings Beach intrusion, then Baumhoff and Olmsted's theory does not hold for this region. Most likely, Kings Beach represents cultural elements diffused into the area from elsewhere at a later time. Apparently, Martis people entered and developed a cultural response to the local environment when the Penutians entered the area around 2000 B.C. and replaced the Valley Hokans who presumably made little use of the foothill and mountain zones. The date of 3350 B.P. from Pla-101 is compatible with this hypothesis."

A number of other publications resulted from the Auburn Reservoir project (see Ritter and Schulz 1972 and Wilson 1972 for examples) which focused on Nisenan environment and subsistence. Ritter and Matson also published a paper (1972)

dealing with the projectile points from Pla-101. They sought to determine if various statistical techniques for artifact classification would yield results similar to those which were obtained from a traditional intuitive classification system. Multidimensional scaling and two cluster analysis techniques were employed to classify projectile points.

The results of the analysis supported the intuitive classification, but are not surprising given the method used. A density type cluster analysis method would have been preferable to the hierarchial method employed. The latter method yields any number of types, and it is up to the researcher to decide where to make the cutoff. Discriminant Analysis would have been useful to measure the degree of similarity among and between clusters.

Pictographs and petroglyphs constitute some of the more interesting, unusual, and difficult to understand, archaeological manifestations in the Sierra Nevada.

In 1966 Louis Payen undertook an exhaustive study of 133 rock art sites found in the northern Sierra Nevada. The study had several goals. The first was to define traditions or styles and to associate them with cultural units. The second goal was to attempt to determine the possible motivation and purpose behind the traditions or styles.

Two major traditions were identified: Pit and Groove and Abstract Representational. Within the Pit and Groove tradition, Payen identified three styles: Style I was equated with pitted boulders; Style II was pit and groove; and Style III referred to complex pit and groove expressions.

Within the Abstract Representational tradition were:

Style IV: Simple Abstract Monochrome
Style V: Abstract Polychrome
Style VI: Valley-Sierran Abstract
Style VII: High Sierra Abstract-Representational.

Style I is found executed on a variety of rock types. There is generally no particular pattern to the pits, and the number of pits varies. There is usually one boulder at a site. Style I petroglyphs are associated with large occupation sites or bedrock mortar areas.

Style II also occurs in association with occupation sites and is found in the lower foothills north of the Consumnes River.

Complex pit and groove, Style III, is found adorning the walls of caves which have midden or evidence of occupation. This style is restricted to the foothills below 2000' elevation and south of the Consumnes River.

Style IV consists of simple grid designs, line series, random lines, and hatches. It is usually found on cave walls in the foothills south of the Consumnes River.

Style VI consists of wavy lines and circle motiffs which are large and may cover an entire rock surface. The designs are pecked into the rock and then finished by rubbing. The style is found in isolated hilltop locations and is concentrated in the area north of the Consumnes River and in Sierra Valley.

From Style VI to Style VII there is a marked difference in construction, combinations of elements, and association. Style VII petroglyphs are more complex on all levels and exhibit a greater variety of designs and elements. Several hundred elements may occur, as evidenced at the Hawley Lake site.

Style VII elements include concentric circles, simple circles elaborated by line elements, wavy lines of varying complexity, animal tracks, and anthropomorphic and zoomorphic representations (see Figures 1-6).

Payen (1966) noted no apparent association with occupation sites. Style VII sites were found to be located along game trails and at passes above 5,000' elevation in the rugged and glaciated Sierran Crest zone. They are found from Plumas County southward to the Stanislaus River, but are concentrated along the crest north and west of Lake Tahoe.

According to Payen (1966:73), both Styles VI and VII are old and may be related to the Great Basin Abstract Curvilinear style. Style VII shows a development of naturalistic representations, including mountain sheep. This style is found at a number of high elevation sites within the Tahoe National Forest.

Style I, simple pit and groove, is found within the Forest in both the higher elevation areas and the western foothills.

In the Great Basin this type of petroglyph may be 5,000-7,000 years old, but the Sierra foothill manifestations are probably much more recent and may have been used by the ethnographic inhabitants.

Payen (1966:75) suggested a magico-religious function (associated with hunting) for Style VII petroglyphs. The location of a number of sites, including those at Donner Summit, Wabena, and Hawley Lake, support such a hypothesis.

Not all archaeological research in the Sierra in the 1960's was stimulated by reservoir construction projects. A very notable project was begun in the summer of 1965 by Wilbur Davis of the University of Nevada, Reno. The project, which was funded by the National Science Foundation, University of Nevada, and the Nevada State Museum, was entitled "The Cultural Position of the Washo" and. . ."was designed specifically to deal with the problem of discovering relationships between certain archaeological complexes found in Washo territory and the ethnographic Washo themselves (Elston 1971:1)."

Robert Elston supervised the fieldwork; and in 1971 published "A Contribution to Washoe Archaeology" as Research Paper Number 2 of the Nevada Archaeological Survey. This study ranks as the first rigorous examination of the conclusions and hypotheses presented by Heizer and Elsasser (1953) and Elsasser (1960).

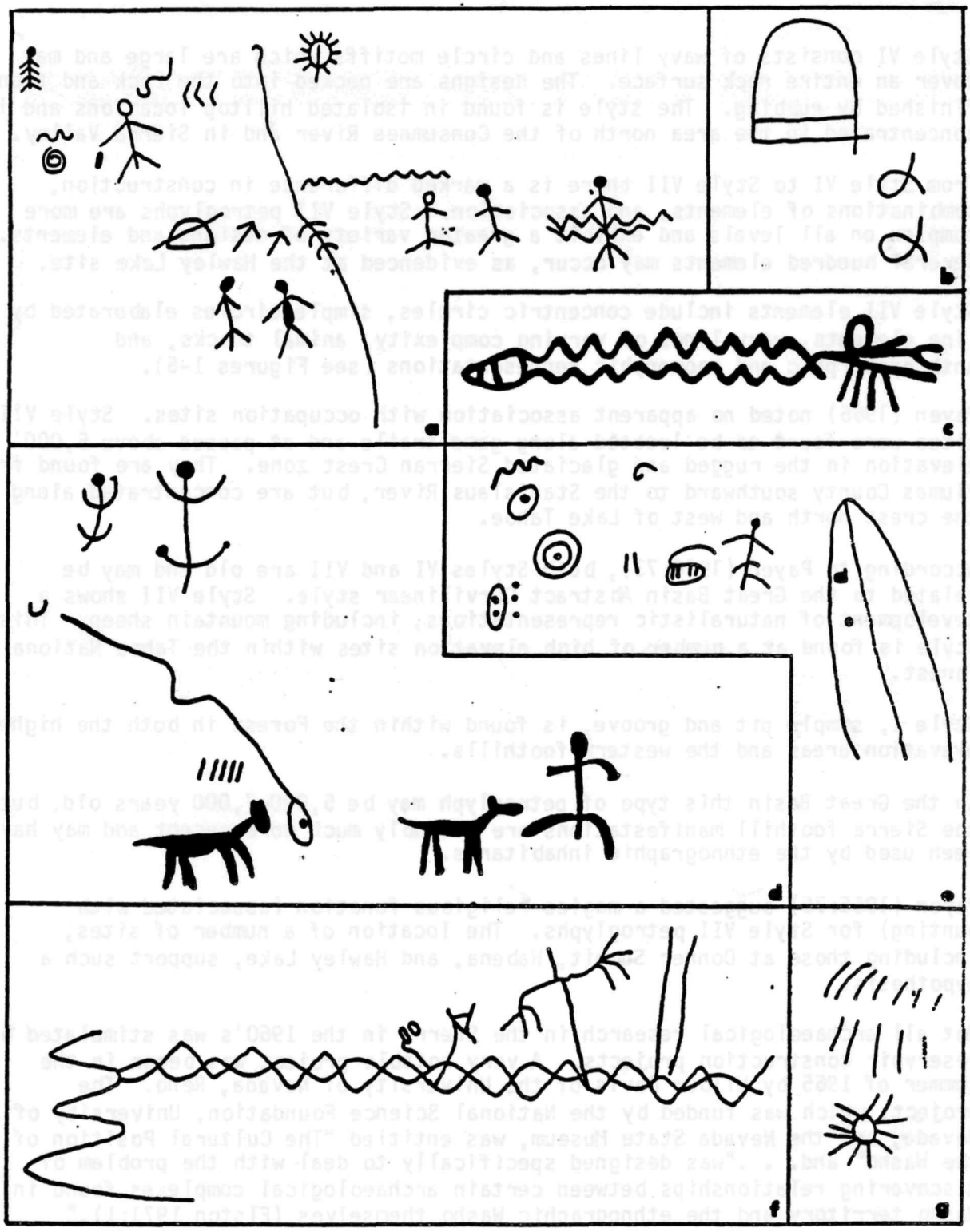


Figure 1. Petroglyphs at CA-SIE-1, Hawley Lake Site. (From Heizer and Clewlow 1973)

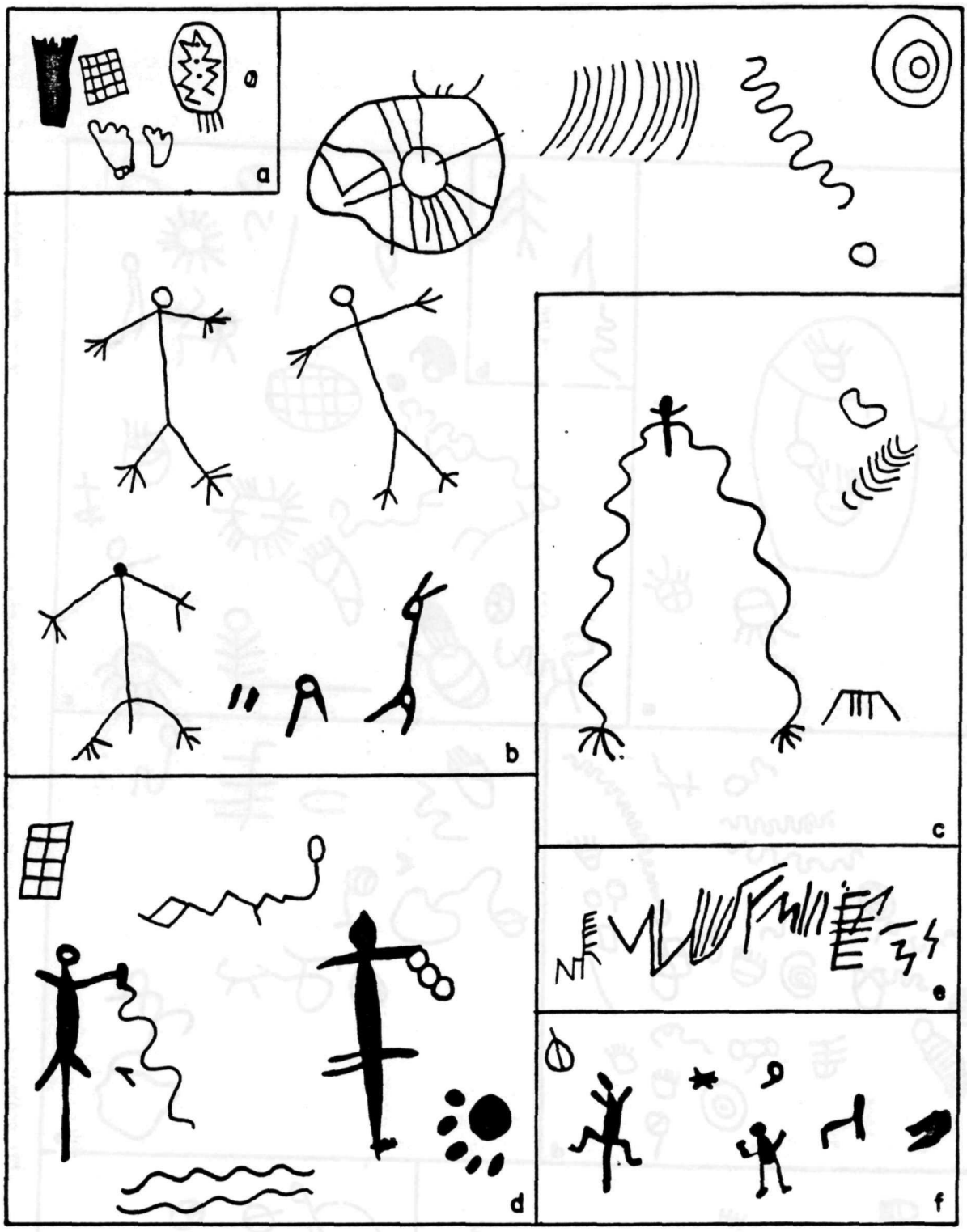


Figure 2. Petroglyphs at CA-SIE-1, Hawley Lake Site. (From Heizer and Clewlow 1973)

