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The Kern County Archaeological Society Journal is published on an occasional basis. The Journal publishes articles and reports on the archaeology and ethnography of Kern County and surrounding areas.

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Cover illustration: Moche two-dimensional balsa motif
(see article by Osborne beginning on page 35)

KERN COUNTY ARCHAEOLOGICAL SOCIETY JOURNAL

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MESSAGE FROM THE EDITOR

This is the eighth volume of the *Kern County Archaeological Society Journal* that has been published to date. We still have a limited number of copies available of Vol. 3 (1992), Vol. 4 (1993), Vol. 5 (1994), Vol. 6 (1995), and Vol. 7 (1996). As always, the goal of the Kern County Archaeological Society (KCAS) is to publish a *Journal* annually, and with enough submissions we will continue to be able to accomplish this goal.

The KCAS is interested in papers on the archaeology or ethnography of the San Joaquin Valley and surrounding areas written by members of the KCAS or others in the community, whether they be professionals, students, or avocationalists. We always strive to include as many articles as possible and encourage authors to submit their papers for consideration. By publishing such material, it is our hope that we may benefit our members by making available the important archaeological and ethnographic work being done in the San Joaquin Valley and environs, as well as educating the public about the significance of such work.

Finally, I thank Mark Q. Sutton and Adele Baldwin for their valuable assistance in preparing this issue of the *Journal*. I also thank the authors whose articles appear in this issue for putting up with my incessant demands for perfection during the editorial process. Their patience will someday be rewarded.

Jill K. Gardner
Editor, *Kern County Archaeological Society Journal*, Vol. 8 (1997)

A BACKGROUND FOR ARCHAEOLOGICAL INVESTIGATIONS AT BUENA VISTA LAKE, SOUTHERN SAN JOAQUIN VALLEY, CALIFORNIA

Mark Q. Sutton, Dept. of Sociology and Anthropology, California State University, Bakersfield.

INTRODUCTION

Buena Vista and Kern lakes, the major bodies of water present in the southern San Joaquin Valley (Fig. 1), were the scene of human occupation for many millennia. Large, complex, and deep sites, containing a great quantity of cultural remains, are present along the shores of both lakes. Due to their visibility, these sites have been subjected to severe vandalism for the last century. The damage to many of these sites is so extensive that their ability to contribute to any meaningful anthropological research in the region has been seriously questioned.

Recently, archaeology classes from California State University, Bakersfield (CSUB), have been conducting investigations at sites located along the northwestern shore of Buena Vista Lake in the vicinity of its outlet channel, Buena Vista Slough, within ARCO Western Energy's South Coles Levy Ecological Preserve. The intent of this paper is to provide a backgound for these ongoing investigations.

ENVIRONMENTAL BACKGROUND

Hydrology

The Buena Vista Lake Basin is located at the southern end of the San Joaquin Valley of California. The valley is drained by the Kern and San Joaquin rivers, which debouch through the Carquinez Strait into San Francisco Bay. The San Joaquin Valley is bounded on the east by the central and southern Sierra Nevada, on the southeast by the Tehachapi Mountains, on the south by the San Emigdio Mountains, and on the west by the Temblor and Diablo ranges. At the south end of the Temblor Range, and immediately to the west of Buena Vista Lake, lie the Elk and Buena Vista hills (Fig. 1). Buena Vista Creek, an intermittent stream, drains a portion of the Elk Hills and flows into Buena Vista Lake from the west.

In pre-agricultural times, the landscape of the southern San Joaquin Valley was considerably different than it is today. A network of interconnecting lakes, rivers, streams, and sloughs that were charged by the Sierra Nevada snowpack dominated the eastern and central portions of the valley. As a result of these water sources, an otherwise xeric land was the home of biotic communities usually associated with a mesic environment.

The diversion and channelization of the Kern, Tule, Kings, Kaweah, and other rivers during the past century have dramatically affected the physiography of the valley. Tulare Lake became dry in the 1920s when the Kings River was diverted away to provide irrigation water for agriculture. A similar fate befell Buena Vista and Kern lakes when the path of the Kern River was modified and channelized and its flow later controlled via the dam at Lake Isabella. Thus, the current path of the Kern River, flowing west of Bakersfield and into the northern portion of Buena Vista Lake (very close to the Buena Vista

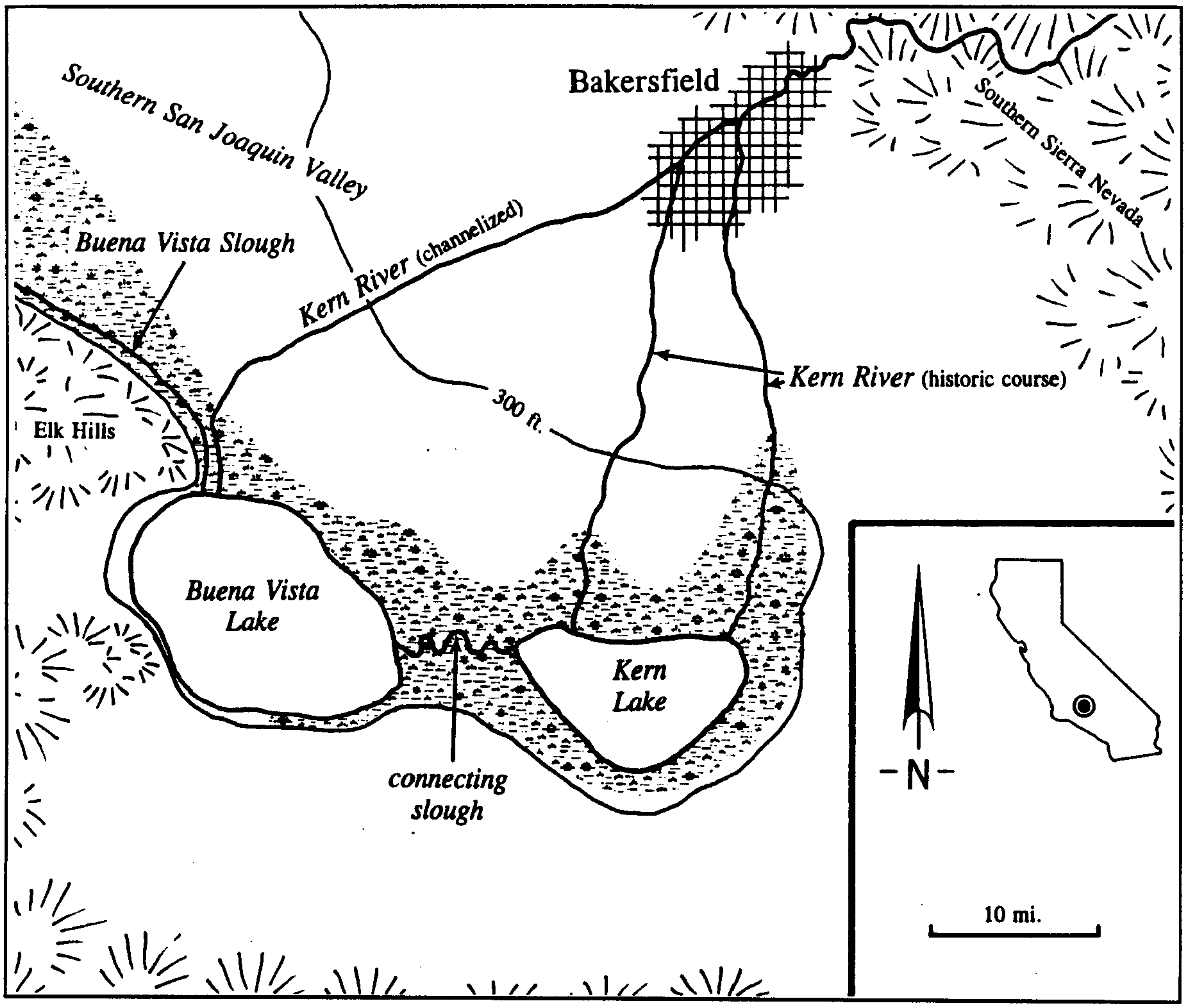

Fig. 1. General map of the southern San Joaquin Valley, showing the location of the Buena Vista Lake Basin.

Slough), is likely recent. Historical documentation, such as old place-names, old maps, and reported locations of ethnographic villages, suggests that prior to about 1860, the Kern River flowed south of Bakersfield and entered the northern portion of Kern Lake.

Climate

The climate of the southern San Joaquin Valley is categorized as Mediterranean, which is characterized by hot, dry summers and mild, semiarid winters. The Sierra Nevada provides a barrier for the valley against most of the cold air that moves southward during the winter, while the Coast Ranges, with an average altitude of approximately 1,220 m. (4,000 ft.), mitigate the marine weather patterns of the Pacific Ocean (Elford and McDonough 1964:1-4). The average yearly precipitation in the Bakersfield area is 6.36 inches, with approximately 70% of it falling between December 1 and April 1. Dense fog, caused when moist air is trapped in the valley by a high pressure system, is common during the months of December and January. Occasionally, this condition—known locally as "tule fog"—will continue day and night for up to three weeks (Felton 1965:103). During the summer, temperatures frequently exceed 100° F., with the City of Bakersfield reporting temperatures in excess of 90° F. for about 110 days each year.

Plant Communities

The principal plant communities dominating the southern San Joaquin Valley are Lower Sonoran Grassland, the Alkali Sink Association and, to a limited extent, the Freshwater Marsh Association (Twisselman 1967:87-92, 115-117). Each of these communities is represented within the Buena Vista Lake area, although the Freshwater Marsh Association was considerably more prominent prior to the latter part of the nineteenth century.

Lower Sonoran Grassland. The southern valley is recognized as a true desert (Twisselman 1967) and, as previously mentioned, receives a minimum of precipitation. The area is internally drained and, as a result, plants must be drought- and salt-tolerant to survive. The most common and widespread perennial shrub is the common saltbush (*Atriplex* spp.), which thrives throughout much of the southern valley (Preston 1981:24). Another conspicuous member of this plant community is Russian-thistle or tumbleweed (*Salsola Kali* var. *tenuifolia*), which in some years covers thousands of acres. The balance of the Lower Sonoran Grassland Community is primarily comprised of winter annuals, many of which are introduced species. During the winter months, the moisture from the dense tule fog supplements the limited rainfall.

Alkali Sink Association. Soils in the arid and poorly drained plains of the southern valley are highly mineralized. While all plants included in the Alkali Sink Community are considered halophytics, not all require salty soil to prosper (Twisselman 1967:88). Various species of saltbush (*Atriplex* spp.), for example, fit into this category. Other plants, such as pickleweed (*Allenrolfea occidentalis*), glassworts (*Salicornia subterminalis*), and seep weeds (*Suaeda* spp.), appear to demand highly alkalotic soil in order to flourish.

Freshwater Marsh Association. Though few vestiges of this community are present today, much of the project area was comprised of marshlands in the not-too-distant past. The plants that make up the Freshwater Marsh Community were extremely important to the aboriginal inhabitants of the southern San Joaquin Valley. The marshlands in general are often referred to as the "tules," "tulares," or "los tulares" (Bolton 1935:7). This is derived from the name of the common tule (*Scirpus acutis*), one of the most utilized plants in the Freshwater Marsh Community. Other species of *Scirpus*, as well as cattail (*Typha* spp.), spike rush (*Eleocharis* spp.), and sedges (*Carex* spp.), were also prominent in the environment (Preston 1981:22). The exploitation of these and other marshland plants by native peoples cannot be overstated.

Animals

An extensive variety of animals is represented in the area surrounding present-day Bakersfield. However, many species that were important to the aboriginal resource base are no longer found in this region. Environmental pressures brought about after European contact (approximately A.D. 1770), created primarily through hunting, mining (many of the large mammals were killed to provide food for the gold rush miners), and farming, have radically altered the faunal makeup of the region. In addition, the desiccation of the lakes, rivers, and sloughs either eradicated or greatly reduced the numbers of mollusks, fishes, amphibians, and waterfowl that were formerly indigenous to the area.

Mammals were abundant in the southern valley (Jamison and Peeters 1988). Large mammals included tule elk (*Cervus elaphus nannoides*), pronghorn (*Antilocapra americana*), black bears (*Ursus amer-*

icanus), and grizzly bears (*U. arctos*), all of which were once common in the southern San Joaquin Valley. Bears are now absent from the valley and elk are present only in a small, reintroduced herd at the Tule Elk Reserve in Tupman. A small population of pronghorn is found on the Carrizo Plain, just west of the San Joaquin Valley.

A large variety of medium to small mammals is currently present in the valley as well. These include coyotes (*Canis latrans*), dogs (*Canis familiaris*), foxes (*Vulpes* spp. and *Urocyon* spp.), skunks (*Spilogale* spp.), badgers (*Taxidea taxus*), black-tailed hares (*Lepus californicus*), cottontail rabbits (*Sylvilagus audubonii*), squirrels (*Spermophilus* spp.), voles (*Microtus californicus*), kangaroo rats (*Dipodomys* sp.), and mice (*Onychomys* sp.). A diversity of mammals has been identified at sites in the Buena Vista Lake area (Hartzell 1992:188-191, 254-257, 280-281, Tables 6.12, 6.24, and 7.4).

Avifauna, particularly waterfowl, were particularly abundant and widely used. Major species included geese, various ducks, mud hens, coots, grebes, and (likely) pelicans (see Bellrose 1976; Cogswell 1977). Teals (*Anas* sp.), particularly the cinnamon teal (*A. cyanoptera*), are known to inhabit the San Joaquin Valley (Cogswell 1977:130-131) and can be found there throughout the year. Teals may reach a weight of over one pound. The American coot (*Fulica americana*) is a chicken-sized bird that can attain lengths of 33 to 41 cm. (13 to 15 in.) and winters in waters that do not freeze, such as Buena Vista Lake. It was present locally during the entire year and nested in the area, laying eight to 12 eggs on a raised platform nest. Many of these species have been identified at sites in the Buena Vista Lake region (DeMay 1942; Hartzell 1992:185-188, 251-254, 279-280, Tables 6.9, 6.23, and 7.3).

In noting the use of turtles (*Clemmys marmorata*) by the Yokuts of the Tulare Lake area, Gayton (1948:14) explained that "Turtles (tu'nkot) were plentiful. They were stabbed under the throat with a sharp stick, put on hot coals, and roasted; then the shell was broken off and the larger entrails were discarded." Turtle remains (and those of other reptiles and amphibians) have been found in archaeological deposits at Buena Vista Lake (Hartzell 1992:184-185, 259-261, 283-284, Tables 6.8, 6.26, and 7.6; also see Dillon and Porcasi 1991).

A large number of fish species was available in the rivers, sloughs, and lakes, including lake trout, chubs, perch, suckers, steelhead, salmon, and sturgeon. The following is a list of species that were major food sources to the native populations. The Sacramento blackfish (Cyprinidae:*Orthodon microlepidotus*) (ca. 60 cm. TL [total length]) prefers backwater areas, is quite tolerant of low-oxygen waters, and is common in the San Joaquin Valley river/lake system (Moyle 1976:183). Hitch (Cyprinidae:*Lavinia exilicauda*) is also found in the river/lake system and prefers slow-moving, deeper water (Moyle 1976: 178). It reaches a size between 15 and 25 cm. Thicktail chub (Cyprinidae:*Gila crassicauda*; now extinct) preferred the slow, backwater areas of sloughs and lakes, particularly in association with tule stands (Moyle 1976:178). It attained a size of about 25 cm. TL. Sacramento sucker (Catostomidae:*Catostomus occidentalis*) also inhabits the rivers and lakes of the region. Adults (perhaps as long as 60 cm. TL [Moyle 1976:215]) prefer deeper water, while the young tend to inhabit more shallow waters (Moyle 1976:214). Sacramento perch (Centrarchidae:*Archoplites interruptus*) inhabits the sloughs, sluggish rivers, and lakes of the central valley floor (Moyle 1976:294).

One of the most important characteristics of this fish habitat is the presence of beds of rooted and emergent aquatic vegetation that serve as spawning grounds and nurseries. The vast tule stands that were common in the Tulare-Buena Vista lacustrine environment most likely supported a large quantity of Sacramento perch. Tule perch (Embiotocidae:*Hysterocarpus traskii*) is a small (< 16 cm.) member of the viviparous perch family and was common in the freshwater lakes of the region (Moyle 1976:337). Specimens of each of these species (along with others) were recovered from archaeological sites in the Buena Vista Lake area (Hartzell 1992:181-184, 257-259, 281-282, Tables 6.6, 6.25, and 7.5).

In addition to the vertebrate animals, invertebrates also were important resources. These include insects (Sutton 1988; Gardner 1997 [this volume]) and several genera of freshwater shellfish, specifically *Anodonta nuttalliana* and *Margaritifera* sp. Crayfish were also eaten (Gayton 1948:14). Land snail (cf. *Helminthaglyptha* sp.) has been recovered in other sites in the region.

ETHNOGRAPHIC BACKGROUND

The Native American groups that inhabited the San Joaquin Valley during ethnographic times were known as the Yokuts. The Southern Valley Yokuts have been studied by several ethnographers, including Kroeber (1925), Gayton (1948), Latta (1977), and Wallace (1978a). The following detailed discussion of the Yokuts was synthesized using these sources (also see the summary by Osborne [1992]).

There were more than 40 Yokuts tribes, each having a distinct name, dialect, and territory. However, for purposes of definition, the Yokuts have been separated into three geographical divisions, Northern Valley, Southern Valley, and Foothill Yokuts (see Wallace 1978a, 1978b; Spier 1978). The Southern Valley Yokuts, primarily the Tulamni tribe, occupied the region around Buena Vista Lake. The Tulamni "were in possession of Buena Vista Lake and the land surrounding it on the north, west, and south" (Osborne 1992:43). Somewhere on the western or northwestern shore of Buena Vista Lake "where the hills come close to the water," was their primary village, known as *Tulamniu* (Kroeber 1925:478).