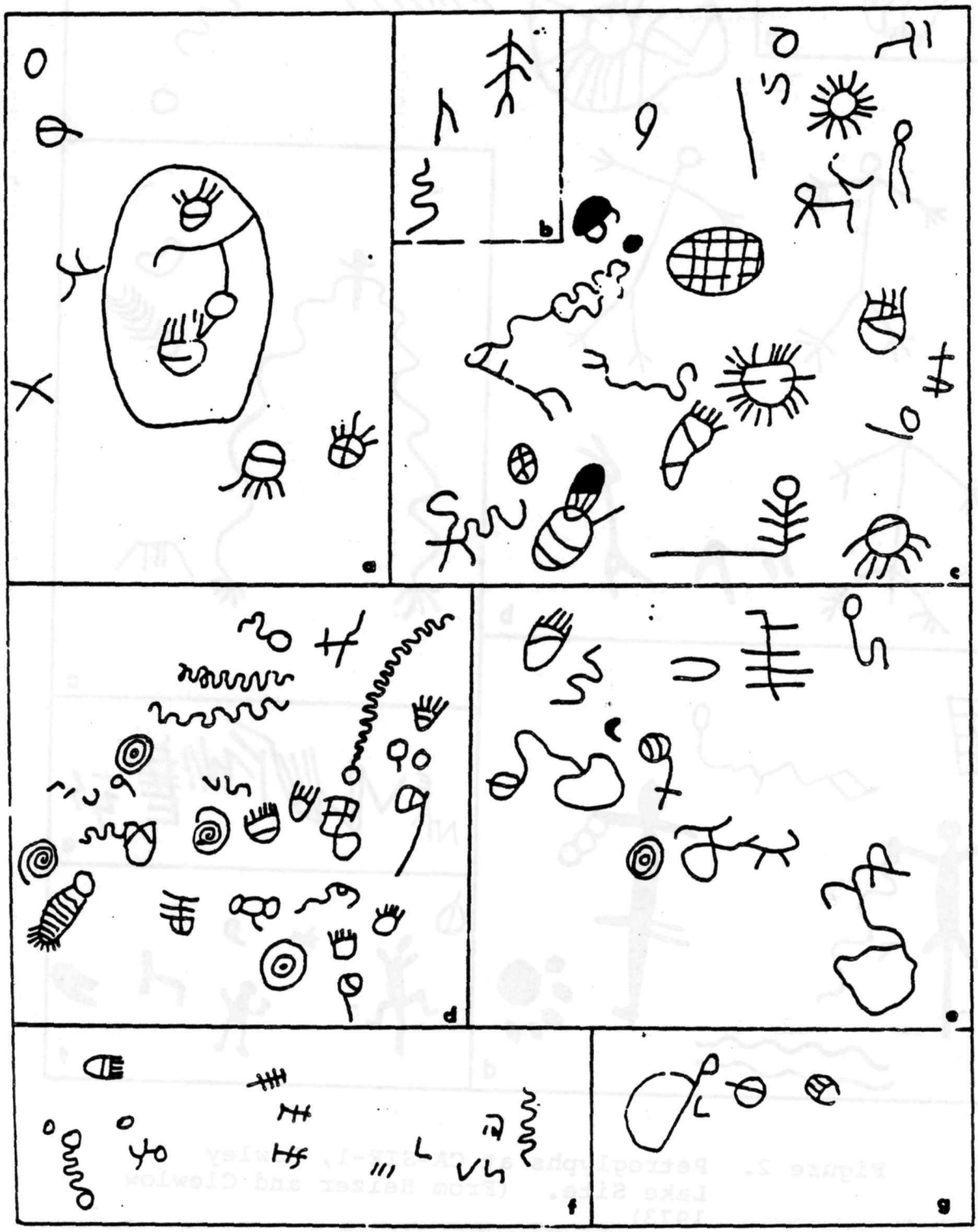


Figure 3. Petroglyphs at CA-PLA-26.
(From Heizer and Clewlow 1973)

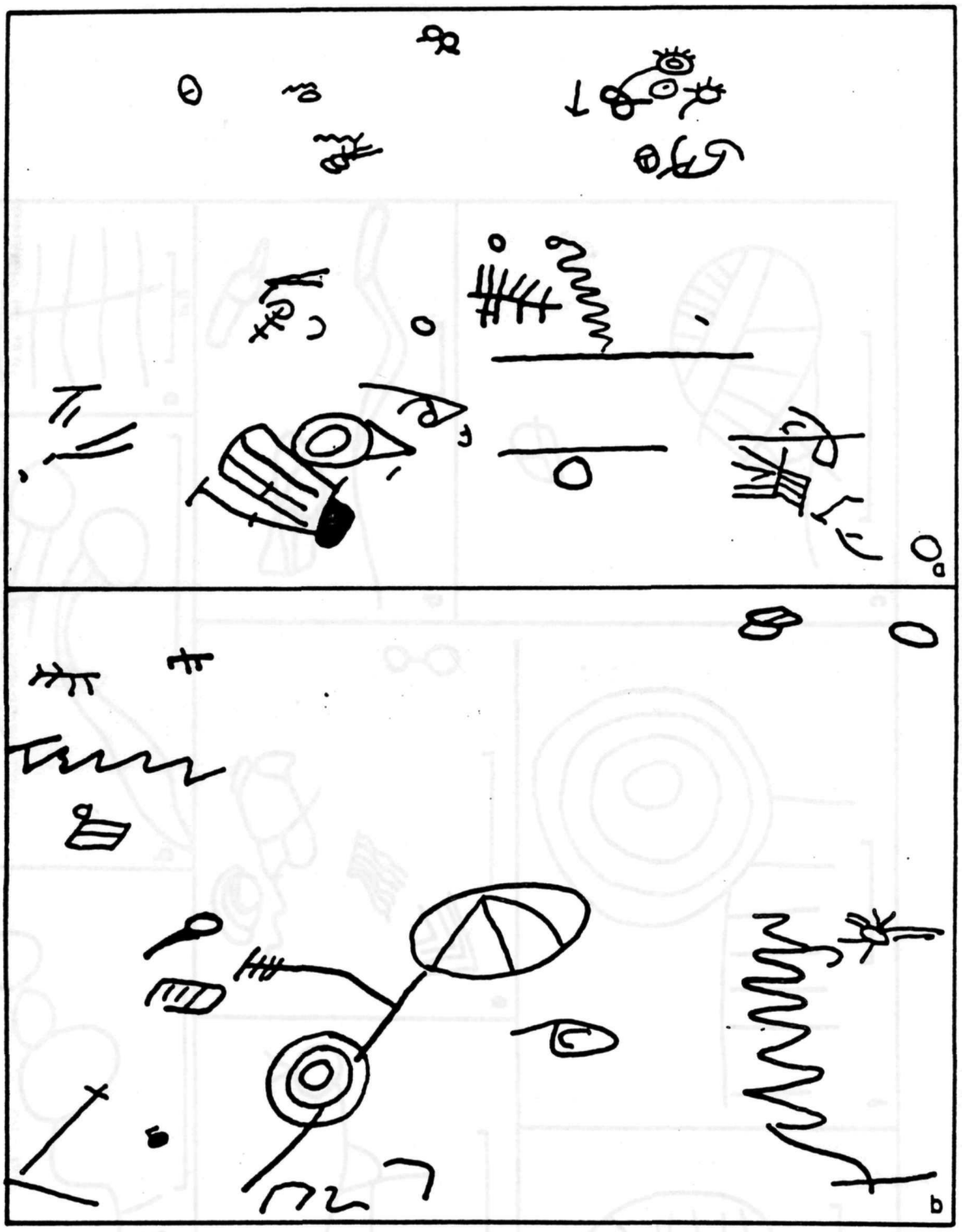


Figure 4. Petroglyphs at CA-NEV-85.
(From Heizer and Clewlow 1973)

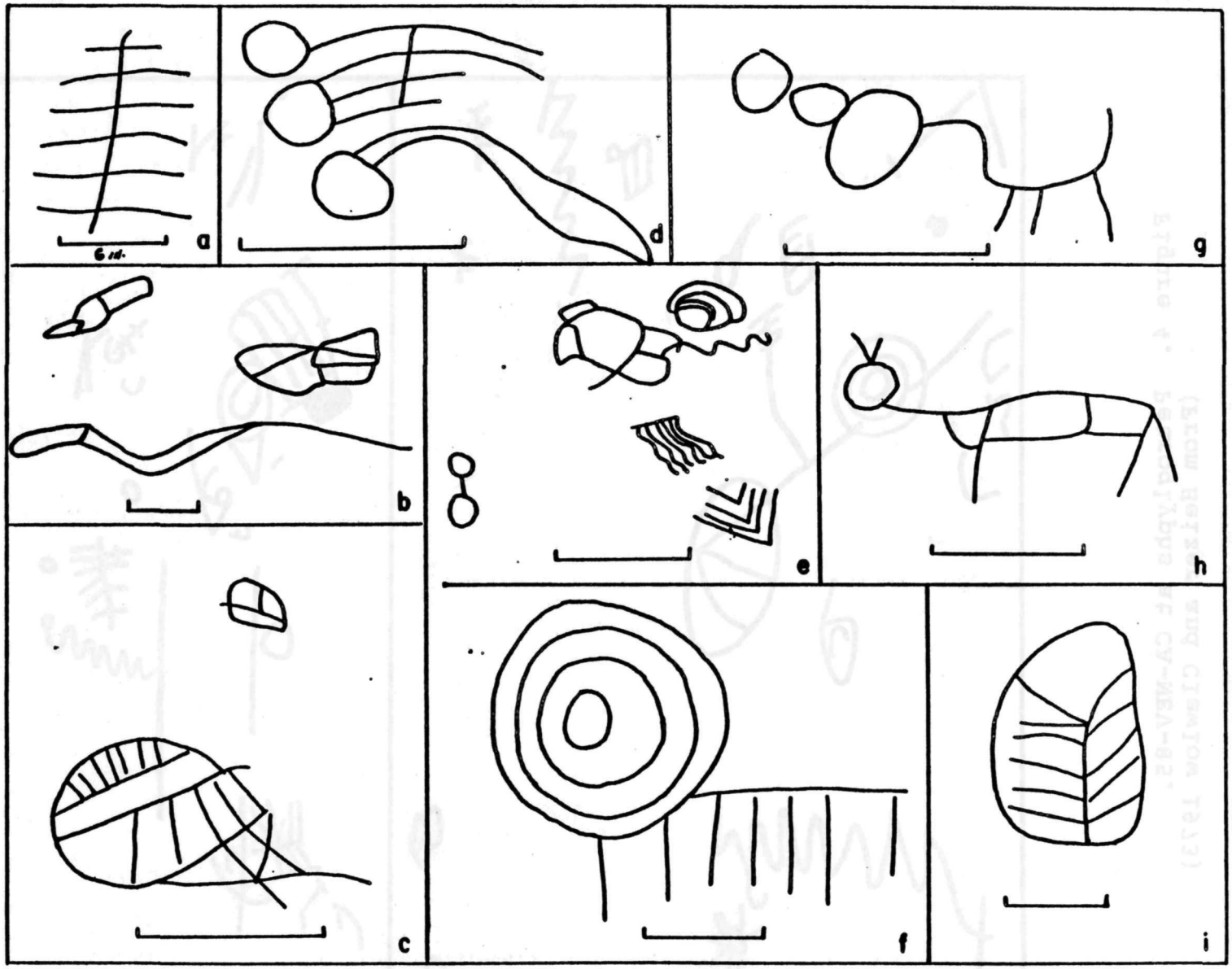


Figure 5. Petroglyphs at CA-NEV-6. (From Heizer and Clewlow 1973)

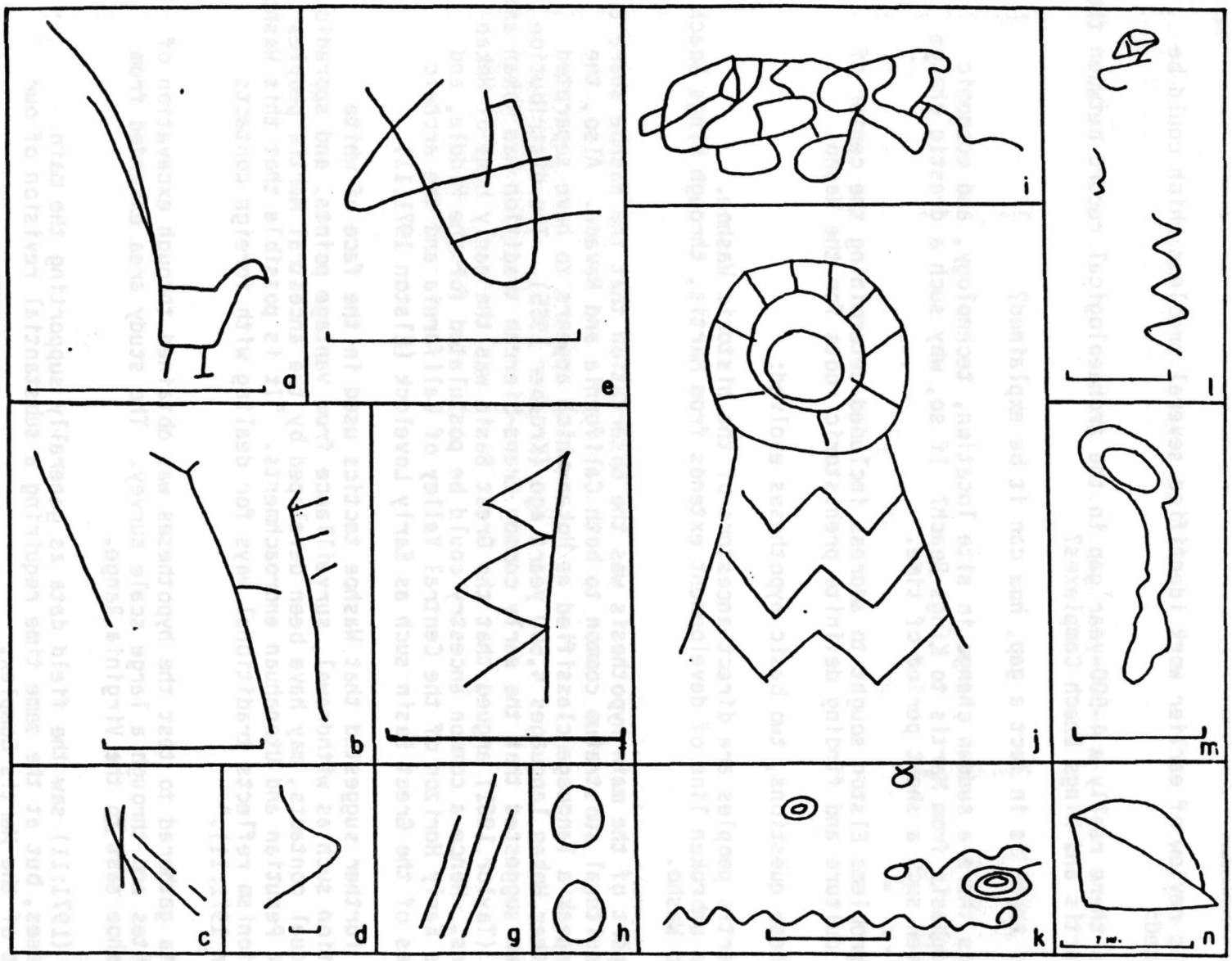


Figure 6. Petroglyphs at CA-SIE-20 (a-d,g) and CA-NEV-6 (e,f,h-n). (From Heizer and Clewlow 1973)

Elston's review of earlier work identified several problems which could be addressed:

1. Is there really a 4-500-year gap in the archaeological record between the Martis and Kings Beach Complexes?

2. If there is in fact a gap, how can it be explained?

3. Was there a sudden change in site location, technology, and economic emphasis from Martis to Kings Beach? If so, why such a drastic change over such a short period of time.