In general, the Southern Valley Yokuts, including the Tulamni, were organized into single, large village settlements, or in several smaller settlements grouped together, with one settlement being the largest and most dominant. Each group consisted of approximately 350 people and each was self-governed. The abundance and availability of resources enabled the Tulamni to occupy permanent villages for most of the year. Relations between Yokuts tribes and their neighbors were generally friendly. When conflicts did occur, local groups banned together against common foes.

The Tulamni practiced a mixed subsistence strategy that emphasized hunting, fishing, and fowling, as well as the collection of shellfish, roots, and seeds (see Tables 1 through 3). Fishing provided their primary food resource and was generally accomplished by netting, either in large nets dragged by a tule raft, or by diving with small hand nets. Waterfowl were snared or shot with arrows. In addition, large quantities of mussels were gathered. Seeds and roots also provided a large portion of their diet, including tule, grassnuts, clover, and other flowering herbs. Rabbits were hunted in communal drives; elk and pronghorn were shot from blinds near the lakes or sloughs. Acorns, the staple of most other native Californians, were not readily available to the Tulamni, so some groups traded fish for acorns with neighboring tribes to the east. In describing the resource base of the Tulamni, Latta (1977:205) humorously reported that

> Except for an occasional antelope surround, or a ground squirrel smoke-out on the West Side, theirs [the Tulamni] was strictly a goose, duck, mudhen, swan, blue heron, egret, pelican, lake, slough, swamp-and-overflow culture; water and mosquitos, willows and mosquitos, tules and mosquitos everywhere; tule boats, tule bags, tule skip-rings, and other tule equipment—and mosquitos; tule houses, tule sunshades, tule windbreaks, piled-up tules for sails on tule boats; tule cloth-

Table 1
THE SUBSISTENCE BASE OF THE TULAMNI YOKUTS: PLANTS

Name	Parts Eaten	Other Parts Used	Indicated Season of Availability
Marsh Plants			
cattail (*Typha* spp.)	roots	leaves, stalks	late spring
cattail (*Typha* spp.)	pollen		late spring
cattail (*Typha* spp.)	seeds		late spring to late fall
tule (*Scirpus acutis)*	roots	leaves, stalks	all year
tule (*Scirpus acutis)*	pollen		spring
sedge (*Carex* spp.)	roots	leaves, stalks	all year
sedge (*Carex* spp.)	pollen		spring
spike rush (*Eleocharis* spp.)	roots	leaves, stalks	all year
spike rush (*Eleocharis* spp.)	pollen		spring
Land Plants			
rice grass (*Achnatherum hymenoides*)	seeds	--	spring
buckwheat (*Eriogonum* sp.)	seeds	--	spring
fiddleneck (*Amsinckia tessellata*)	leaves	--	spring
fiddleneck (*Amsinckia tessellata*)	--	seeds	summer
clover (*Trifolium* sp.)	leaves	--	spring
salt grass (*Distichlis spicata*)	salt	--	all year
pickleweed (*Allenrolfea occidentalis*)	seeds	--	fall
seep weed (*Suaeda* spp.)	roots	--	all year
grassnuts (e.g., *Brodiaea* sp.)	roots	--	late spring
oak (*Quercus* spp.)	nuts	wood	fall
pine (*Pinus* spp.)	nuts	wood	fall
juniper (*Juniperus* sp.)	seeds	wood	fall
grapes (*Vitis* spp.)	fruit	--	late summer
blackberries (*Rubus* spp.)	fruit	--	mid-summer
manzanita (*Arctostaphylos* spp.)	seeds	wood	summer
buckeye (*Aesculus californica*)	nuts	wood	late summer

ing—caps, capes, hoods, parkas and skirts; tule mattresses, tule mats, tule blankets, pounded tule-fibre disposable diapers for babies, tule baby cradles, tule fuel, tule blinds for hunting, tule-seed mush, tule-root bread, tule baskets, tule shrouds, tule rope, tule string, tule elk, beaver, sea and fresh-water otter, tules, tules, tules—and mosquitos; seal, raccoon; waterfowl and fish in myriads; more tules, tules, tules—and mosquitos.

Latta (1977:219-220; also see Gifford and Schenck 1926:111-112) reported that weirs were used for fishing in Kern Lake, just to the east of Buena Vista Lake. Latta (1977:219-220) described such a weir:

> . . . the Indians built a corral—drove willow stakes in the mud where the water was about a foot deep and wove willow branches back and forth between them. From an opening in the corral near

Table 2
THE SUBSISTENCE BASE OF THE TULAMNI YOKUTS: ANIMALS OTHER THAN FISH

Name	Age	Parts Eaten	Parts Used as Tools	Indicated Season of Availability
Reptiles and Amphibians				
turtles (*Clemmys marmorata*)	juveniles and adults	flesh, eggs	shell	all year
frogs (*Rana* spp.)	adults	flesh	unknown	all year
gopher snake (*Pituophis catenifer*)	juveniles and adults	flesh?	unknown	all year
rattlesnake (*Crotalus* spp.)	juveniles and adults	flesh?	unknown	all year
horned lizard (*Phrynosoma coroatum*)	juveniles and adults	flesh?	unknown	all year
Birds				
Canada goose (*Brant canadensis*)[a]	adults	flesh	unknown	winter
tule goose (*Anser albifrons*)[a]	adults	flesh	unknown	winter
mallard duck (*Anas platyrhynchos*)[a]	adults	flesh	unknown	winter
cinnamon teal (*A. cyanoptera*)[a]	juveniles and adults	eggs, flesh	unknown	spring to fall
northern shoveler (*A. clypeata*)[a]	adults	flesh	unknown	late fall, winter
American wigeon (*A. americana*)[a]	adults	flesh	unknown	late fall, winter
canvasback (*Aythya valisineria*)[a]	adults	flesh	unknown	winter
common goldeneye (*Bucephala clangula*)[a]	adults	flesh	unknown	rare in winter
common merganser (*Mergus merganser*)[a]	adults	flesh	unknown	winter
ruddyduck (*Oxyura jamaicensis*)[a]	adults	flesh	unknown	winter
American coot or mudhen (*Fulica americana*)[b]	juveniles and adults	eggs, flesh	unknown	all year
pied-billed grebe (*Podilymbus podiceps*)[b]	juveniles and adults	eggs, flesh	unknown	all year
western grebe (*Aechmophorus occidentalis*)[b]	juveniles and adults	eggs, flesh	unknown	all year
white pelican (*Pelicanus erythrorhynchos*)[b]	adults	flesh	unknown	late summer, fall, early winter
morning dove (*Zenaida macroura*)	juveniles and adults	eggs, flesh	unknown	all year
quail (*Callipepla* spp.)	juveniles and adults	eggs, flesh	unknown	all year
Mammals				
beaver (*Castor* spp.)	juveniles and adults	flesh	skin, teeth	all year
cottontail rabbit (*Sylvilagus audubonii*)	juveniles and adults	flesh	skin	all year
black-tailed hare (*Lepus* cf. *californicus*)	juveniles and adults	flesh	skin	all year
ground squirrel (*Spermophilus* spp.)	juveniles and adults	flesh	skin	all year
pocket gopher (*Thomomys* sp.)	juveniles and adults	flesh	unknown	all year
pocket mouse (*Perognathus* sp.)	juveniles and adults	flesh	unknown	all year
kangaroo rat (*Dipodomys* sp.)	juveniles and adults	flesh	unknown	all year
grasshopper mouse (cf. *Onychomys* sp.)	juveniles and adults	flesh	unknown	all year
packrat (*Neotoma* sp.)	juveniles and adults	flesh	unknown	all year
vole (*Microtus* cf. *californicus*)	juveniles and adults	flesh	unknown	all year
coyote (*Canis latrans*)	juveniles and adults	flesh	skin	all year
fox (*Vulpes* spp., *Urocyon* spp.)	juveniles and adults	flesh	skin	all year
bobcat (*Felis rufus*)	juveniles and adults	flesh	skin	all year
pronghorn (*Antilocapra americana*)	juveniles and adults	flesh	skin, bone, sinew	all year
tule elk (*Cervus elaphus nannoides*)	juveniles and adults	flesh	skin, bone, sinew	all year
domesticated dog (*Canis familiaris*)	juveniles and adults	flesh	unknown	all year
bear (*Ursus* spp.)	juveniles and adults		skin	all year
black-tailed deer (*Odocoileus hemionus*)	juveniles and adults	flesh	skin, bone, sinew	all year
Invertebrates				
grasshoppers (e.g., *Schistocerca venusta*)	juveniles and adults	whole animal	none	spring, summer, fall
crickets (e.g., *Miogryllus* sp.)	adults	whole animal	none	spring, summer, fall
ants (e.g., *Pogonomyrmex* sp.)	eggs, adults	whole animal	none	spring, summer, fall
caterpillars (e.g., *Coloradia pandora*)	pupae	whole animal	none	fall
freshwater mussel (*Anodonta nuttalliana*)	adults	muscle	unknown	all year
freshwater mussel (*Margaritifera* sp.)	adults	muscle	unknown	all year
freshwater mussel (*Gonidea* sp.)	adults	muscle	unknown	all year
crayfish (cf. *Cambarus* sp.)	adults	whole animal	none	unknown

[a] Data adapted from Bellrose (1976).
[b] Data adapted from Cogswell (1977).

Table 3
THE SUBSISTENCE BASE OF THE TULAMNI YOKUTS: FISH

Habitat	Season	Expected Water Conditions	Expected Species
slough	winter/spring	faster/cooler	Sacramento blackfish (*Orthodon microlepidotus*) hitch (*Lavinia exilicauda*) thicktail chub (*Gila crassicauda*) Sacramento sucker (*Catostomus occidentalis*) Sacramento perch (*Archoplites interruptus*)
lake	all year	slower/warmer	Sacramento blackfish (*Orthodon microlepidotus*) hitch (*Lavinia exilicauda*) thicktail chub (*Gila crassicauda*) Sacramento sucker (*Catostomus occidentalis*) Sacramento perch (*Archoplites interruptus*) tule perch (*Hysterocarpus traskii*)

> the shore at the east end they ran a wing of the same construction to the southeast out into the lake at an angle with the shore. All of the Indians waded into the lake outside of the corral and the wing, almost shoulder to shoulder and herded the fish into the angle behind the brush wing. They kicked their feet and slapped the water with willow branches and yelled and ran the fish into the corral. Then they closed the opening in the corral and used the trapped fish as they needed them. They gave my grandparents [Anglos] all the fish they could use.
>
> To catch the fish they used a larger wicker, funnel-shaped basket with no bottom. They would wade around and slap the big end of the basket down over a fish, reach in through the open small end and catch it.

The Tulamni built two types of dwellings. Oval-shaped, single-family huts covered with tule mats generally stood in a single row in the village. Larger communal structures, also covered with tule mats, could house as many as 10 families. In the communal dwellings, separate sections containing a fireplace and outside door were occupied by individual families.

As noted above, tule was an important commodity for the Tulamni. They used the reeds in their basketmaking, to fashion mats for use in and on their houses, and to lash together to make canoes (see Osborne et al. 1997 [this volume]; also see Osborne 1996). Tule roots were used to make a starchy flour for mush, and seeds were ground into meal.

Basketweaving was a highly developed technological skill among the Tulamni. Conical baskets were used as burden baskets. Flat winnowing trays, seed beaters, and necked water bottles were also common utilitarian items. Knives, scraping tools, and projectile points were made from stone imported into the valley. Mortars and pestles of wood and stone were secured in trade. Marine shells, predominantly *Olivella*, were obtained in their natural state from coastal peoples, and were then manufactured into disks, beads, cylinders, pendants, etc., for use as money and as personal adornment.

The basic family unit was composed of the nuclear family. Families were patrilineal and the children inherited their father's totem. Each tribe was divided into moieties, a bilateral division of society. Members of opposite moieties acted reciprocally during mourning rites and first-fruit ceremonies.

Life events recognized as significant were birth, female puberty, and death. The ritual honoring the tribal dead was the most conspicuous religious festival. It was usually held annually and was a six-day affair, with participation by outside local groups. During these mourning ceremonies, much feasting, merriment, and gambling would occur. First-fruit rites were observed when each crop of ripening seeds or berries was ready to be gathered.

History

European contact with the Tulamni (and other Southern Valley Yokuts groups) was first recorded in 1772, when a group of Spanish soldiers, led by Captain Don Pedro Fages, entered the San Joaquin Valley through Tejon Pass in an attempt to capture renegade soldiers who were residing there (Smith 1939:22). Fages entered the valley from the south and found a vast expanse of plains, rivers, lakes, and marshes in the valley. He assigned the name Buena Vista (beautiful view) to the most prominent of the lakes (Bolton 1935:3). He then crossed the southern end of the valley, found the village of Tulamniu (which he also called Buena Vista), and traveled on to San Luis Obispo.

In 1776, Padre Francisco Garcés, in an attempt to discover a more direct overland route from Yuma to Monterey, spent several weeks in the southern San Joaquin Valley (Bailey 1984:14). He entered the valley via Tehachapi Pass and traveled north along the eastern periphery of the valley. Garcés kept a detailed diary and apparently interacted well with the native population. Among the many villages (or rancherias) he visited was *Woilu*, a Yokuts village located in what is now downtown Bakersfield (see Zaborsky 1997 [this volume]). During his visit, Garcés gave the Kern River its original name (Rio de San Felipe), performed the first baptism in the valley, and exited by the same route from which he had arrived.

In 1824, Indians from four of the coastal missions revolted, and some took refuge in the San Emigdio Mountains south of Buena Vista Lake (Magruder 1950:21-22). As a result, two military expeditions were dispatched to the southern San Joaquin Valley and several confrontations with the refugees were recorded.

When California was annexed by the United States in 1848, the San Joaquin Valley was overrun by settlers, and Indian lands passed into Euroamerican hands. The few remaining Tulamni people went to the Tejon reservation established at the base of the Tehachapi Mountains, or to the Fresno reservation near Madera. These reservations failed to prosper, and the Indians who remained on them were moved to the Tule River reservation in 1859. At one time, it was estimated that the population of the Southern Valley Yokuts numbered approximately 9,500. After European contact, however, that number dramatically decreased, primarily due to introduced diseases (Osborne 1992:41-42).

ARCHAEOLOGICAL BACKGROUND

Culture History

The San Joaquin Valley has been occupied by Native American groups for thousands of years. To generally characterize the prehistory of the central valley, the taxonomic system proposed by Beardsley (1954a, 1954b), as detailed in Moratto (1984:181-193), is followed.

Paleoindian (ca. 12,000 to 8,000 B.P.). There is evidence of human habitation in the lake country of the San Joaquin Valley dating to approximately 11,000 years ago, although only a few sites of this age have so far been identified. The most notable of these sites is the Witt Site on the shore of Tulare Lake, which contained fluted (Clovis-like) projectile points, scrapers, crescents, and Lake Mojave type points (Moratto 1984:81-82). To date, there is little evidence of a Paleoindian occupation of the Buena Vista Lake area.

Early Period (ca. 8,000 to 4,000 B.P.). During this period, it is thought that people generally were highly mobile and that their subsistence was based on fishing and hunting large game. Mortars, pestles, and millingstones appear infrequently in archaeological sites from this period. Artifacts include hand-molded, baked clay net weights, *Olivella* and *Haliotis* shell beads and ornaments, well-made charmstones, and heavy-stemmed projectile points that infer use of the atlatl rather than the bow and arrow. Bone was not commonly used for making artifacts. Burials are fully extended, oriented to the west, and generally have contained artifacts, often quartz crystals. Cremations are rare.

Middle Period (ca. 4,000 to 1,500 B.P.). This time period is characterized by a more diversified subsistence, with increased emphasis on seed processing, along with hunting, fowling, and fishing. Artifacts include *Haliotis* shell ornaments in various geometric shapes, *Olivella* and *Haliotis* beads, distinctive spindle-shaped charmstones, cobble mortars, chisel-ended pestles, and large, heavy projectile points. There was extensive use of bone for artifacts, such as awls, fish spear tips, saws, and flakes. Burials are tightly flexed, but less than half have contained artifacts. There is a slight increase in the number of cremations. There is much evidence of violent death, such as disarticulated skeletons and weapon points embedded in more than 5% of the burials.

Late Period (ca. 1,500 B.P. to Historic Contact). During this time period, subsistence shifted to a focus on the processing of acorns and other plant foods, with less emphasis on hunting, fowling, and fishing. Artifacts include *Olivella* beads, *Haliotis* ornaments, stone beads and cylinders, clamshell disk beads, tubular smoking pipes of schist and steatite, arrow-shaft straighteners, flat-bottomed mortars, cylindrical pestles, and small side-notched projectile points, inferring use of the bow and arrow. Burials are often flexed and cremation is more common.

A History of Archaeological Research in the Southern San Joaquin Valley

Formal archaeological investigations have been undertaken in the Buena Vista Lake region over the last 100 years. Archaeology in the southern San Joaquin Valley had its beginnings in 1899, when a party of researchers from the University of California, Berkeley, visited the area (Gifford and Schenck 1926:5). This group, led by Phillip Mills Jones, spent three weeks working near Buttonwillow. They investigated approximately 150 mounds and found cultural materials in each one, including several that contained human skeletal remains (Wallace 1971:13-14). In 1909, N. C. Nelson recovered "a series of skeletal remains and artifacts, the latter being in large part textiles" from the western end of the Elk Hills (Gifford and Schenck 1926:41), and in 1924, W. D. Strong recovered two burials from the same immediate vicinity (Gifford and Schenck 1926:41). In 1910, A. L. Kroeber excavated cremations "from a hill above Buena Vista Lake" (Hartzell 1992:121). Gifford and Schenck (1926) conducted a comprehensive research project in the San Joaquin Valley, performing site recordation and limited test excavations at a number of sites, including some in the vicinity of the northwestern shore of Buena Vista Lake (Gifford and Schenck 1926:40).