Other problems Elston sought to address included determining the center of Martis culture and finding definite prehistoric roots for the Washo.

From these questions, two basic hypotheses evolved:

1. Martis peoples are direct ancestors of the historic Washoe.
2. An unbroken line of development extends from Martis, through Kings Beach to Washo.

In support of the main hypothesis was the observation that the Washoe share a basic cultural substratum common to both California and Nevada. Also, the Washo speak a language classified as Hokan which appears to have separated from other Hokan languages 4,500 years ago (Kroeber 1955). The distribution of Hokan suggested that the early common trans-Sierran tradition was Hokan and others (Taylor 1961) argued that the Great Basin was the early home of Hokan speakers. Hence a common ancestry could be postulated for the Middle, and perhaps Early Horizon of the Central Valley of California and the archaic cultures of the Great Basin such as Early Lovelock (Elston 1971:11).

Elston further suggested that Washoe tactics used in the face of white emigration such as withdrawal, surveillance from vantage points, and sporadic individual contacts, may have been developed by the ancestral Martis peoples against Penutian and Utonahuan encroachments. "It is possible that this Washo isolationism reflects traditional ways for dealing with foreign contacts (Elston 1971:11)."

The data gathered to test the hypotheses was obtained through excavation of four sites and through a large scale survey. The study area extended from Lake Tahoe east to the Virginia Range.

Elston (1971:11) saw the field data as generally supporting the main hypotheses, but at the same time requiring a substantial revision of our concept of the Martis Complex.

Heizer and Elsasser (1953) had developed a scheme for classifying the distinctive Martis Complex projectile points; but when Elston attempted to utilize the basically descriptive system, the results were not satisfactory. The system emphasized differences rather than similarities and the points Elston excavated could not be arranged into a meaningful temporal sequence (Elston 1971:18).

Elston then revised the point typology and came up with three basic types which characterized the Martis assemblage: Martis Triangular, Martis Stemmed Leaf, and Martis Contracting Stem.

A fourth type - Sierra Stemmed Triangular - was not included in the Martis series as it was found to have continued in use following the end of the Martis period. As will be discussed later, this Martis typology was further revised by Elston et al(1977) to include some of the Sierra Stemmed Triangular subtypes.

Excavation of the Spooner Lake site yielded evidence of a pre-Martis occupation, which was termed the Spooner Complex. A series of radiocarbon dates suggested a time span for this complex of several throusand years beginning 5 to 7,000 years ago and extending to 3000 B.P. The Spooner Complex corresponds to the Altithermal climatic period and is characterized by Humboldt and Pinto series projectile points. Elston (1971:135) suggested that the Spooner Complex might represent refugees escaping the desicated Great Basin and colonizing the higher Sierran region.

Excavation data further suggested a division of Martis into early and late phases. The early phase was seen to begin about 3000 B.P. and terminate at 2000 B.P. The early Martis phase signified a period of intensive use of the study area and probably the central Sierra in general. This may have been precipitated by a climatic change rather than a Penutian intrusion since California-like artifacts did not appear until the later Martis Phase (Elston 1971:137).

The early Martis period ended about A.D. 1 when the mano-metate begin to be replaced by the mortar and pestle, and the bow and arrow (the latter tipped by smaller silicate and obsidian points of Eastgate, Rose Spring Contracting Stem, and possibly Cottonwood series) were introduced. This Late Martis Phase was viewed as a transitional period which ended by A.D. 500. Radiocarbon dates indicate that the Desert Side-Notched point may have been introduced during this time.

The Kings Beach Complex was poorly represented at the sites excavated by Elston, but several revisions of this complex were proposed. The cylindrical pestle, formerly assigned to the Martis Complex, was placed within the Kings Beach assemblage. Elston (1971:139) also took exception to earlier observations that basalt chipped stone tools were scarce in the Kings Beach Complex. According to Elston, basalt was not preferred, when chert or obsidian was available.

In the early 1970's a number of archaeological surveys were initiated within the Forest. In 1972 and 1973 surveys were conducted along the Truckee River (Payen 1973) and in the upper reaches of the Bear River drainage (Claytor 1973).

Claytor's survey was done as a master's project at Sacramento State College and resulted in the recording of 43 aboriginal sites. The survey focused on a high elevation region of the Sierra from Bear Valley east to the summit. The objective of the survey was to ". . .locate and record the number and types of archaeological sites within the area in order to determine the pattern of

aboriginal occupation and economic utilization of this seasonally restricted mountain environment (Claytor 1973:2)." Claytor began his survey at an elevation of 1,375 meters... to insure that survey included only seasonally available territory (1973:2)."

The survey focused on areas likely to contain evidence of aboriginal occupation. Lake shores, meadow margins, and favorable looking knolls and hillsides were examined, although stream and river courses received the greatest attention. Surface artifacts were collected, with the exception of pestles, which were measured and left at the sites (Claytor 1973:7).

The most frequent sites were temporary camps (34). Sites were classified as temporary camps if they exhibited more than 100 flakes and/or two projectile points or fragments. Of the 34 sites, 8 exhibited bedrock mortars, 4 showed evidence of midden, 3 contained petroglyphs, 2 had pestles on the surface, and 6 had manos.

Nine bedrock mortar sites were recorded as were five previously unrecorded petroglyphs, which brought the total number of such sites in the survey area to ten.

Chipping stations (4) represented hunting stands or isolated point making or resharpening sites and were characterized by light lithic debris.

A total of seven hunting blinds recorded as two sites, was identified. The blinds were situated on the tops of long, open ridges in association with recognizable deer trails. Desert Side-Notched projectile points and flakes of fine grained materials found in association suggested late period usage of the blinds.

The artifacts recovered by Claytor showed a preference for local material. Basalt was the most frequent (74 percent) material used for chipped stone implements. Although Claytor felt the study area was held by the Nisenan, both foothilll and eastern (Washoe) influences were apparent. "Projectile point types apparently related to the Martis Complex in the Tahoe-Truckee Basin also indicate(d) eastern Sierran influences (Claytor 1973:102)." The presence of such points led Claytor to conclude that aboriginal use of the area began about 1500 or 1000 B.C.

Regarding the economic emphasis of the aboriginal population, Claytor suggested that "The archaeological sites recorded indicated a reliance on hunting and gathering as the major subsistence activities pursued in the locality. Specifically, the hunting of deer and the gathering and processing of acorns and Wyethia has been suggested."

Claytor found sites to be most numerous in elevations where black oaks grew and were generally located in open areas with water and food sources nearby.

Louis Payen's (1973) survey was conducted along the Truckee River below Lake Tahoe where the planned Tahoe-Truckee Sanitation Agency (TTSA) interceptor line and treatment facility were to be built.

Payen used this opportunity to test Heizer and Elsasser's (1953) hypothesis that there were economic and settlement pattern differences between the Martis and Kings Beach Complexes. If Heizer and Elsasser were correct, the Kings Beach Complex should be well represented along the Truckee River, which presumably was rich in fish resources. The results of the survey, however, indicated very little evidence of occupation by Kings Beach peoples. The majority of evidence pointed to the occupation during the Martis period. Thus, with the evidence available, the Heizer and Elsasser hypothesis was rejected. However, as will be discussed later, subsequent research (Elston et al. 1977) identified climatic change as a variable which may be brought into play to help explain the archaeological evidence.

In 1974 Elston conducted further investigations at the sites recorded by Payen. He also (Elston 1973, 1974) began work to evaluate the research potential of several sites in the Goodyears Bar and Indian Valley areas near Downieville in Sierra County. Five sites were examined, and one (FS-05-17-53-15) was test excavated and surface collected. Few diagnostic artifacts were recovered from the site, which appeared to represent a buried component that was being exposed by erosion.

The work conducted by Elston and Townsend (1974) along the Truckee River involved test excavations at six sites and surface examinations of the remaining sites recorded by Payen. Six of the sites investigated were found to have further research potential and also would be affected by project activities. An additional survey was conducted by Leventhal in 1975.

In a report completed in 1977, Elston et al. presented the results of intensive excavations of Pla-23, -27, -149, and -164, and of surface collection and testing of Pla-151, -161, -162, -165, and -166.

The report represented the culmination of a considerable amount of research conducted along the Truckee River and incorporated many ideas developed by Elston and his associates during several years of work in adjacent localities.

The research approach taken was problem oriented and much attention was paid to the local geology, glacial history, and hydrology as they affected the depositional history and archaeology of the area. As a result they were able to synthesize palaeoclimatic data from the northern Sierra into a single coherent sequence (Table 2).

One of the major goals was to establish a prehistoric chronology with fine structure. Previous research had placed the Martis and Kings Beach Complexes in time, but the internal temporal details were as yet unclear.

Other major questions the research effort sought to answer were:

1. What functional differences existed between Martis and Kings Beach tool assemblages? It was expected that functional similarities would be found, but that morphological and technological differences would be apparent.

2. Do tool assemblages and activity sets differ from site to site, and can they be explained by environmental variability?

3. Is there internal site patterning reflective of specialized activity areas?

4. What are the origins of the Martis Complex? This question investigated the degree of similarity between projectile points from the study area and recognized Great Basin types included in Thomas' (1970) operational key.

5. How has Holocene deposition occurred and where is it likely to have buried artifacts in stratigraphic contexts?

Elston and his associates were able to revise the chronology developed in 1971. The Martis Phase was found to begin earlier (2000 B.C.) than previously recognized, and was divided into three periods as follows:

Early Martis	2000 B.C.	to	1500 B.C.
Middle Martis	1500 B.C.	to	500 B.C.
Late Martis	500 B.C.	to	A.D. 500

The preceding Spooner Phase was more firmly positioned between 5000 B.C. and 2000 B.C. Evidence of an even earlier occupation, termed Tahoe Reach, was found at Pla-164. A radiocarbon date of 8130+130 (6180 B.C.) was obtained from small chunks of charcoal found in a lower stratum described as mottled silt. Found in association was a backed knife, biface, and the partially fossilized wing bone of a large bird (Elston et al. 1977:151). Elston et al. noted that a similar date had been obtained from Last Supper Cave, where Parman points (Layton 1970) like those found at Pla-23 were recovered.

The Kings Beach Phase was subdivided into early and late periods. The Early Kings Beach Phase began around A.D. 500 and lasted until A.D. 1200. Late Kings Beach (protohistoric Washo) extended from A.D. 1200 to historic contact. Table 1 summarizes the cultural sequence and provides information on time markers, climate, and soils associated with each phase.

Both functional similarities and differences were recognized among Martis and Kings Beach tool assemblages. The similarities, it was suggested, were due to the relatively constant availability of particular resources through time, while the differences could be accounted for, in part, by temporal variations in the regional carrying capacity (Elston et al. 1977:166). Palaeoclimatic data suggest that neoglacial conditions prevailed from 2000-3000 years ago. Such conditions stemmed from increased precipitation rather than decreased temperatures and resulted in higher floral resource yields, more dependable and higher game populations, and better fisheries (Elston et al. 1977:166). During this optimum period, the human population was larger than during other time periods. The researchers contended that this population was characterized by a more elaborate and rigid social organization, craft specialization, regularly occupied the same winter villages and base camps, and manufactured basalt bifaces that were traded.

Table 2 CULTURAL PHASES OF THE TAHOE REACH

PHASE	TIME MARKERS	DEPOSITS	AGE	CLIMATE
Washo-Late Kings Beach	Desert Side-notched and Cottonwood Series points, chert cores, utilized flakes and other small chert tools	Surface and upper portion of sandy pebbly loam	Historic Contact-AD 1200	Neoglacial; wet and cool, but with little summer percipitation.
Early Kings Beach	Eastgate and Rose Spring Series points, chert cores, utilized flakes and other small chert tools.	Surface and upper portion of sandy pebbly loam	AD 1200-AD 500	Nonglacial; dry, trees growing in former bogs, Tahoe may often not overflow.
Late Martis	Corner-notched and eared points of the Martis and Elko Series? Large side-notched points? Large basalt bifaces and other basalt	Within the pebbly sandy loam	AD 500-500 BC?	Neoglacial; wet but not necessarily cooler, increased summer precipitation.
Middle Martis	Steamboat points, other types in Elko-Martis Series? Large basalt bifaces and other basalt tools.	Within the pebbly sandy loam and sandy cobbly loam	500 BC?-1500BC	Possible warm, dry interval centered on 1500 BC.
Early Martis	Contracting Stem points of the Elko-Martis Series? Large basalt bifaces and other tools. Light colored basalt artifacts?	Lower portions of pebbly sandy loam; on contact with orange san at Pla 164	1500 BC-2000 BC	Beginning of Medithermal; Neoglacial, wet but not necessarily cooler, increased summer precipitation, Tahoe begins to overflow.
Spooner	Points in the Pinto and Humboldt Series, light colored basalt artifacts.	Orange sand at PLA 164	2000 BC-5000 BC	Altithermal; generally hot and dry, Tahoe does not overflow for long periods of time.
Tahoe Reach	Parman Points	Mottled Silt at Pla 164	6000 BC	Anathermal; warming trend, climate similar to later Neoglacial intervale.

(From Elston et al 1977)

The early Kings Beach Phase was marked by a drier climate with little summer precipitation as opposed to the earlier period, in which significant precipitation occurred during the summer months. The generally low level of precipitation may have caused Lake Tahoe to cease flowing into the Truckee River for long periods of time. Certainly such conditions would have a dramatic effect on the human population. The available archaeological evidence led Elston et al. to conclude that major adaptive shifts occurred. It appears that the population during this time was small and more dispersed, with evidence that winter village and base camps were not occupied or visited regularly. The adoption of the bow and arrow during this time may have been an adaptation to a smaller, more dispersed big game population (Elston et al. 1977:167). Likewise, a shift to smaller, less specialized tools may represent an energy saving response to a less productive environment.

The basalt quarries in the Truckee Basin and the sinter source at Steamboat Springs, Nevada were heavily used during the Martis period but the Kings Beach population appears to have abandoned them in favor of ubiquitous but dispersed chert nodules. The latter material was heat treated to obtain a more uniform quality, but trade and craft specialization seems to have disappeared (Elston et al. 1977:167).