In the 1930s, several projects were undertaken in the region. Harold A. Estep, along with a small group of friends, surveyed and excavated in and around Pelican Island (CA-KER-33) in 1933 (Estep 1993). Pelican Island was a shell mound (the most extensive in the region [Gifford and Schenck 1926:41-

43]) located in the northeast portion of Buena Vista Lake. A diverse assortment of artifacts, none of which were European in origin, was recovered, as well as several burials (Estep 1993).

In late 1933 and early 1934, Edwin F. Walker and Waldo R. Wedel conducted excavations on the southwest shoreline of Buena Vista Lake (Wedel 1941) in an attempt to gain insight into the prehistory of the southern San Joaquin Valley. They also hoped to locate the ethnographic village of Tulamniu that had been referenced by several of the early Spanish explorers. Five sites were excavated (CA-KER-39, -40, -41, -42, and -60). Extensive deposits were discovered and explored in two of the sites (CA-KER-39 and -60), and many artifacts, structures, and burials were recovered. Also around this time, Walker excavated a Yokuts cemetery (CA-KER-64) at the eastern tip of Elk Hills (very close to the Bead Hill site; see below) (Walker 1935, 1947). The site yielded hundreds of flexed burials (most lying on their sides), many of which were covered with the trunks of small trees or textile mats and marked by juniper posts (Walker 1947:5). Most of the interments were accompanied by grave goods, with many of the artifacts dating to postcontact times.

The next significant work accomplished at Buena Vista Lake was conducted in 1964, during the construction of the California Aqueduct. A number of sites was recorded and some "salvage" work was done. At that time, Fredrickson directed excavations at CA-KER-116 on the southwestern shore of the lake (Fredrickson 1965; Fredrickson and Grossman 1977; Hartzell 1992). A deeply buried compo-nent "at a depth of approximately 350 to 400 cm. below the surface," dating to approximately 8,000 B.P. (Fredrickson and Grossman 1977:174), contained the earliest dated archaeological materials in the southern San Joaquin Valley.

Formal excavations were undertaken between 1969 and 1970 by Dieckman (1977) at the Bead Hill site (CA-KER-450), a site that had been intensely vandalized for many years. One of the purposes of Dieckman's work was to determine the extent of damage at the site. Many artifacts of aboriginal manufacture were recovered, including shell beads, fragments of steatite bowls, aboriginal pottery, stone milling equipment, projectile points, and bone awls (Dieckman 1977:51-52). Additionally, the site yielded a variety of European goods, such as ammunition and buttons of metal and glass. After examining these artifacts, as well as those from private collections that had previously been removed from the site, Dieckman (1977) reviewed the ethnographic literature. Based on his studies, he concluded that CA-KER-450 was the village of Tulamniu (Dieckman 1977:52).

In the late 1980s, Hartzell (1992) conducted test-level excavations at several sites on the Tule Elk Preserve, just north of Buena Vista Lake, as part of her dissertation work on lacustrine adaptations in the Buena Vista Lake Basin. As part of this work, Hartzell (1992) performed limited excavations at the sites excavated by Wedel (1941) and analyzed the materials from Fredrickson's work at CA-KER-116 (Fredrickson 1965; Fredrickson and Grossman 1977).

In addition to the "major" work that has been accomplished at Buena Vista Lake, a number of smaller investigations has been conducted. While performing some maintenance, groundskeepers at the Buena Vista Golf Club unearthed several skeletons (von Werlhof MS:1; Siefkin et al. 1996). Ultimately, more than 10 interments were found at the site; unfortunately, many of them had been removed by vandals. Jay von Werlhof (MS) recorded what information he could regarding these burials and the associated artifacts. In addition, test excavations at several sites have been undertaken within the Elk Hills Naval Petroleum Reserve as part of environmental requirements (Peak 1991). Lastly, archaeology field classes from both Bakersfield College and Taft College have worked in the area for a number of years, although no results have yet been published.

A GENERAL RESEARCH DESIGN FOR THE BUENA VISTA LAKE AREA

Paleoindian Occupation

Paleoindian materials (e.g., crescents and Clovis-like projectile points) are known to be present in substantial quantities on the shoreline of Pleistocene Lake Tulare, located some 60 miles north of Buena Vista Lake. However, Paleoindian materials are rare in the Buena Vista Lake Basin, with the exception of a few crescents (Wedel 1941:99; Fredrickson 1965; Fredrickson and Grossman 1977:181; Wallace 1978c:27; Sutton 1989; Hartzell 1992:297). There are several possible explanations for this disparity: (1) it may simply be a sampling error (the right areas have not been examined); (2) Paleoindian materials may be buried and thus remain undiscovered; (3) if the Kern River had assumed a course that bypassed the Buena Vista/Kern lake system, Paleoindians may not have occupied the area; and (4) as Buena Vista/Kern lakes lie behind a fan dam, it is possible that the Buena Vista Lake Basin did not exist until after Paleoindian times (see Sutton 1996).

The Middle Holocene Occupational Gap

Although the evidence is meager, it is apparent that occupation of the Buena Vista Lake Basin dates from at least 8,000 B.P. (see Fredrickson 1965; Fredrickson and Grossman 1977). However, there appears to be a gap in the occupational record during the Middle Holocene, or the latter part of the Early Period (between about 6,000 and 4,000 B.P.). Two possibilities may account for this gap: (1) there is no hiatus; we just know too little about the area; or (2) the gap is real, and the area was abandoned during the Middle Holocene. If the latter scenario is the case, increasing xeric environmental conditions may have been the cause. However, Hartzell (1992:v) noted that:

> Degradation of the lake habitat does not correlate with existing evidence for diminished lacustrine resource exploitation. Rather, positioning of encampments in lakemargin settings and exploitation of resources available year-round was indicated during lower water and more alkaline conditions as well as during cycles of fresher, deep water conditions.

This suggests that as lake levels declined and the shoreline retreated, settlements were moved following the water. Such sites may now be buried in sediments formed when conditions were wetter, bringing us back to the first scenario.

Human and Cultural Ecology

Reconstruction of the human and cultural ecology of the Buena Vista Lake Basin is of continuing importance. An understanding of the natural ecology is required to recognize changes in resource availability and utilization by humans. Four major ecozones are present in the general area of the northwestern shore of Buena Vista Lake (see above). Each of these zones, and their associated ecotones, are present in close proximity along the northern portion of the lake. It is important to determine which resources from which zones were utilized at which sites, by season and over time.

Site catchment analysis attempts to delineate (predict) where the resources found at a site were obtained (following the strategy of Flannery [1976:103-104]; for a general review, see Roper [1979]). For hunter-gatherer groups, the primary catchment range is typically viewed as about a five-km. radius, or the distance one can walk in about two hours (taking into account difficulty of terrain) (Vita-Finzi and Higgs 1970). The site catchment approach generally utilizes modern environmental data, a serious prob-

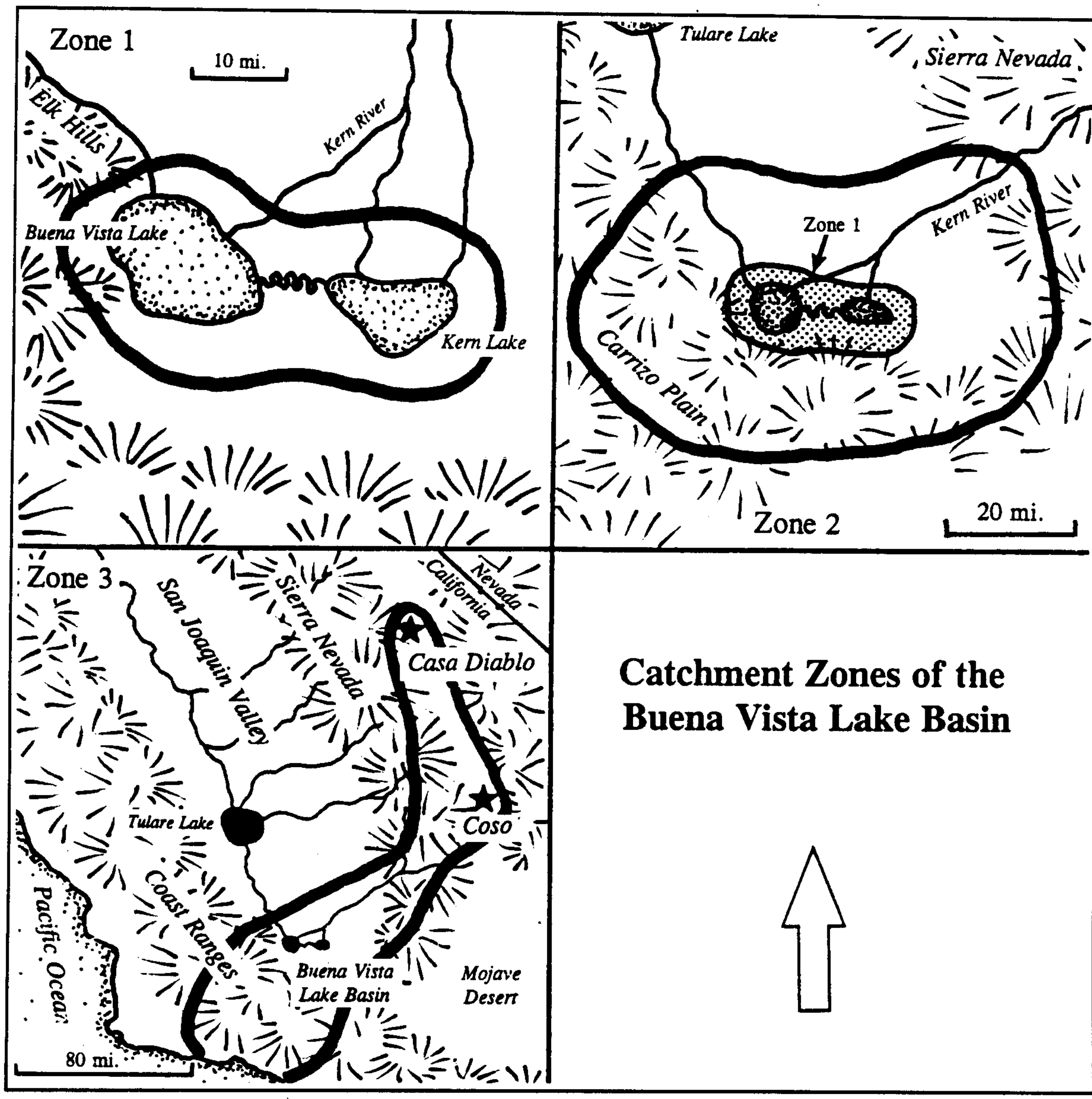

Fig. 2. The three general catchment zones delineated for the northern shore of Buena Vista Lake.

lem for the interpretation of early sites (this analysis included). Of additional consideration here is the fact that boats and/or rafts made waterways efficient highways of travel and transport.

Three general catchment zones for the Buena Vista Lake Basin are delineated herein (Fig. 2). Catchment Zone 1 is defined as those areas within a five-km. radius. Within Catchment Zone 1, one would expect to find materials collected from at least three ecozones (aquatic, alkali sink, and grassland) and multiple ecotones. Catchment Zone 2 is the surrounding area within which a person would likely have to camp overnight in order to procure resources. This zone would be limited almost entirely to grassland areas located away from the Buena Vista Lake Basin (e.g., upland areas). Catchment Zone 3 is defined as other regions at considerable distances, where the most logical way to procure resources would be through trade; for example, fish from the Buena Vista Lake Basin may have been exchanged

Table 4
OBSIDIAN DATA FROM THE BUENA VISTA LAKE AREA

Site	No. of Specimens	Hydration Band Range[a]	Geologic Source	Reference
CA-KER-39	unknown	unpublished	unpublished	R. Hughes (in Hartzell 1992:174; also see Wedel 1941)
CA-KER-116	108	10.0 to 2.8 (n = 70)	Coso (87%) Casa Diablo (8.3%) Fish Spring (1.9%) others (2.7%)	Hartzell 1992:218-229, Tables 6.14, 6.15, and 6.16
CA-KER-180	16	4.7 to 2.3 (n = 15)	Coso (100%)	Hartzell 1992:274-275, Table 7.2
CA-KER-1611	9	17.0 to 4.9 (n = 8)	Coso (78%) Casa Diablo (22%)	Hartzell 1992:287-288, Table 7.7

[a] In microns.

for imported materials. Such trade items might be expected to be found in archaeological sites within Catchment Zone 3.

Obsidian is one of the primary trade items so far identified at sites in the area. To date, most of the obsidian has originated from the Coso Volcanic Field, a pattern manifested in both phases of the Late Period, and perhaps in the Middle Period as well (e.g., CA-KER-1611, Hartzell 1992:295). Few data on the use of obsidian sources over time are available. Hartzell (1992) provided obsidian hydration and/or source data for several sites in the Buena Vista Lake region (CA-KER- 39, -116, -180, and -1611; see Table 4). Although most of the obsidian has been sourced to the Coso Volcanic Field, a significant quantity came from Casa Diablo as well. Both of these sources are located along the eastern slope of the Sierra Nevada, Casa Diablo being almost 100 miles further north than Coso.

Basic Economy

One of the basic research questions for the Buena Vista Lake region is what people were eating. Once species are identified, the patterns of processing, preparation, and use are also important questions to address. For example, tule elk may have been killed and butchered elsewhere, with few faunal elements being present at a particular habitation site (called the schlepp effect, see Daly [1969]). Analyses of the butchering patterns of animals can be quite informative regarding resource use, levels of resource stress (e.g., whether low-quality foods were being consumed due to a lack of higher quality foods), and cultural preference. Some of the plant and animal species expected to be found in archaeological sites in the Buena Vista Lake Basin are listed in Tables 1 through 3, many of which have been recovered from other sites in the region (Hartzell 1992:passim).

The species and quantity of fish remains and their season of capture—winter/spring when the river is usually flowing with cooler water, or summer/fall when river flow is reduced and the lake water would be warmer—could indicate use of specific habitats, such as lakes or sloughs (see Table 3). It is possible that otoliths can be utilized to determine the species, age, size, and perhaps season of death of fish (see Casteel 1976:31; Wheeler and Jones 1989:145, 158; Colley 1990:214), and their recovery is important.

Table 5
A MODEL OF ETHNIC SEQUENCES FOR
THE SOUTHERN SAN JOAQUIN VALLEY

Time Period	Ethnic Group	Archaeological Expectations
? to ca. 1,000 B.P.	unknown preYokuts	not yet determined
ca. 1,000 to 400 B.P.	Yokuts	not yet determined
ca. 400 to 300 B.P.	"Paiute" (Kawaiisu?)	not yet determined
300 B.P. to present	Yokuts	not yet determined

The Entry of the Yokuts into the Southern San Joaquin Valley

As noted above, the Buena Vista Lake region was occupied by the ethnographic Southern Valley Yokuts (the Tulamni tribe) (e.g., Wedel 1941; Latta 1977; Wallace 1978a). It is not clear, however, when the Yokuts first entered this region or who preceded them. Current opinion of a late entry for the Yokuts (ca. within the last few hundred years) into the southern San Joaquin Valley is based on linguistic evidence (e.g., Moratto 1984:571-573). It is possible that sites older than several hundred years may have been occupied by other groups. Powers (1877:369-370) suggested that the "Paiuti" attacked the Yokuts and occupied much of the southern San Joaquin Valley in fairly recent times. If so, one could envision a cultural sequence as proposed in Table 5. By applying the direct historical approach with data from the Buena Vista Lake Basin, it may be possible to determine the timing of the entry of Yokuts populations into the Buena Vista Lake region.

CONCLUSIONS

The southern San Joaquin Valley contains a considerable and long record of human occupation. To date, relatively little archaeological work has been done in the region. However, the research potential is immense and there is a great deal to learn.

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VILLAGE SITES OF THE YOWLUMNE YOKUTS IN KERN COUNTY, CALIFORNIA

Erik C. Zaborsky, Dept. of Sociology and Anthropology, California State University, Bakersfield.

INTRODUCTION

Investigations conducted by several researchers in the southern San Joaquin Valley of Kern County, California, have resulted in the identification and recordation of the ethnographic Yowlumne Yokuts villages of *Wawcoye, Tsineuhiu,* and *Woilu* (see Figure 1 for geographic details of the region). The identification of these villages was accomplished through archaeological and ethnographic research spanning a 70-year period. This paper reevaluates the reported place-names and locations for these (and other) Yowlumne villages in the lower Kern River Canyon area. In a preliminary reanalysis utilizing ethnographic data in conjunction with a review of the past archaeological findings from the region, a revised placement for these villages of the Yowlumne Yokuts is offered.

BACKGROUND

The lower Kern River Canyon has seen few archaeological investigations with respect to a regional emphasis. The earliest scientific investigations in this region began at the turn of the twentieth century. Kern County resident James W. Stockton discovered remains of a mummified skeleton in a cave above the Kern River (Merriam and Heizer 1950). The remains were analyzed once by the Smithsonian Institution in 1903, and again by the University of California, Berkeley, in 1950. In another early contribution, Gifford and Schenck generated their classic work, *Archaeology of the Southern San Joaquin Valley, California* (1926), which gave some attention to the Southern Valley Yokuts, yet provided only minimal information about the Yowlumne Yokuts.

In practice, exact determinations of ethnographic village placements are difficult. A comprehensive regional archaeological analysis has the potential to make intrasite comparisons in conjunction with ethnographic data, and thus should be able to overcome a limited or piecemeal archaeological reconstruction of the Protohistoric Period along the lower Kern River.