Elston's work along the Truckee River allowed for a substantial revision of the Martis projectile point typology. Seven types were identified which characterize the Martis Complex: Corner Notched, Side Notched, Contracting Stem, Triangular, Lead Shaped, Stemmed Leaf, and Steamboat. The Martis Contracting Stem type was equivalent to subtypes 1 and 3 of the Sierra Stemmed Triangular type defined previously. One of Elston's associates, Alan Leventhal, modified Thomas' (1970) Great Basin projectile point key to include the seven Martis types. The key was seen as a useful tool which would allow for the study of the variation among projectile points within the Martis area and with adjacent regions.

Elston (1977) suggested that the key could be used to measure the degree of similarity of Martis point collections with those of the Great Basin. He suggested that if Martis was of California origin, the percentage of Martis types should be observed to increase towards the west, with Great Basin types becoming less frequent. If Martis was an autochthonous or indigenous culture, Martis types should peak at the crest of the Sierra and decrease in frequency towards the west where they are replaced by California types.

The analysis of points from along the Truckee River showed only a 33 percent similarity with points from the interior Great Basin. This was somewhat surprising, and prompted Elston to suggest that archaeologists analyze collections along a north-south and east-west transect to see how the percentage of Martis and Great Basin types varies. Analyses of projectile points using the modified Thomas Key have been attempted (Markley 1980 and 1981), and the results will be discussed in a following section.

While work was progressing on the TTSA project, Elston, Davis, and Townsend (1976) undertook an extensive investigation of the Hawkins Site (FS-05-17-57-33) located just north of the town of Truckee.

This work was one of several attempts being made at that time to deal more systematically with surface sites and lithic scatters (see Kowta 1976 and Markley 1976 for similar studies)

The investigation of the Hawkins site involved test excavation and complete surface collection. The latter employed a grid system of 2X2-meter cells which provided for provenience control. By systematically collecting all surface items, distributional patterns and variations in the frequencies of various artifact classes could be observed.

The work at the Hawkins site was concerned with the distribution of surface artifacts and whether the location and content of the site fit the ethnographic model. The researchers found that the site represented a single occupation during Martis times (2000 B.C. to A.D. 1). The major activities performed at the site included the manufacture of basalt bifaces, butchering of large game, and working of bone, wood, and antler.

In the mid-1970's Congress authorized the construction of the Pacific Crest Trail (PCT) which was to follow a north-south route through the Sierra Nevada. The Tahoe National Forest portion of the trail was to be roughly 50 miles in length and pass through some of the more scenic, high elevation regions of the Sierra. The archaeological survey of the route through the Tahoe was directed by Susan Lindstrom (1978) and resulted in the discovery of 45 historic and prehistoric sites.

Lindstrom recognized that the PCT project offered an opportunity to explore a relatively unknown area from an archaeological standpoint. Her review of the archaeological literature for the northern Sierra revealed a number of questions which she felt could be addressed with survey-derived data. These included questions concerning climatic changes during the Holocene and concomitant human adaptive changes, similarities and differences between Martis and Kings Beach assemblages and their spatial distribution, prehistoric exchange systems, intersite functional variability, and cultural - chronological change. Lindstrom also sought to test a cultural-environmental model she developed and termed a subsistence - subsystems model with functional and temporal implications (1978 Part II: 3). The model modified Heizer and Elsasser's characterizations of prehistoric settlement and subsistence and incorporated ethnographic data for the Maidu and Washo.

The data obtained through survey and field observation generally were in keeping with expectations generated by the model. The model proved to be a good predictor of site type, environmental situation, and artifact assemblage. Lindstrom (1978 Part II: 67) concluded that ". . .Washo and Maidu subsistence activities under aboriginal conditions appear to be a rather good source for archaeological model building," and went on to state that "this demonstrated relevance may suggest long-lived patterns of procurement and processing. . ."

Regarding the Martis and Kings Beach Complexes, Lindstrom observed that Martis sites and artifacts were more numerous and varied and were found in more varied environments. In contrast, Kings Beach sites were found to be small, less complex, and more dispersed. "Pure Kings Beach sites are exclusively confined to hunting activities (with rock blinds), being located on dry, open ridges in close proximity to game trails (Lindstrom 1978 Part II: 63)." She

found support for previous researchers' contentions (Elston 1971) that the adoption of the bow and arrow by Kings Beach peoples was an adaptation to smaller, more dispersed big game populations, reflected a shift to less labor intensive techniques of manufacture, and could possibly be explained as an energy saving response to a less productive environment. Her data also supported earlier observations that there was a shift from basalt to chert during Kings Beach.

Little new information could be generated regarding the origin and affiliation of the Martis Complex or its internal chronological details. Analysis of projectile points did, however, reveal that Martis types were dominant over Elko (35 vs. 20) even when Steamboat points were excluded from consideration. Kings Beach points made up 25 percent of the sample from the 38 prehistoric sites. Despite a paucity of data, Lindstrom concluded that the projectile points reflected a unique Sierran autochthonous culture with closer affinities to the Great Basin than California (1978 Part II:68).

Table 3. Principal Excavated Sites Within the Tahoe National Forest

Site	Principal Investigator	Date	Location
Sie-20	A.D. Kreiger	1958	Sardine Valley (1)
Sie-39	Peter Jensen	1979	Gold Lake (2)
Sie-28	W. Olson; L. Payen	1969	Stampede Res. (3)
Sie-S44	W. Olson; L. Payen	1969	Stampede Res. (3)
Sie-78	Peter Jensen	1979	Gold Lake (4)
Sie-82	M. Rondeau	1980	Salmon Creek (5)
Loyalton R.S.	Norm Wilson	1958	Sierra Valley (6)
Ratchet Cave	B. Arnold; N. Wilson	1957-58	Martis Valley (7)
Pla-5	R.F. Heizer	1952-53(?)	Martis Valley (8)
SP-6	B. Arnold	1957-58	Martis Valley (9)
Pla-23	R. Elston	1976	Truckee River (10)
Pla-101	E. Ritter	1967-68	Foresthill (11)
Pla-149	R. Elston	1976	Truckee River (12)
Pla-164	R. Elston	1976	Truckee River (13)
05-17-57-73	R. Elston	1980-81	Truckee (14)
05-17-57-209	R. Elston	1980-81	Martis Valley (15)
05-17-57-33	R. Elston	1976	Truckee (16)
Nev-15	R.F. Heizer	1954	N. San Juan (17)
Nev-318	P. Jensen	1979-81	Chalk Bluff (18)
Nev-199	M. Rondeau	1980	Truckee (19)
Yub-18	S. Humphreys	1966-67	Garden Valley (20)
Yub-19	S. Humphreys	1966-67	Garden Valley (21)
Yub-24	S. Humphreys	1966-67	Garden Valley (22)

* Numbers in parentheses refer to Map 4.

Excavation work continued in the higher reaches of the Sierra in the late 1970's. Under the direction of Michael Rondeau, two sites, the Salmon Creek Site (CA-SIE-82) and CA-NEV-199 near Truckee, were excavated.

The Salmon Creek site is located at an elevation of 5,600 feet along a glaciated valley near the Sierra Buttes. The site was found to represent a buried deposit composed of chipping waste from biface production, utilized flakes, projectile points, and other artifacts such as millingstones which indicated a variety of activities took place at the site.

Rondeau (1980) utilized the opportunity to investigate prehistoric stone tool technology, particularly biface production. Regarding the bifaces from CA-SIE-82, Rondeau concluded that broken specimens represented manufacturing failures or workshops rejects and not tools broken from use. He also cautioned against equating bifaces with the Martis Complex, as biface production occurred in other time periods.

A great amount of the lithic debitage from the Salmon Creek site exhibited edge modification in the form of crushing, nibbling, and step scarring. After an extensive analysis of the material, Rondeau concluded that the edge modification apparent on many of the flakes was due to edge preparation during the manufacture of stone tools and post-depositional processes, and not from aboriginal use of the flakes as tools. He stressed that the ability to distinguish between use, wear, and other types of edge modification is critical to correctly interpret site function.

The data collected from CA-SIE-82 and other sites investigated by Rondeau led him to question several existing ideas regarding the Martis Complex. He noted that Martis has increasingly come to be equated with basalt chipped stone tools. Rondeau suggested that this is an unfortunate oversimplification since available evidence suggests that basalt was used in the region during all time periods. By assigning all basalt assemblages to the Martis time period, the Martis Complex is overrepresented.

The apparent abundance of Martis sites which results from such an approach has led researchers to erroneously try to explain such a cultural fluorescence (Elston et al. 1977). The most popular explanation is that the Martis period was one of more favorable climate which allowed for a larger prehistoric population. Rondeau contended that the appearance of such a large population stems from our lumping of pre- and post-Martis materials into the Martis time period. He further suggested that the climatic optimum hypothesis is not sufficiently supported by paleoecological data.

The Truckee Site (CA-NEV-199) was recorded and test excavated in 1977 by Sacramento State University. In 1980, a full scale excavation was initiated under the supervision of Michael Rondeau.

The excavation of the Truckee site revealed a long span of occupation which may have begun as early as 8,000 to 9,000 years ago. Throughout much of the occupation of the site, it functioned as a seasonal camp where the reduction of basalt bifaces was the primary activity. Bifaces were the second most numerous artifact recovered, and 99 percent of the specimens represented manufacturing failures which were discarded. The low frequency of lithic debitage showing cortex indicated that primary quarrying and reduction occurred away from the site.

Rondeau (1982) presented a Regional Lithic Model to aid in the interpretation of sites in the northern Sierra. This model places the prehistoric lithic industry within the context of a seasonal round, and may be used to explain differences in archaeological assemblages. The model predicts the types of lithic artifacts and debitage that should occur given the location of a particular site in relation to source or quarry areas.

Rondeau's analysis of the collection indicated that the first occupants of the site utilized projectile points characteristic of the Great Basin Stemmed series. He cautioned that often these points are misclassified as blades or knives; thus, evidence for very early occupations goes unrecognized.

Rondeau also expressed concern that the range of projectile point types in the Sierra Nevada has yet to be recognized and that there are distinct types which have not been defined in the literature.

RESEARCH DOMAINS, PROBLEMS, AND QUESTIONS

A review of previous archaeological studies conducted over the past 30 years within the Tahoe National Forest reveals a variety of research problems which various researchers have tried to address. The purpose of this section is to identify those research problems or questions, evaluate past approaches to them, assess the relative success or failure of such studies, and determine whether the problems remain viable topics for further research. Of necessity this section will draw upon more general issues and research centering on adjacent areas of California and the Great Basin to the extent that they have relevance to northern Sierra prehistory.

The aim of this section, therefore, is to ultimately focus research into productive areas which will increase our knowledge and understanding of prehistory and human behavior. Obviously, the problems identified do not represent an all-inclusive list. Ongoing archaeological research in California and the Great Basin is likely to expand upon the range of relevant problems. Thus the present attempt at synthesis should be viewed as a step toward a dynamic process involving hypothesis development, testing, reformulation, and validation.

Questions or problems which have historically been investigated may be subsumed under two broad headings of "Cultural History" and "Cultural Dynamics or Process."

Cultural history includes the lifeways of prehistoric peoples, and is generally particularistic in nature. It is concerned with such things as who lived in a particular location or region, where did they come from, when did initial settlement occur, what material culture did they possess, what was their linguistic affiliation, how long did they occupy a particular area, what was their adaptive strategy, how large was the population, and how did they interact with adjacent populations.

Cultural dynamics is concerned with the processes of change or stability, demography, adaptive processes or strategies, the interplay of culture and environment, and generally involves the search for underlying meaning or

causes for observed phenomena. The goal is to explain by reference to general laws, be they cultural or natural. Studies of cultural processes on a local level may lead to hypotheses or laws regarding human populations wherever they may occur in the world. Thus studies of prehistoric cultures in the Sierra Nevada can contribute to our understanding of hunters and gatherers in all places at all times.

Studies of cultural history and culture process are seldom mutually exclusive. Few archaeologists are content to simply gather, describe, and classify or categorize their data. They strive to explain observed similarities or differences either through analogy or through references to general laws or processes. The extent to which they are successful hinges upon the soundness of their observations, the way in which inquiry is structured, and the validity of general principles brought to bear on the subject. Archaeology in the Sierra Nevada has mimicked the general development of archaeological science in that in recent years we have seen greater attention paid to the structure of inquiry, representativeness of data, and the logic of our conclusions.

In the following pages, specific research questions or problems will be presented along with a discussion of past research which bears on the particular question.

The Initial Settlement of the Northern Sierra Nevada

Until the early 1970's, the initial occupation of the northern Sierra was thought to have begun 3,000 to 4,000 years ago, with the appearance of the Martis Complex. Elston (1971), however, found evidence in the eastern part of the range of an earlier manifestation which he called the Spooner Complex. He cautioned that Spooner was "extremely hypothetical" and based only on the occurrence of Humboldt and Pinto projectile points and radiocarbon dates which placed the assemblage "between 5000 and 3000 B.C. to around 1000 B.C. (Elston 1971:135)."

In subsequent work along the Truckee River, Elston et al (1977) found additional evidence of the Spooner Complex which he more firmly dated at 5000 to 2000 B.C. He also found evidence of an earlier occupation which he termed the Tahoe Reach Phase and assigned it an initial date of 6000 B.C. The 6000 B.C. date was based on radiocarbon data and the occurrence of two fragmentary Parman points which had been dated at Last Supper Cave in Nevada at 6000-7000 B.C.

Near Truckee, Rondeau (1982) has found what he considers additional evidence for the Tahoe Reach Phase. At Nev-199 a number of projectile points were recovered which were typologically similar to those in the Great Basin Stemmed Series. On this basis Rondeau placed the initial occupation of the site between 6000 and 7000 B.C.

West of the Sierran Crest nothing equivalent in age to Tahoe Reach or Spooner has been firmly established. To the north, in the Oroville locality, the earliest occupation has been pushed back in time no further than 1000 B.C. A single radiocarbon date of 2800 years B.P. was obtained from near the bottom

of the deposit at But-157 (Olsen, Personal Communication). Other investigations in the western foothills (Humphreys 1969, Ritter 1968 and 1971, and Markley 1978) have been unable to push the antiquity of man in the region much beyond 2000 to 3000 years ago. The effort has been hampered by a paucity of datable materials and generally mixed stratigraphic contexts (Elsasser 1960 and Ritter 1971).