DESCRIPTION OF THE REGION

The Yowlumne

The Yowlumne are a tribelet of the Southern Valley Yokuts (Wallace 1978). For many years, some confusion has been perpetuated in the archaeological literature over the use of "Yauelmani" or "Yowlumne" as the proper name for these native Californians of the southern San Joaquin Valley. The correct name is Yowlumne, as Yauelmani translates as "a little group of Yowlumne" (Latta 1949:49). The protohistoric Yowlumne region stretched from the foothill strip of the Sierra Nevada near present-day Poso Creek all the way to the Tejon Pass (Cook 1955:54). The lower Kern River Canyon was the heartland of this region. Along the river, the upstream limits of the Yowlumne was "the second powerhouse in the canyon" near the mouth of Kern Canyon (Latta 1977:275), and their "downstream limits were on the plains at about the Pioneer Weir and Pioneer Bridge on Kern River" (Latta 1949:45).

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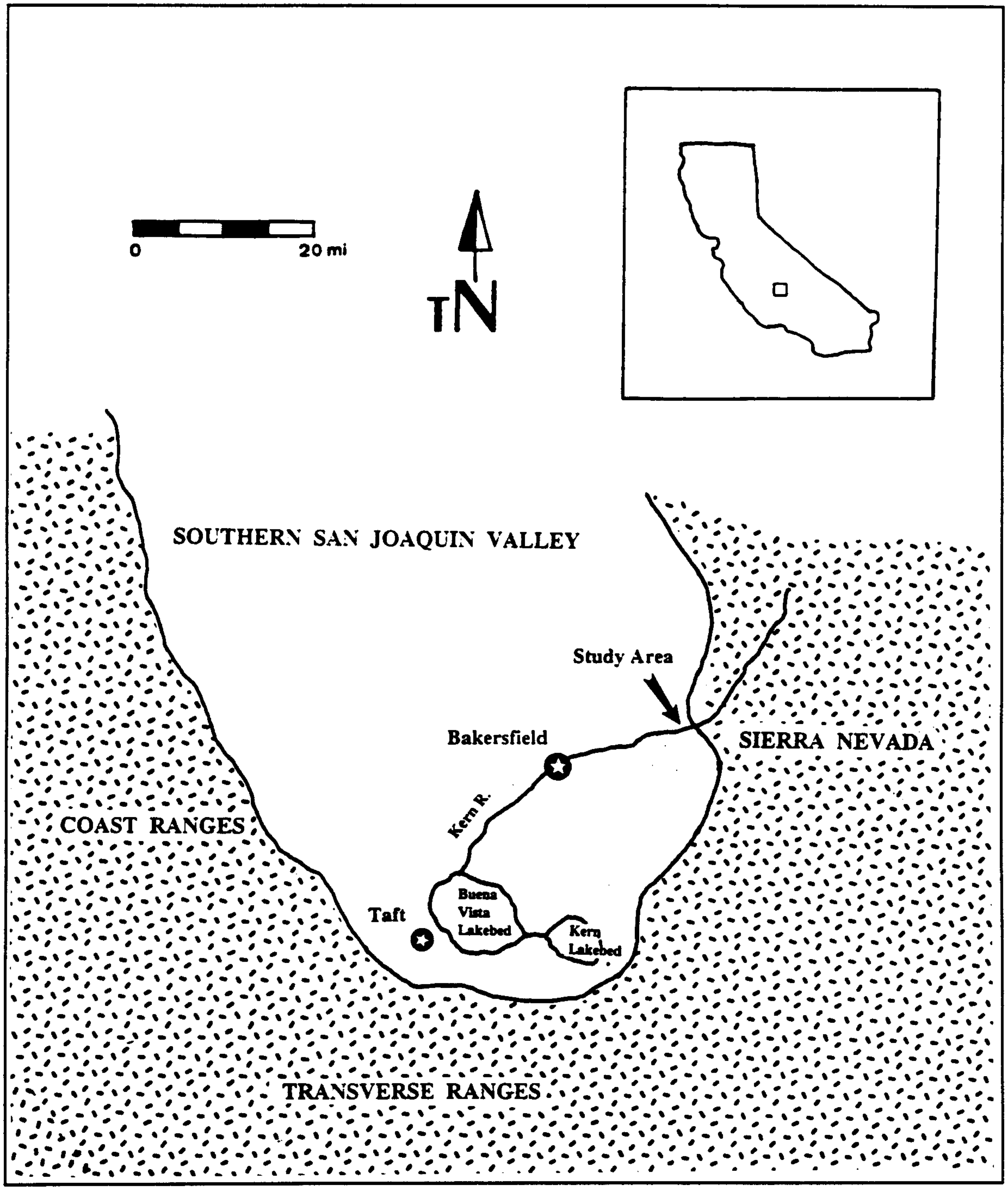

Fig. 1. Map of the southern San Joaquin Valley, including the general region of the study area.

Although there is some disagreement as to the precise number, as well as the spellings, of the Yowlumne villages as described by Kroeber (1925), Latta (1949, 1977), and Wallace (1978), it seems fairly clear that there were at least seven major villages (Cook 1955:40). These villages were *Woilu, Tsinliu, Tsineuhiu, Hawsu, Wawcoye, Konoilkin,* and *Shoko*. (These spellings will be used throughout the remainder of this article, as they represent the most common spellings in the literature.) The average village size for the Tulare Lake Basin and southern San Joaquin Valley has been placed at approximately 60 or 70 persons; for the hill regions above the basin, the populations were probably smaller (Cook 1955:40). Traditionally, the Yowlumne area was included in the foothill regions of Kern and Tulare counties and was ascribed a very conservative number of 40 persons per village as an average (Cook 1955:40). However, in contrast to these population estimates, on several occasions, missionary explorer Padre Francisco Garcés reported seeing between 100 and 150 people in the larger villages, such as Wawcoye, during his journeys through the foothills (Cook 1955:55).

Paleoenvironment

The prehistoric environmental setting of the Kern River Canyon has been characterized as a very productive riparian corridor (e.g., Wallace 1978). The rivers and lakes provided trout, chubs, perch, suckers, steelhead, salmon, and sturgeon to the Yokuts that inhabited the region. Mussels and turtles were also popular food items, as well as waterfowl such as geese, ducks, and mud hens (Wallace 1978: 450). Mule deer came down from the mountains into the valley floor during the winter, and were hunted by the Yowlumne. The Yowlumne also hunted pronghorn, rabbits, squirrels, and quail (see Latta 1949: 45; Wallace 1978:449-450). The region was treeless, with the exception of the river banks, where cottonwoods, sycamores and willows prospered. The valley floor was virtually devoid of oaks; thus, acorns were not a predominant food item in the region, although they were sometimes obtained through trade from other Indian tribes to the east (Wallace 1978:450).

PREVIOUS ARCHAEOLOGICAL RESEARCH

Previous archaeological research conducted in the river canyon had not been extensive, yet provided a general background to the region and offered up possible placements for the villages of the Yowlumne Yokuts. The summations below represent the published (as well as some unpublished) sources of archaeological data pertaining to the lower Kern River Canyon.

The Elliot Ranch Site

The Elliot Ranch site (CA-KER-1437) consists of a midden "located on a Holocene terrace of the Kern River" five meters above the flood plain (Weil and Macko 1983:1), across the river and due east of the village Tesinliu (or Tsineuhiu). According to Macko and Weil (1984:iv), the site was "occupied ephemerally for a relatively short interval during the neoglacial (ca. 2000-2600 BP)." Test excavations recovered mostly faunal remains, principally burned bone fragments of fish, reptiles, birds, and mammals of various size classes (Weil and Macko 1983:3). The excavation techniques included sample shovel test units and controlled 1 x 1 m. units, which resulted in the detection of hearth features that contained faunal remains and flaked stone artifacts. The data suggested the "early development of an economic trend" predominant throughout prehistoric southern California—a trend that involved the economics of developing exchange systems in which "the ancestral Yawlemani [*sic*] were likely middlemen working between emerging coastal populations and those controlling access to obsidian" (Macko and Weil 1984:v).

Initial excavation data also indicated that "several lithic types were utilized in the production of flaked-stone tools including chert, basalt, metasedimentary rock, metavolcanic rock, quartzite, quartz, and obsidian" (Weil and Macko 1983:5). With the exception of the obsidian, these lithic materials were "probably available at local quarries or readily retrievable in the form of occasional cobbles within or near the Kern River" (Weil and Macko 1983:5). Flaked stone artifacts were mostly comprised of core reduction material (Macko and Weil 1984:67). Twenty-three obsidian flakes and two bifaces were sourced and dated. The obsidian recovered at Elliot Ranch most likely originated from the Coso Range, and the samples were dated to approximately 3,100 to 2,400 years B.P. (Macko and Weil 1984:46-47).