Surface finds in the western portion of the Forest of Pinto, Humboldt, Parman, and various large, wide-stemmed projected points suggest that the area was occupied in times equivalent to Tahoe Reach and Spooner. As will be discussed further in a later section, many of the specimens come from the American River area on the Foresthill Divide.

Fluted points have been found in western Nevada (Tuohy 1968), west of the Sierra near Tulare Lake (Riddell and Olsen 1969), and in the southern Sierra near Ebbetts Pass (Davis and Shutler 1969), but none within the northern Sierra. Glacial action, Holocene erosion and deposition, and an apparently low population level probably contribute to the lack of fluted point finds. If such evidence is to be found (if it is present at all), perhaps we need to heed Jonathan Davis' statement (oft repeated by Elston) that "if we want to find old stuff, we have to look in old dirt."

Context of Initial Occupation

Some attempts have been made to address the question of who the initial occupants of the northern Sierra were, what prompted them to come into the region, and what their relationship was to more recent archaeologically defined cultures. Generally, these studies have been linguistically based and concerned with tracing hypothesized population movements with archaeological data presented as supporting evidence. Some have been rather grand in scale such as Krantz' (1978) "The Populating of Western North America." Others (Kowta 1984) have been more restricted and focus on Northern California and immediately adjacent regions.

Most researchers generally conclude that the initial occupants of the Northern California (including the northern Sierra) area were Hokan speaking peoples who probably entered California from the Plateau or Great Basin. The thesis of Baumhoff and Olmstead (1963) and others (Whistler 1978 and Levy 1979) contends that later in time Penutian speakers entered California and displaced the resident population to peripheral areas as reflected by ethnographic linguistic distributions. Originally it was believed that there was a single "Penutian Intrusion" which occurred perhaps around 1000 B.C. More recently Whistler (1977) has hypothesized that Penutian speakers may have entered California in as many as four different ethnic waves. Within the Tahoe National Forest were two linguistically different groups - the Maidu, who were Penutian speakers, and the Hokan-speaking Washo at the time of contact.

According to Kroeber (1955) and others, the Washo split off from other Hokan speakers about 4,500 years ago and have remained linguistically isolated. For the Maidu, the linguistic evidence points to population movement; however, the details are as yet sketchy and a subject of linguistic and archaeological study.

Correlating archaeological and linguistic data is both difficult and risky, as a number of researchers have pointed out (Rondeau 1982). Artifact types or styles seldom correlate with established linguistic boundaries, and to assert that a particular archaeological assemblage represents Hokan or Penutian speakers is difficult to test.

Chartkoff, Johnson, and Miller (n.d.), in an early paper, offered a hypothesis to explain observed differences among valley and foothill archaeological assemblages and suggested that initial settlement in the region was in the foothills. The early population utilized the mano/millingstone to process hard seeds, and as the population grew, it extended into the valley. Eventually, the mano/millingstone was replaced by the mortar/pestle combination, as acorns became more important to the economy. Later, the mortar/pestle spread into the foothill zone. This hypothesis is testable by analyzing archaeological data from valley and foothill sites.

In a recent paper, Kowta (1978) examined the Chartkoff, Johnson, and Miller hypothesis and found that existing data are generally supportive. Kowta incorporated this and other hypotheses into a general model for the northern Sacramento Valley and adjacent foothills which may be of relevance to the general northern Sierra region. His model is as follows (1978:14-15):

Beginning about 6000 B.C., the foothill zone was occupied by a Hokan-speaking population that emphasized the use of hard seeds which were processed with the mano and millingstone. Archaeologically, this phase is represented by the Borax Lake Complex and the basal layers of the Squaw Creek site. This population was successful, and eventually expanded into the Sacramento Valley where the mano/millingstone complex continued in use.

By about 3000 to 2500 B.C. an intrusion of Penutian speakers occurred. This population skirted the valley edge and moved into the Bay area and is represented archaeologically by the Berkeley Pattern. Later, acorn exploitation diffused northward, reaching the Chico area by 1000 B.C. and the surrounding higher elevation areas somewhat later.

Adoption of the acorn resulted in population expansion such as that of the mortar-using Palaihnihan Hokan speakers into the Pit River area around 1500 B.C.

About A.D. 700 in the Great Basin/Plateau area, a split occurred in the Penutian community. The Yokuts entered California across the Sierra and moved southward along the foothills to their ethnographically recorded location. The Wintun entered California from southwest Oregon and, after contact and exchange with the Achomawi/Atsugewi, moved into the Valley floor by about A.D. 1000. Movement of the Maidu into California also involved Achomawi/Atsugewi contact, but primarily on the Basin side of the Sierra. The Maidu moved to their ethnographically recorded location, adopting the bedrock mortar. The Maidu expansion was at the expense of the Hokan population, which was represented historically by the Washo in the Lake Tahoe area.

The Martis Complex

As discussed earlier, this complex was first recognized and defined by Heizer and Elsasser in 1953. Since that time it has been the subject of much archaeological research.

Research into the Martis Complex has focused on the following topics:

1. Origins - from where did the archaeological complex derive?
2. Characteristics - what archaeological materials comprise the complex?
3. Adaptation - with what means and by what strategy did Martis Complex peoples adapt to their environment?
4. Boundaries - what is the distribution of Martis artifacts? What are the geographical limits of Martis?
5. Dating - what is the time span for the Martis Complex?
6. Cultural Relationships - what was the relationship between Martis and adjacent contemporary cultures? Who were the descendents of the Martis culture?

Origins - As discussed earlier, Elsasser (1960) offered three possible explanations for the origin of the Martis Complex. Essentially, Elsasser saw Martis as representing either a California, Great Basin, or indigenous Sierran culture.

As a part of his work along the Truckee River, Elston et al (1977) attempted to address this question by analyzing projectile points and determining the ratio of Martis to Elko points. Elston et al (1977:168) reasoned that "...if Martis has a central California origin, the percentage of Martis points should increase towards the west; if Martis is an autochthonous Sierran culture, the percentage of Martis points should peak at the Sierran Crest and then decrease toward the west as they are replaced by California types." Elston found that there was only a 33 percent correspondence between points from the Tahoe Reach and those of the Great Basin. He suggested further work be done to ascertain the Martis/Elko ratio across the Martis range. Subsequent work (Markley 1980) in the Tahoe National Forest has shown that Martis points are much more frequent than Elko in the western Sierra, while still maintaining a numerical advantage east of the Sierra Crest.

Markley (1980) suggested that it might be more appropriate to compare the frequency of Elko points with contemporaneous California types across the Martis range. Establishing a set of point styles and calling them Martis at the outset tends to obscure evidence for California or Great Basin origins and presupposes that Martis is an autochthonous culture. It is the frequency of California and Great Basin types which is most illuminating. Markley (1980) rephrased Elston's et al (1977) statements as follows:

1. If Martis is an autochthonous culture, then the frequency of California points will decrease as one moves eastward, where distinctive points which are neither markedly California nor Great Basin (i.e., Martis) will predominate. Great Basin points will decrease in frequency as one moves west from the Great Basin toward the Sierran Crest.

2. If Martis is a Great Basin culture, California points will decrease in the same manner as above, with an increase in Great Basin (i.e., Elko) points as one moves west to the Sierran Crest and beyond.

3. If Martis is a California culture, then California points will maintain a high frequency as one moves east. Towards the east (east of the crest) Great Basin points will become increasingly frequent.

The initial hurdle to overcome is the fact that there are no well recognized California point types that are equivalent to Elko. Review of the literature for central California suggests that distinctive types are present which have been observed to occur in the Sierra Nevada. Future research should focus on establishing well defined California types which may then be used to help unravel the question of Martis origins.

Recently, Elsasser (1978) appears to have concluded that the roots of Martis lie in the Great Basin. Such an opinion has also been expressed by Moratto (1972). While this may ultimately prove to be true, a survey of the recent literature would indicate that the question is far from being resolved.

It appears that there is a need to better distinguish between the origin of the Martis Complex and what influences may have affected the Martis Complex once in place in the Sierra. For example, the Martis population occupying the eastern Sierra may have originally derived from California, but because of close proximity to Great Basin cultures, their material culture may have become more Basin-like over time. Similarities may come from contact rather than common origins.

Characteristics - Progress toward the identification of Martis origins has been hampered by a lack of concensus over what artifacts are indicative of the Martis Complex. Originally, Heizer and Elsasser included points which we would now call Pinto in the Martis Complex. In subsequent work Elston (1971) removed them from the list of Martis points and assigned them to the preceding Spooner Complex. It is likely that other point styles have been erroneously included in Martis.

Rondeau (1980) has suggested that part of the problem is that Martis has come to be equated with basalt points and tools, to the exclusion of other traits which identify Martis. The result has been that older, pre-Martis materials, as well as more recent materials, have been described as Martis solely because they are made from basalt. This has confused our understanding of the origin, geographical extent, and age of the Martis Complex.

Heizer and Elsasser (1953) originally characterized the Martis Complex as follows:

1. Basalt preferred material for chipped implements.

2. Obsidian and chert used very rarely.

3. Projectile points fairly large and heavy, roughly chipped, variable in form.

4. Mano and metate for seed grinding.

5. Cylindrical pestle and bowl mortar.

6. Boatstones.

7. Economic emphasis on hunting and seed using.

8. Basalt flake scrapers with pressure retouched edge abundant.

9. Expanded base finger-held flaked drills or punches common.

Elston (1971) later revised the Martis Complex and divided it into two phases. Early Martis was represented by points of the Elko and Martis series and the Sierra stemmed triangular type; key shaped drills of basalt and chert; obsidian flake knives and scrapers; shaped biface manos; and basin metates, often in bedrock. The second Martis phase saw a decline in shaped manos; introduction of bedrock mortars; and a change to smaller points of chert and obsidian (Rose Spring and Eastgate). Shaped cylindrical pestles, formerly assigned to Martis by Heizer and Elsasser, were removed from the Martis trait list by Elston (1971) and included instead in the Kings Beach artifact inventory.

Although Elston later divided the Martis Complex into three phases, the artifact inventory remained essentially the same with only a few changes in projectile point types.

It is with some difficulty that I have attempted to develop a list of traits which characterize the Martis Complex. The original list has been modified over the years, and it is not possible to refer to a single publication for a complete list. It should also be noted that some traits are not exclusively Martis (e.g., mortars and pestles). Part of the problem is that it has been virtually impossible to find "pure" Martis sites. Invariably, earlier (Pinto, Humboldt, etc.) or later (Kings Beach) materials are "mixed" with Martis assemblages.

To summarize, however, the Martis Complex may be characterized as follows:

1. Predominance of basalt over chert and obsidian for chipped stone tools. Evidence from Tahoe N.F. suggests a preference for local materials such as basalt, schist, slate, and metavolcanic/metamorphic materials. Basalt occurs in consistently high frequencies at sites located in the crest zone and eastward.

2. Medium to large points which are stemmed, side notched, corner notched, and leaf shaped. Point types include Elko series; Martis contracting stem, side notched, corner notched, triangular, stemmed-leaf, and leaf shaped; Steamboat; Rose Spring; and Eastgate.

3. Shaped bifacial manos

4. Metates, often in bedrock

5. Key-shaped drills

6. Mortars and pestles

7. Craft specialization as evidenced by a developed biface production industry.

8. Reoccupation of winter villages and base camps over long periods of time.

9. Seasonal transhumance involving expansion into higher elevations during summer period.

The establishment of a definite set of criteria to define Martis should be a major focus of future research.

Adaptation - The nature of the archaeological materials encountered by Heizer and Elsasser which they dubbed "Martis" led them to suggest that the economic orientation of these people was towards hunting of big game and gathering of floral resources, as distinguished from the later Kings Beach peoples, who seemed to have had a fishing orientation. They suggested that, spatially, Martis and Kings Beach sites were distinct, resulting from different economic emphases.

This observation was tested by Elston and Townsend (1974), Davis, Elston and Townsend (1974), and Payen (1973). In each case the hypothesis was rejected. As Elston et al (1977:18) later observed, "..Martis and Kings Beach base camps were not mutually exclusive since base camp sites were multicomponent in every case, although Martis tends to be overrepresented." Elston cautioned, however, that in a difference resource situation elsewhere in the Martis area, sites attributed to the two complexes may prove to be mutually exclusive.

Payen's (1973) survey along the Truckee River offered an opportunity to test the site location hypothesis. Payen expected to encounter Kings Beach materials in this riverine setting based on the model, but such was not the case. Kings Beach materials were virtually absent, which prompted him to reject the hypothesis. Subsequent work by Elston et al. (1977) confirmed the absence of Kings Beach occupation and recovered information that was previously unknown regarding past climatic conditions. Elston found that during much of the time ascribed to the Kings Beach complex, the flow of the Truckee River was much reduced from earlier times, and in fact ceased to flow for long periods of time. This fact, not a difference in prehistoric

settlement preference, most likely contributed to the lack of Kings Beach sites. Thus when climatic data was included, it is not possible to reject the Heizer and Elsasser hypothesis. It remains a testable proposition.

Based on their work along the Truckee River, Elston et al. (1977) have suggested that the Martis Complex corresponded to a period of more favorable climate which allowed for higher resource yields, larger, more stable prehistoric population, and greater cultural complexity with evidence of craft specialization. The latter stems from the presence of a developed biface production industry. From work at a number of sites, including several quarry/workshop sites, Elston et al (1982) has suggested that the volume and nature of the lithic assemblages point to specialized resource procurement strategies which are logistical in nature (cf. Binford 1980). Elston suggests that the workshop sites were visited by special task groups which came for essentially one reason -- the procurement of raw materials for chipped stone tools.

Rondeau (1982) differs with this view and suggests that the sites were visited by groups during the course of their seasonal round and not necessarily by members of special task groups.

If Elston is correct, a very different picture of Martis adaptation emerges which suggests complex social and political structures associated with procurement, redistribution, etc., of resources which more closely approximates ethnographic Nisenan culture. Binford (1980) has suggested that environmental variables dictate whether a mapping-on (logistical) or foraging strategy is employed. The nature and distribution of resources, particularly in the western Sierra, lend themselves to the type of adaptation evidenced by the ethnographic population (i.e., logistical). Without falling into an environmental determinist trap, it is perhaps not unreasonable to suggest that earlier populations also adapted to the environment in a similar way.

Determining the nature of the adaptive strategy of the prehistoric population should be a critical concern of future research. Such studies have the potential of elevating Sierran archaeology from its position as a regional topic and placing it in a position to contribute to more general studies of hunter/gatherer systems.

Boundaries - In his 1960 paper, Elsasser defined the Martis areas as falling into the Transition Zone on either side of the Sierra Nevada. He noted that in the seven years since the Martis Complex was first identified, Martis sites had been found as far north as Honey Lake and extending to Hope Valley in Alpine County to the south. He also noted their occurrence to the east of the Sierra in Spanish Spring, Washoe, and Carson Valleys. Elsasser did not propose any boundary for the complex other than that of the Transition Zone which he stated ranged from 2,500 - 6,000 feet in elevation, depending on which side of the Sierra one is on.

Since 1960, Martis-like assemblages have been found throughout the northern Sierra; and some have even suggested that Martis extends into the Central Valley and southern Sierra. Whether the ever increasing geographic spread of Martis is real or a function of the fact that the definition of the complex has become fuzzy is something yet to be determined. Projectile points from

the Sacramento Valley near Chico are nearly identical in form and material to those from the Martis heartland. Yet, it would be premature to suggest an extension of the Martis Complex into the valley on the basis of projectile points alone.

It would appear that future studies should attempt to better define the characteristics which serve to identify the Martis Complex, preferably employing quantifiable, measurable criteria. It is all too easy to observe "general" similarities among different assemblages, particularly if the assemblages consist of rough chipped stone and ground stone tools used in essentially technoeconomic activities.

Dating - At present the Martis Complex falls within the period from 2000 B.C. to A.D. 500 (Elston et al. 1977). This dating is not far from the guess-date by Heizer and Elsasser (1953) which placed the complex within the first two millenia B.C.

The 2000 B.C. and A.D. 500 dates are by no means firmly established for the entire Martis range. These circumscribing dates are primarily for the eastern region around Lake Tahoe and are based on C14 dates from several sites and typological comparison of projectile points.

In the western Sierra, the dating appears much less firm. Ritter (1971) has suggested that Martis extended in the Auburn area up to A.D. 1300. Other studies of foothill sites (Olsen and Riddell 1963 and Humphreys 1969) hint that the complex may not have appeared until 1000 B.C.

The establishment of firm, temporal limits for Martis have been hampered by several factors. One is a general lack of C14 dates from Martis sites. This is in part due to an absence of datable materials brought about by characteristically acidic soils. It is also due to too few sites being excavated. Those sites which are excavated are not necessarily those with the most information potential; they are generally those which are threatened by modern developments.

A second factor which is not unique to the Sierra but pervasive there is mixing of cultural deposits. A common complaint of virtually every investigator has been that the deposit was badly mixed by rodent activity, tree throw, root action, and/or native practices (e.g., pit house building). The result is that there has been little progress made with relative dating based on stratigraphic positioning of artifacts.

Through the efforts of Jonathan Davis and Robert Elston, substantially more progress has been made towards unraveling the complex natural and cultural stratigraphy of the eastern Sierra area (see Elston et al. 1977 and Elston et al. 1982 for examples). These researchers have combined detailed observation and analysis of soils in the Truckee Basin with the few available C14 dates and have been able to identify temporally diagnostic strata which occur in many areas of the basin. Such sophisticated studies and analyses of soil stratigraphy and depositional history have yet to be done at sites in the western Sierra.

Some progress has been made in the area of obsidian sourcing and hydration. At Bullards Bar, Humphreys (1969) cut 18 obsidian specimens and obtained readings of 1.0 to 6.5 microns. Humphreys obtained an age of 434+ years B.P. for the youngest specimen (1.0 microns) and a 5275 ± 342 years B.P. date for the specimen which measured 6.5 microns. Of interest is that below a recognized stratigraphic break in the deposit, all readings except one were in the 4.3 to 6.5 range.

A trio of readings suggests that the first significant occupation of the area occurred around 3600 to 4000 years B.P. (1600 - 2000 B.C.). Also worthy of note is that a Pinto point yielded a 4.9 micron reading (3638 ± 200 years B.P.). Humphrey appears to have taken a more conservative position regarding this data as he suggested a 500 B.C. date for the beginning of Bullards Bar I. As previously noted, there is some confusion on this point as elsewhere Humphrey refers to there being evidence of 4,500 years of occupation in the locality. The latter estimate would seem to be more in keeping with the obsidian data. A major problem with Humphrey's obsidian hydration data is that the material was not sourced. It is well known that obsidian from different sources hydrates at different rates.

As yet, an obsidian hydration rate specific to the northern Sierra has not been developed. This should be an important task to undertake in the future. Obsidian occurs infrequently in the region, but this dating method achieves particular importance in an area of poor organic preservation.

Table 4. Obsidian Hydration Readings from Selected Northern Sierra Sites.

Microns	Pla-101*	Bullards Bar*	Nev-199
1.0	2	2	0
1.2	0	1	0
1.4	1	0	2
1.6	1	0	1
1.8	0	1	4
2.0	1	0	3
2.2	1	0	1
2.4	1	0	3
2.6	3	0	4
2.8	2	0	1
3.0	1	0	1
3.2	0	0	1
3.4	1	0	0
3.6	1	0	2
3.8	1	1	2
4.0	3	0	1
4.2	3	1	4
4.4	2	1	0
4.6	2	0	2
4.8	2	1	0
5.0	1	0	0
5.2	2	1	1
5.4	2	0	0
5.6	3	0	0
5.8	1	0	0
6.0	1	0	0
6.2	1	1	1
6.4	0	1	0
6.6	0	0	2
6.8	2	0	0
7.0	1	0	0
7.2	1	0	0
7.4	0	0	0
7.6	0	0	0
7.8	0	0	0
8.0	0	0	0
8.2	0	0	0
8.4	0	0	0
8.6	0	0	0
8.8	1	0	0

*Samples not differentiated as to source.

Cultural Relationships - Much of the research concerning the Martis Complex has focused on identifying its position in relation to contemporaneous complexes in California and the Great Basin. Research has also sought to explicate the relationship of Martis to earlier and later cultural manifestation within the Sierra.

The general concensus among researchers is that both California and Great Basin elements may be observed among Martis materials. Elsasser (1960:69) suggested that the materials from site DO-12, located east of the Sierra Crest, were similar to those in Yosemite Valley (Bennyhoff 1956), Mono Lake (Meighan 1955), and the Humboldt lakebed site, 26-CH-15.

At the same time, Elsasser could not ignore the obvious similarity of Martis materials and those from the Middle Horizon of the Central Valley of California. In a recent paper, Markley (1981) has discussed the apparent similarity of Martis projectile points with those of the Early Horizon of the Central Valley. He suggested that Martis may have originated in the Central Valley and moved into the Sierra when Berkeley Pattern populations expanded into the Delta region (Fredrickson 1974). One group may have moved up the American River drainage and eventually settled the eastern Sierra Valleys (Martis, Boca, Stampede, and Sierra). Occupation of the western foothills (Feather, Yuba, and American Rivers) occurred at about the same time. Similarities between the eastern and western Martis groups may stem from a common origin in California while differences developed over time, with the eastern group becoming more Basin-like in its material characteristics. The hypothesis finds support in the fact that the distribution of projectile points within the Tahoe N.F. shows two areas of high projectile point frequency divided by a zone of low frequency, which corresponds to the crest zone. Points of the Elko variety are quite frequent east of the crest and relatively few to the west. The only exception is the Foresthill Divide, where an east-west band of Elko point occurrence exists.

In order to test Markley's hypothesis, rigorous comparative studies of projectile points from the Sierra Nevada and the Central Valley are needed. It should be noted that both Elsasser (1960) and Payen and Olsen (1969) commented on the differences between Martis assemblages from east and west of the crest. Payen and Olson (1969) noted that the points from Nev-15 were more like those from other foothill sites (e.g., Oroville and Bullards Bar) than the high Sierran forms. Elsasser was struck by similarities between points from DO-12 and other Great Basin sites.

The analysis and classification of projectile points from the Sierra Nevada has been hampered by a seemingly endless variety of styles. Although specific types have been defined (Martis Contracting Stem, Streamboat, etc.), the classification criteria are generally not very specific, resulting in a variety of stylistically different points being subsumed under one or another type designation. The use of keys such as that developed by Thomas (1970) for the Great Basin and Leventhal (Elston et al. 1977) for the Tahoe-Truckee area does not resolve the problem (cf. Markley 1980 and Johnson et al. 1980). In some cases the parameters used in the keys are based on only a few specimens and, therefore, do not adequately consider the range of variablility that exists. Secondly, as Thomas (1970) stressed, such keys should be based on recognized and accepted types. This has not always been the case.

A number of researchers have recognized that distinctive projectile point styles occur in the northern Sierra Nevada, but little progress has been made towards actually defining types. One problem is that oftentimes stylistically distinctive points that come from excavated sites are represented by too few specimens to allow for designation as a type.

Another problem stems from an apparent reluctance to define types based on collections recovered during archaeological surveys. The implication is that projectile point types which stem from excavations are more valid. If the goal is to establish temporal types (Thomas 1981), data obtained through excavation where temporal controls exist are more valuable. However, if we wish to establish morphological types, the source of the data (survey vs. excavation) is practically irrelevant. In fact, projectile points recovered during surveys covering broad areas of the Sierra may provide the only opportunity to recognize regional types which have cultural/historical significance. If particular groups or bands made distinctive types of points, the distribution of those types may provide information regarding settlement patterns, extent of seasonal movements, etc. It has only been in the last ten years that large scale survey data have been available, and the potential of these data have yet to be fully realized.

In the western Sierra foothills, near Oroville, Olsen and Riddell (1963) identified the Messilla Complex, which they dated at prior to A.D. 1. Similarities with Heizer and Elsasser's Martis complex were recognized by Riddell and Olson as well as subsequent researchers in the region (Ritter 1968 and Markley 1978). Similar observations at other foothill localities (Bullards Bar and Auburn Reservoir area) suggest the Messilla complex may be a general foothill complex and possibly a somewhat distinct western expression of the Martis Complex. The significance of the Messilla Complex and its relationship to Martis has yet to be fully addressed. In a recent paper Farber (1982) has argued that there are a number of consistent and significant differences between eastern and western Martis assemblages. Of note is the presence of red ochre, quartz crystals, and charmstones in western sites, while they are virtually absent in eastern sites. Farber (1982) suggests that this points to religious/ceremonial differences between the two areas. He suggests that the western Martis expression be referred to as the Messilla Complex, with the term Martis Complex used to refer to the eastern Sierra assemblages.

The relationship of Martis to the Kings Beach Complex has been most fully explored by Elston in the eastern Sierra. Originally, Heizer and Elsasser perceived a break in the sequence between the two complexes; but Elston (1971) was able to demonstrate a direct continuity from Martis through Kings Beach to ethnographic Washo. Linguistic data (Kroeber 1955) may be viewed as supporting the archaeological evidence for this historical continuity.

In the western Sierra, the picture is much less clear. First, it has not been clearly demonstrated that the Kings Beach Complex exists in the western Sierra. Late prehistoric materials in the latter area show few, if any, differences from the complex of traits which characterize Kings Beach; yet the established archaeological sequence in the west suggests there are significant historical-developmental differences between the two areas. For example, in the Oroville locality, the established sequence runs from Messilla (prior to

A.D. 1) to Bidwell (A.D. 1 to A.D. 800) to Sweetwater (A.D. 800 to A.D. 1500) and finally to Oroville (A.D. 1500 to historic contact). At Bullards Bar there is Bullards Bar I (500 B.C. to A.D. 1), Bullards Bar II (A.D. 1 to A.D. 1000), and Bullards Bar III (A.D. 1000 to A.D. 1500).

In general, the temporal divisions denote technological changes or changes in projectile point styles, and in some cases there are supporting C14 dates. In contrast is the Kings Beach Complex, which began about A.D. 500 and is divided into two phases: early (A.D. 500 to A.D. 1200) and late (A.D. 1200 to historic Washoe).

A developing body of linguistic data (Whistler 1977 and Levy 1979) suggests that complex population movements/replacements occurred in the western Sierra foothills during the last 500 to 1,000 years. It then would seem, based on available evidence, appropriate to view western Sierra prehistory as "different" from the eastern, Kings Beach, variety. The implications of this late prehistoric phenomenon for interpretation of earlier prehistoric periods have yet to be fully explored.

With few exceptions, the search for interregional similarities and differences among archaeological assemblages has been cursory in nature. Future research should attempt to quantify and make measurable, perceived differences or similarities among archaeological data.

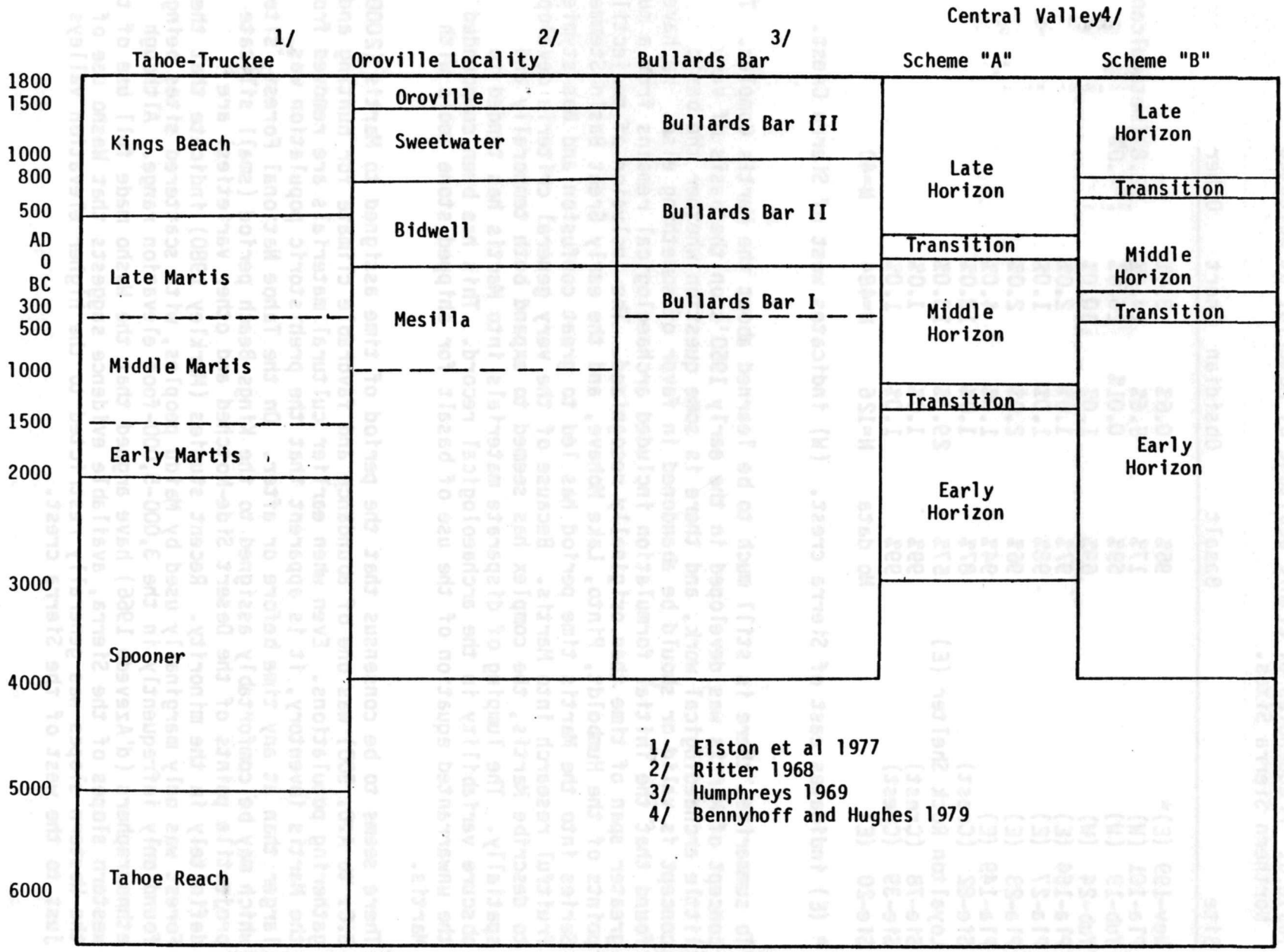


Table 5. Chronological Sequences in the Vicinity of the Tahoe National Forest

Table 6. Frequencies of Lithic Debitage by Material at Selected Northern Sierra Sites.

Site	Basalt	Obsidian	Chert	Other
Nev-199 (E)*	96%	0.6%	3.4%	--
Pla-101 (W)	17%	5.6%	14.6%	62.8%(metavolcanic)
Yub-19 (W)	69%	0.01%	26.0%	4.0%
Yub-24 (W)	69%	1.0%	30.0%	
Pla-164 (E)	97%	1.0%	2.0%	
Pla-27 (E)	98%	1.0%	1.0%	
Pla-23 (E)	96%	2.0%	2.0%	
Pla-149 (E)	94%	1.0%	4.0%	
Sie-82 (Crest)	87%	1.0%	13.0%	
Loyalton Rock Shelter (E)	57%	29.0%	13.0%	
Sie-78 (Crest)	99%	1.0%	1.0%	
Sie-39 (Crest)	99%	1.0%	1.0%	
Sie-20 (E)	No data	N=126	N=484	N=40

* (E) indicates east of Sierra crest. (W) indicates west of Sierra Crest.

To summarize, there is still much to be learned about the Martis Complex. The concept of Martis was developed in the early 1950's on the basis of very little archaeological work, and there is some question whether the basic concept is valid or should be abandoned in favor of something else. We have found that the initial formulation included archaeological remains from a much greater span of time than originally recognized. The inclusion of projectile points of the Humboldt, Pinto, Lake Mohave, and the early Great Basin Stemmed Series into the Martis time period has led to great confusion and has stymied fruitful research into Martis. Because of the very general criteria developed to describe Martis, the complex has seemed to expand both temporally and spatially. The lumping of disparate materials into Martis has tended to obscure variability in the archaeological record. This has been compounded by the unwarranted equation of the use of basalt for chipped stone tools with Martis.

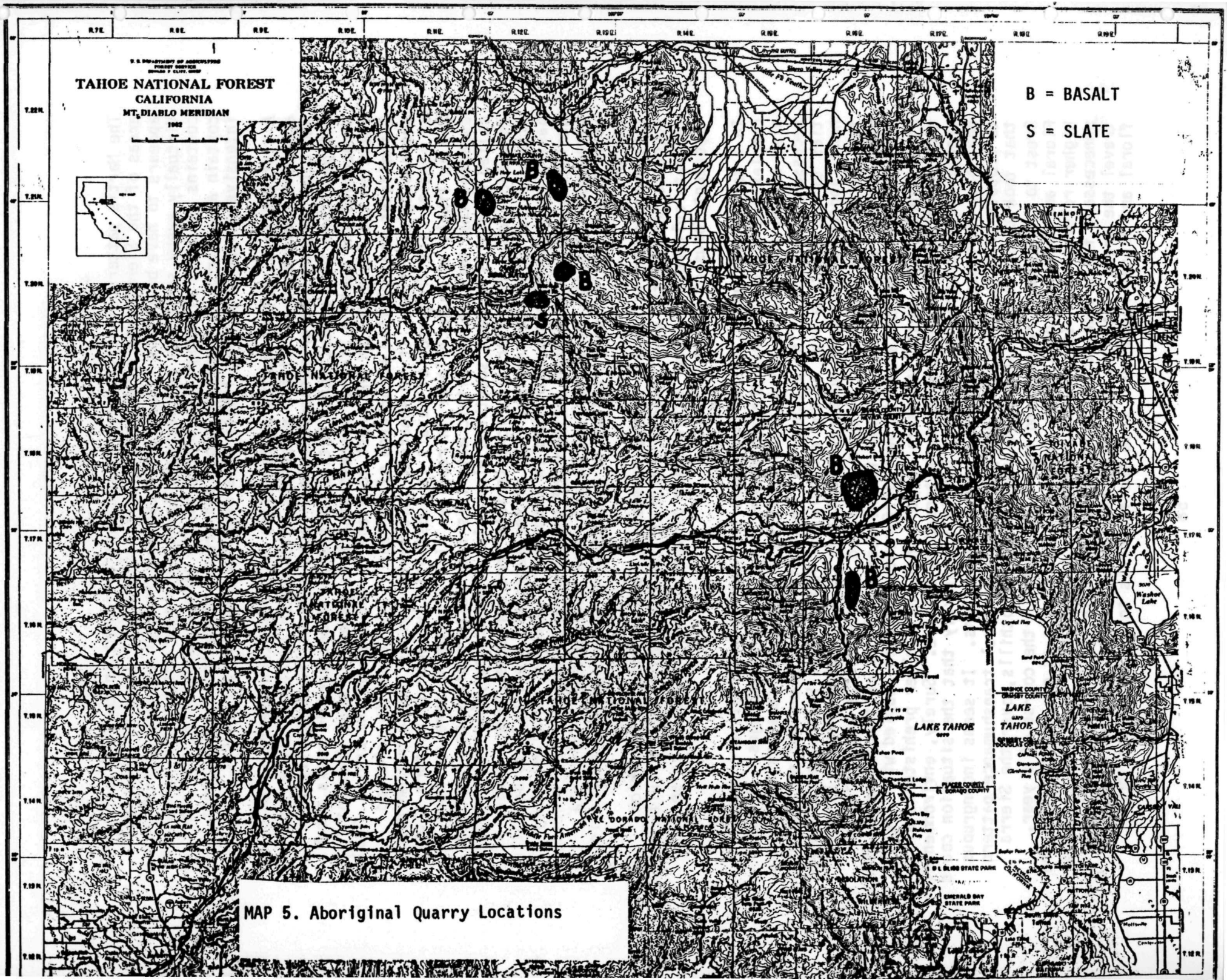
There seems to be consensus that the period of time assigned to Martis (2000 B.C. to A.D. 500) was one of abundance and favorable climate for hunting and gathering populations. Even when earlier cultural materials are removed from the Martis inventory, it is apparent that the prehistoric population was larger than at any time before or after. On the Tahoe National Forest, sites which may be comfortably assigned to the Kings Beach period (small silicate projectile points of the Desert Side-Notched and other varieties) are definitely in the minority. Recent studies (Markley 1980) indicate that the Forest was only marginally used by Maidu peoples, with scattered sites being found only infrequently in the 3,000-5,000-foot elevation range. Although ethnographers (d'Azevedo 1966) have argued that the Washo made full use of the western slopes of the Sierra, available evidence suggests that Washo use of the Western slopes was generally restricted to the higher elevation valleys just to the west of the Sierra crest.

The Martis pattern of utilization is somewhat different in that virtually all areas of the Sierra were occupied at least seasonally. The only area that appears to have been less intensively used was the high elevation crest zone. Virtually every spring on the westward trending ridges which cross the Sierra contains evidence of occupation during Martis times. Generally, the sites contain a wide range of chipped stone and ground stone tools and suggest intensive occupation, most likely on a repeated year-to-year basis.

A distinctive aspect of Martis period sites in the western Sierra is an apparent preference for lithic materials which occur locally. Slate, schist, and other metamorphic or metasedimentary rocks were utilized heavily for chipped stone tool production. Metasedimentary and metamorphic rocks occur throughout the western Sierra, whereas basalt is generally most abundant (at least on the Tahoe NF) in the crest zone and to the east of the crest. Table 6 indicates the relative occurrence of various lithic types in selected archaeological sites. It is apparent that eastern sites show a predominance of basalt. The frequency of basalt is substantially lower in western sites, and is likely to be much lower in reality. It is becoming more and more apparent that much of the lithic materials from western sites that we have called basalt is in fact something else. In a recent study (Jones, personal communication), dark black lithic materials were collected from a number of sites in the Yuba River region. All of the materials are likely to be called basalt by archaeologists untrained in lithology. However, detailed study by a geologist who analyzed thin sections of the materials revealed that schist, metamorphosed slate, etc., and not basalt, were represented. This is a significant finding that promises to dramatically alter our view of Martis.

This evidence is in keeping with a developing body of information which suggests that Martis may in fact consist of two geographically and culturally separate cultures. Further exploration of this possibility must be an important focus of future research.

In a series of studies, Elston has shown that Martis materials are more complex and elaborate than the subsequent Kings Beach assemblages. He has also argued that Martis populations utilized a logistical strategy to procure necessary resources. The picture that begins to appear bears marked similarities to the adaptive ways of the ethnographic Maidu. The Washoe, on the other hand, appear to have been more representative of a foraging group. Despite this recognized difference, we have continued to view Martis adaptation as being essentially the same whether in the western Sierra or the eastern. The environment in the two areas is very different, and when coupled with the ethnographic data, must lead us to suspect that the earlier prehistoric situation was also different than we have tended to believe. Surely, environmental changes have occurred in the past, but it is unlikely that the situation could have been that much different than current conditions. It seems incongruous to propose that Martis populations practiced a seasonal transhumance pattern that took them from the lower elevation western foothills, over the Sierra Crest to the eastern ranges, and then back again in the course of a year. Floral and faunal changes occur rapidly in the Sierra as one ascends into the higher relevations. It does not necessarily have to hold true, but it seems unnecessary for a prehistoric group who wintered in the Sierra foothills to travel the great distances some would have us believe to procure essential floral and faunal resources. From the foothills to the crest are three



MAP 5. Aboriginal Quarry Locations

distinct environmental zones, each with distinctive flora and fauna. The ethnographic Maidu found it unnecessary to intensively exploit each of the zones. Instead, they appear to have focused on the transitional zone below about 5,000 feet elevation. Based on climatic changes of the magnitude we believe occurred, it is unreasonable to suggest that the earlier populations differed significantly in their transhumance patterns.

Data from the Tahoe NF indicate that higher than average site densities occur at 2,400-2,800 feet elevation, 4,000 feet, and 6,800 feet. The low-and mid-range areas are likely to represent western Martis and Maidu occupation while the 6,800-foot zone corresponds to the higher elevation area just west of the crest and represents eastern Martis and Washoe/Kings Beach occupation.

Antiquity of Ethnographic Patterns

Although not a principal focus of research, the tracing of ethnographic practices back in time has been attempted by most researchers (Ritter 1971).

In the western Sierra, the following are some ethnographic traits/practices which have been observed archaeologically to extend into prehistory:

- Use of steatite for vessels and implements
- Construction of semisubterranean structures
- Specific burial practices
- Manufacture of bone artifacts (beads, pins, tubes, etc.)
- Use of mano/metate and mortar/pestle.

Washoe culture has been extended back to A.D. 500 essentially as it was known ethnographically. Several graduate students at the University of Nevada, Reno (Seck 1978 and Jack 1978) have developed a model of Washoe settlement and subsistence which has proved useful for predicting the location and content of late prehistoric sites (Turner and Hamby 1982).

Lithic Technology

In an area where the majority of archaeological materials is chipped stone tools, it is not surprising that lithic analysis has become a major component of archaeological studies in the Sierra.

In the 1950's and 1960's, lithic studies focused on morphological attributes, and artifacts were classified as side scrapers, knives, choppers, etc. The function of various artifact types was largely inferred until the late 1960's and 1970's, when replicative studies were initiated to determine the kinds of edge modification that resulted from working bone, wood, hide, and other materials presumably processed by aboriginal peoples.

Studies in the Sierra (Markley 1978) drew from the results of functionally based lithic analyses and attempted to classify artifacts on the basis of edge form and suspected use-wear characteristics.

By the late 1970's, replicative studies involving the manufacture of chipped stone tools were becoming increasingly frequent. These studies indicated

(Rondeau 1980) that much edge wear previously thought to have resulted from use was actually a product of tool manufacture. Edge preparation during manufacture was found to cause striae and abrasions which earlier had been viewed as evidence of use.

Basalt bifaces are a frequent artifact in Sierran sites and have been the subject of much discussion (Elston et al. 1977 and Rondeau 1982). It seems fairly certain now that most bifaces were not finished artifacts, but rather represent a stage in the lithic reduction process. Elston et al. (1977) have applied a scheme (following Muto 1971) to characterize bifaces in terms of trajectories. A trajectory is a sequence of transformations that an artifact goes through during manufacture. The process of reducing a core to a finished projectile point is an example of a trajectory. Replicative studies have shown that breakage of bifaces most likely occurred during manufacture rather than as a consequence of use.

The study of lithic technology involving replication of archaeological specimens has important implications for unraveling Sierran prehistory. It may be expected that technologies changed through time, and if the postulated population replacements in the western Sierra did in fact occur, they should be evidenced by changes in stone tool technology. Irrespective of function or style, technology can be an important tool to study cultural stability and change.

Function and form (or style) must not be ignored in favor of technological analysis, for both may provide important information on cultural contacts, environmental adaptation, and resource utilization. Future studies must look at form, function, and technology in the analysis of lithic assemblages.

The possibility that the procurement of raw materials used in tool manufacture involved a logistical strategy and that the products (i.e., bifaces) may have been trade items has been discussed in a preceding section. Another aspect of lithic production which has been recognized and warrants further work is the heat treating of chert. This practice, which apparently enhances the knappability of chert, has been observed at a number of sites within the Tahoe National Forest (Markley, personal observation), including CA-NEV-318 (Farber 1982).

Palaeoclimatic Studies

A body of data is beginning to accumulate that indicates that significant climatic changes have characterized the past 10,000 years in the Sierra Nevada. However, work is only just beginning that is concerned with establishing the magnitude of these changes and their effects on environmental and cultural systems. In the southern Sierra, Moratto, King, and Woolfenden (1978) utilized palaeoclimatic data to help explain observed changes in the archaeological record. Similar studies have been undertaken by Elston et al. (1977) in the Truckee River area. It is apparent, though, that the palaeoclimatic picture is not very clear. Part of the problem lies in trying to interpret climatic data from a variety of sources. Studies of fossil pollen, tree rings, etc., tend to produce conflicting results (see Moratto, King, and Woolfenden), and often it is uncertain whether vegetational changes were brought about by temperature or precipitation variations. While the

Altithermal episode in the Great Basin seems to be generally accepted, it is unknown whether a similar dessication occurred in California at the same time. In viewing the modern climatic situation, it is apparent that slight changes in the location of high pressure zones can affect whether Pacific winter storms bring precipitation to the Sierra. Palaeoclimate must be studied on a micro rather than a broad macro level. It does not seem sufficient to reconstruct the climate of the western Sierra on the basis of dendrochronological data from Bristle Cone pines in the White Mountains. Ample opportunities exist in the western Sierra to obtain localized climatic data. Cores from lakes and bogs (Hawley Lake is a good example) could be obtained to provide a much more localized climatic reconstruction. Such studies are unlikely to be generated by traditional cultural resource management avenues, however, and other sources of funding (NSF, NDEA grants, etc.) must be explored.

Table 7. Climatic Variability in the Tahoe-Truckee Region

Climate	Chronology
dry, like Hypsithermal	present
	50 BP
wet, Neoglacial, small glaciers, vegetation similar to today, dry summers	
	600 BP
dry, trees grow in Ralson Ridge Bog and Osgood Swamp	
	1400 BP
less dry, no glaciation, dry summers	
	2000 BP
wet, Neoglacial, wetter summers than later	
dry interval?	2500 BP
wetter summers than later	
Neoglacial begins	3000 BP
Lake Tahoe overflows	4000 BP
Dry, Hypsithermal (Altithermal)	
moist interval?	5850 BP
Lake Tahoe does not drain	
	7000 BP
	7200 BP
dry interval?	7600 BP
Anathermal (Valderan, Hilgard), warming climate generally similar to Neoglacial	
	8800 BP
cold interval?	9000 BP
	10,000 BP
glaciers suddenly retreat	
Glacial	

(From Elston et al. 1977)

The Role of the Foresthill Divide in California-Great Basin Prehistory

The Foresthill Divide is a long, continous ridge that separates the North and Middle Forks of the American River. It trends northeast-southwest from near Auburn, California, to the Sierran Crest near Lake Tahoe. Archaeological surveys conducted over the past 10 years have succeeded in identifying a variety of prehistoric sites. Most notable is a series of large sites associated with springs located between 4,200 and 6,700 feet in elevation. As a group, they appear to contain a richer and more varied artifact assemblage than observed at sites located on similar ridges to the north.

As previously discussed, the distribution of Elko and Martis projectile points within the Tahoe NF shows the Foresthill Divide to be an anomaly in that there is a greater frequency of Elko points than for the west side of the Forest overall. Early points, including those of the Great Basin Stemmed Series, occur frequently, as do milling tools and enigmatic grooved stones. The latter occur both in central California and the Great Basin.

It has been suggested that the Divide may have been a major travel route in prehistoric times. It was d'Azevedo (1966) who indicated that the Washoe travelled as far as the Colfax/Auburn area in the ethnographic period and information from local informants indicates the Washoe seasonally occupied the Foresthill region around the turn of the century.

Based on an analysis of projectile points from the Tahoe N.F. Markley (1981) postulated that the Martis Complex represents the movement of Central Valley (Windmiller) peoples out of the Delta around 2,000 to 1,000 B.C. in response to a climatic change which also saw San Francisco Bay Area populations, representing the Berkeley Pattern, moving into the Delta. Several Windmiller populations may have become established in the Sierra; one in the western foothills and one in the high elevation eastern Sierran valleys. The Foresthill Divide may have served as the primary route for this movement to the eastern Sierra and may have provided a continuing link between the eastern and western Martis populations.

Test excavations were conducted at one of the larger sites on the Divide (Sailor Flat, PLA-500) in 1983 (Wohlegmuth 1984). This work attempted to test the hypothesis that the Divide played a special role in California-Great Basin exchange. The results of this limited test were inconclusive, but suggest that further studies should be undertaken. Such work should include excavations in the crest zone, lower elevation seasonal use zone, and the foothill zone where winter villages were located. Additional obsidian studies are called for as is the reanalysis of lithic assemblages from sites excavated in the 1960's.

Models of Northern Sierran Prehistory

The Chartkoff, Johnson, and Miller Hypothesis

This hypothesis may be stated as follows:

In the Sierra Nevada foothills and adjacent Sacramento Valley, prehistoric occupation centered first in the foothills, where resources were most varied

and abundant, particularly vegetation which produced edible seeds. The prehistoric population processed these hard seeds using the mano and metate. As the population grew, it expanded into the valley, carrying the mano/metate complex with it. As acorn use developed, the mano/metate was replaced by the mortar/pestle combination. The mortar/pestle tool kit then spread into the foothills.

The formulators of this model did not relate it to linguistic groups, but Kowta (1978:2) has suggested that it may be implied that it was Penutian speakers who first inhabited the foothills, possibly displacing Hokan speakers, before expanding into the valley. Based on this model, the following should obtain:

1. Manos and metates should occur stratigraphically below mortars and pestles in Sacramento Valley sites.

2. The change (in the valley) to the mortar/pestle will occur gradually, not abruptly, as the resident population increasingly incorporates acorns and other pulpy foods into its diet.

3. In the foothills there will be evidence of population replacement (introduction or cessation of distinctive artifact types, technologies, different settlement patterns, new architecture, different trade patterns, petroglyph styles, etc.)

4. Archaeological materials from the valley and foothills at the time when the mortar and pestle both are observed to occur in the two regions will be markedly similar. Artifacts which functioned primarily in social and religious contexts will show more interregion stylistic similarity than artifacts used in subsistence pursuits. The technology evidenced by chipped stone tools will be markedly similar at that point in time.

The Martis Complex Origins and Areal Distribution: The Elsasser (1960) Hypothesis

1. The Martis Complex represents a higher altitude or summer manifestation of a culture which was centered farther out in the Great Basin.

2. The Martis Complex represents a summer manifestation of a culture whose point of origin was central California during Middle Horizon times.

3. The Martis Complex represents an indigenous culture which developed in the Sierra Nevada without strong reference to cultures on either side of the Sierra.

In the discussion presented by Elsasser (1960:72-73) two levels of study are intermixed. On one level it appears that Elsasser saw the Martis Complex as representative of a "culture area," and he sought to discover relationships with other such culture areas. On the other hand, Elsasser was concerned with patterns of subsistence and settlement which might be inferred from the distribution of archaeological remains.

Little headway has been made regarding Elsasser's hypotheses. This may be due to a lack of focus and confusion over what phenomena (broad intercultural relationships or intragroup subsistence-settlement systems) are being studied.

The two subjects should be studied separately if progress is to be made on either front. The question of inter-area relationships is the more difficult of the two for a number of reasons. First, it may be expected that population movements occurred in the past, resulting in the transference of cultural "traits" among and between geographic regions. Whether this transference or diffusion was brought about by the physical movements of people or ideas is difficult to demonstrate. Second, in the Sierra Nevada most cultural remains consist of technological items used in subsistence pursuits. Except for certain stylistically distinct projectile points, the assemblages are by and large very similar from area to area, and provide little upon which to base cultural-historical reconstructions. It is likely that inter-area contacts ebbed and flowed and that any assemblage in the Sierra at any particular time will show Great Basin or California traits. Their significance, though, is difficult to establish.

The question of how prehistoric peoples (particularly those we have referred to as Martis) adapted to the Sierran environment can be addressed in a more tangible way and hopefully with better results. Much progress has been made in subsistence-settlement pattern studies in recent years, and such an approach to Sierran archaeology can be pursued without undue reliance on cultural-historical explanations. The results can be utilized in a cross-cultural way to better understand human adaptive systems and those of hunters and gatherers in general. The Sierra Nevada could and should be a testing ground for models of general hunter-gatherer behavior and adaptation and perhaps a source of generalizations which may be tested elsewhere in the world, thus elevating Sierra Nevada archaeology from its cultural-historical quagmire to a contributor to anthropological science.

Prehistoric Subsistence Strategies

Binford (1980) has suggested that the nature and distribution of resources in a particular environment is an important determinant of the structure and organization of an aboriginal subsistence-settlement system. One may envision an adaptive continuum, with foragers on one end of the scale and collectors or harvesters at the other end. Simply stated, foragers move people to resources while collectors move resources to people. In the northern Sierra the Washoe practiced more of a foraging strategy while the Maidu were collectors. The Washoe were relatively mobile and broke up into smaller family-based groups during particular seasons to exploit resources which were both diverse and dispersed. The Maidu, who occupied the western Sierra, were more sedentary, and ulitized task groups to seek out and procure resources for consumption and use by the group as a whole. The two different environments occupied by the Washoe and Maidu required different exploitative strategies, and the systems which evolved and which were recorded ethnographically are essentially as would be expected given Binford's general thesis. If Binford is correct, we might hypothesize that such an east-west difference in exploitative strategy prevailed in the more distant prehistoric past. We should expect that Martis peoples living east of the crest practiced a foraging strategy while those occupying the western region were more like the Maidu in their adaptation.

Looking specifically at the northern Sierra, the evidence amassed thus far from excavations and from surveys within the Tahoe NF suggests that the Washoe occupied the eastern region of the Sierra and that their seasonal movements took them only as far west as the high elevation valleys which form the headwaters of the Yuba, Bear, and American Rivers, which drain into California. The Maidu most intensively exploited the western foothills (see Ritter and Matson 1972) and utilized the higher transition zone (2,500-5,000 feet) seasonally. Despite the contention of d'Azevedo (1966) that the Washoe frequently occupied the western foothills and occasionally wintered with Maidu relatives, other ethnographic data (Littlejohn 1928) and archaeological data suggest that the two groups interacted very little and were generally spatially separated by the Sierra Crest environment. The high elevation western crest zone is relatively poor in archaeological remains from all time periods, which suggests that the ethnographic patterns may have characterized earlier periods.

The hypothesis may be stated as follows: The eastern and western Sierra Nevada represent two environmentally distinct zones which required different adaptive strategies. To exploit the resources characteristic of the eastern zone, prehistoric populations employed a "foraging" strategy involving relatively frequent residential moves by small family groups. In the western zone a "logistical" strategy was employed by prehistoric people in which residental moves were infrequent and task groups moved resources to people rather than vice versa.

In testing the hypothesis, the ethnographic situation provides a baseline to compare with. The ethnographic pattern appears to support the hypothesis, but whether it holds for all time periods has not been demonstrated. By working backward in time (essentially the direct historical approach advocated by Heizer in 1941), research can establish whether the hypothesized system prevailed. If it is found that earlier populations adapted in ways different from those expected or hypothesized, there may be reason to reject the hypothesis. However, it may be that environmental conditions were different in the past which account for a different than expected subsistence settlement pattern. Studies by Elston et al. (1977) and Moratto, King and Woolfenden (1978) suggest that climatic changes may have been rather dramatic during the Holocene and caused changes in prehistoric adaptive strategies. Likewise, it may be that earlier populations lacked knowledge of certain technologies or processes (i.e., acorn leaching) which prohibited them from adapting to their environment as the ethnographic populations did.

In any event the hypothesis provides an idealized situation from which we can make observations about earlier patterns and attempt to explain any differences which are perceived. At present there are several viewpoints regarding the strategy employed by Martis peoples. Elston (1971) and Elston et al 1977 and 1982) sees the Martis population as larger and more sedentary than the later Kings Beach or Washoe, with a more elaborate culture and evidence of craft specialization. Elston et al suggests (1982) that lithic procurement involved a logistical strategy in which specialized task groups traveled to quarry areas and procured raw materials, which were transported back to a larger group. Rondeau (1980 and 1982) suggests that the apparent abundance of Martis sites is due to the fact that we have equated Martis with

basalt and have unnecessarily lumped materials from a long span of time into the Martis period thus giving the appearance of a larger population than existed. Rondeau (1982) suggests that lithic raw material procurement was done during the course of a seasonal round, not by specialized task groups who were logistically organized. To solve the problem requires data from more than one site. Data from surveys may be helpful, and by identifying the types of sites in the region, we may be able to determine whether a logistical strategy was in existence during earlier prehistoric periods. Systematic surface collections and test excavation will be necessary to accurately characterize and classify the sites.

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