The Elliot Ranch site also yielded diagnostic bead artifacts. There were three *Olivella* shell beads (two disk beads and one whole shell bead) dating to the Middle Period Phase 2 in the Santa Barbara Coastal sequence (Macko and Weil 1984:48). Interestingly, the shell beads were "particularly characteristic of the period also suggested by the obsidian hydration dates" (Macko and Weil 1984:49).

Roughly 75% of the groundstone artifacts from the Elliot Ranch site were manos from unshaped stream cobbles (Macko and Weil 1984:72) that were (and still are) prevalent throughout the region. The excavations at the Hart Park site recovered several dozen river cobbles that match the description of the manos recovered at the Elliot Ranch site; however, based on the author's own observations, most of the river cobbles in the Hart Park collection are noncultural (see discussion of the Hart Park site below).

Weil and Macko (1983) incorporated Binford's (1980) forager-collector site definitions—with some modifications—to characterize the cultural and postdepositional history of the Elliot Ranch site. Weil and Macko (1983:8) believed that at least five site types "would be expected in the archaeological record," based on a consideration of the potential regional settlement and subsistence patterns. Binford's *location* and *residential base* site types were used to define a predominantly foraging group of people, further modified to include two location site types: *location - 1* (collector-based) and *location - 2* (forager-based) (Weil and Macko 1983:21). *Location - 1* is a site type with one to three technomic artifact classes in a density greater that five artifacts per 100 $m.^2$, meters, including bedrock mortar (BRM) sites. *Location - 2* is a site type with an artifact density of less than five artifacts per 100 $m.^2$

Weil and Macko (1983) also incorporated Binford's (1980:10) *field camp* site type into their model, a type that is indicative of collector-based strategies as opposed to hunting-based food acquisition strategies. The modified field camp site type was classified as "moderate" in size, with technomic and sociotechnic artifacts representing at least three artifact classes, and some evidence of midden development. The *residential base* was classified as a "relatively large" site that represented at least five artifact classes, including technomic, sociotechnic, and ideographic artifacts. A substantial midden would also be present, along with the occasional cemetery (Weil and Macko 1983:21). The Elliot Ranch site possessed the qualities of a large, modified field camp, which would seem logical being directly across the river from the main village of Tsinliu (or Tsineuhiu) (Weil and Macko 1983:22).

Although Macko and Weil (1984:vi) stressed the importance of regional analyses in order to compare intrasite data, they also noted that such analyses are extremely difficult to accomplish as they believed that "virtually all previous studies in the area [were] not replicable, providing little data for comparative analysis." According to Macko and Weil (1984:vi), this problem is "due to selective screening, a general absence of probabilistic sampling designs, and little consideration for site formation processes and middle-range theory."

The Hart Park Site

In 1973, excavations in the lower Kern River Canyon revealed an extensive lithic processing site and potential residential/habitation site (Anonymous 1974). At this time, there is no formal report for the Hart Park site, although the recovered raw data, along with the anonymous field notes, were available to this author for analysis. According to these field notes, the major cultural material constituents recovered from the site were obsidian flakes and points, shellfish (mussel), fish vertebrae, chalcedony (orange and white), fire affected rock, scrapers, manos, hammerstones, and metates. An undetermined number of hearth features was also identified. One particular feature from Unit 3-B, located at a depth of 11 to 17 in., was identified as a "kitchen" assemblage/food processing complex of manos and metates arranged in a semicircle, and was recovered *in situ*. The artifacts were arranged as if someone had been sitting down, with the processing tools centered around the individual.

Also recovered from the Hart Park site were dozens of river cobbles, some which appeared to be modified through use wear and/or were fire affected. Also, the field notes referred to "potential" postholes associated with a hearth feature recorded at a depth of 17 in., from Unit 5-C South. It is possible that these observed features may have represented households, but it is not likely as the postholes do not appear to be numerous enough or orderly enough to constitute a single dwelling, much less one of the major villages of the Yowlumne. It does appear, however, that there was a hearth associated with these holes, but the exact context was unclear.

More exotic materials were recovered from the site as well, including at least three *Olivella* shell beads (disk and whole shell) and a steatite bead. These data are consistent with the finds at the Elliot Ranch site. Additionally, clumps of yellow ochre were found in Unit 3-V at a depth of 0 to 6 in., and then again with bone fragments at a depth of 12 to 18 in. In the same unit, an unidentified bone artifact with an "indented design" was recovered at a depth of 6 to 12 in.

The Olcese Ranch Site

Another important site is the Olcese Ranch site, presently identified as the village of upper Wawcoye (Schiffman 1986). The site was discovered in the spring of 1980, at which time a few test units were placed on the site, with the units reaching a maximum depth of 40 cm. The artifacts recovered during this testing included several glass trade beads dating to at least post-1770, and a number of shell and steatite beads dating to post-1400. On the basis of this excavation data, as well as his interpretation of historical and ethnographic data, Schiffman (1986:G-5) concluded that the site "might be part of the Yokuts Indian village of Wawcoye."

The Gifford and Schenck Data

Although the Gifford and Schenck (1926) data on the Yaguelame (Yowlumne) are incomplete, two of their sites (Site Nos. 13 and 36) refer to the Yowlumne of the lower Kern River. Gifford and Schenck (1926:40) identified this area as the "Lake Region," which also included an area "near Kern River above Bakersfield." Site No. 13 was originally reported by a Bakersfield man named Charles Morrice on April 23, 1924. Gifford and Schenck (1926:40, 45) suspected that the site was the village of Tsineuhiu. It was reported to have been vandalized by pothunters since the 1920s, perhaps even earlier.

Unfortunately, however, no precise location was ever given for Site No. 13, and many early site records are not accurate. In 1982, a cultural resource management survey conducted in the vicinity of the site was unable to relocate and reidentify the site (Lewis and Schiffman 1982:2). Site No. 36 was assumed to be the village of Konoilkin, originally reported by H. S. Allen on March 4, 1924, as a "burial ground and extensive camp site" located on a mesa north of the river (Gifford and Schenck 1926:45). Allen further observed that the campsite materials were "buried by two feet of overburden and are found in the bands of washes" (Gifford and Schenck 1926:45). The comments by Allen are probably the earliest recorded observations about the nature and intensity of the postdepositional processes acting on sites within the lower Kern River Canyon.

Other Data

Another archaeological survey conducted within the ethnographic region of the Yowlumne was completed for the California Living Museum (CALM), encompassing a 12- to 15-acre parcel (Schiffman 1979). One site, known as the CALM site, was apparently quite large and contained groundstone and flaked stone artifacts eroding out of the surface, the result of weathering and vehicles driving over parts of the site (Schiffman 1979). The discovery of this site had the potential to answer some questions about protohistoric occupation in the lower Kern River Canyon; however, it was destroyed before archaeological mitigation could take place. Sadly, by the mid-1980s, it became apparent that many potentially significant sites, such as the CALM site, had been inadvertently destroyed in the lower canyon due to the development and growth of the area.

CURRENT PLACEMENT OF THE YOWLUMNE YOKUTS VILLAGES

As previously discussed, the Yowlumne Yokuts had a territorial region extending from the mouth of the Kern Canyon, down the river around the foothills of present-day east Bakersfield, and all the way to the part of the river that flowed into and through present-day central Bakersfield (see Figure 2 for study area detail).

All of the sources referenced herein confirmed the village placement of Woilu in the middle of present-day Bakersfield. By the turn of this century, Woilu had been replaced by the Santa Fe passenger rail station in downtown Bakersfield (Latta 1949:45). Garcés "found Woy Loo [Woilu] village atop a fifteen foot hill about where the Santa Fe passenger station stands today on F Street just north of the Bakersfield High School" and a "small group of shelters huddled across the stream on ground now occupied by the Mercy Hospital" (Bailey 1957:46).

In the 1890s, a construction crew for the Valley Railroad—the predecessor of the Santa Fe Railroad in the San Joaquin Valley—used the sand and soil from the mounds of Woilu to build the rail lines from Bakersfield to Mojave. Within that sand and soil were the numerous bones of Yowlumne ancestors, displaced and redeposited as part of a railroad platform for miles and miles beyond Bakersfield (Bailey 1957:46). Before the native village became totally displaced, however, the name Woilu was changed to Wawlu when the white settlers started to plant domesticated crops (like cotton) around the area. Wawlu means "planting place" in Yowlumne (Latta 1977:279).

Woilu had been one of the three major villages for the Yowlumne Yokuts; the other two villages were further up the river canyon. One of these villages was Wawcoye. According to many of the ethnographic records, including those of Father Garcés, Wawcoye was located below the mouth of Cottonwood Creek, on the south bank of Kern River. There were bedrock mortars (or "Indian grinding holes") "scattered from the bridge at the old Rio Bravo Rancho . . . almost to the mouth of Cottonwood Creek," delineating the approximate village boundary (Latta 1949:45). Tsinliu was the third major village of the Yowlumne, which was "located on the north bank of Kern River northeast of the foot of China Grade" Loop (Latta 1949:45).

There were other villages downstream from Rio Bravo Rancho, at least one of which was Tsineuhiu (Latta 1949:46). On the north side of the Kern River, and "beginning just below the bridge

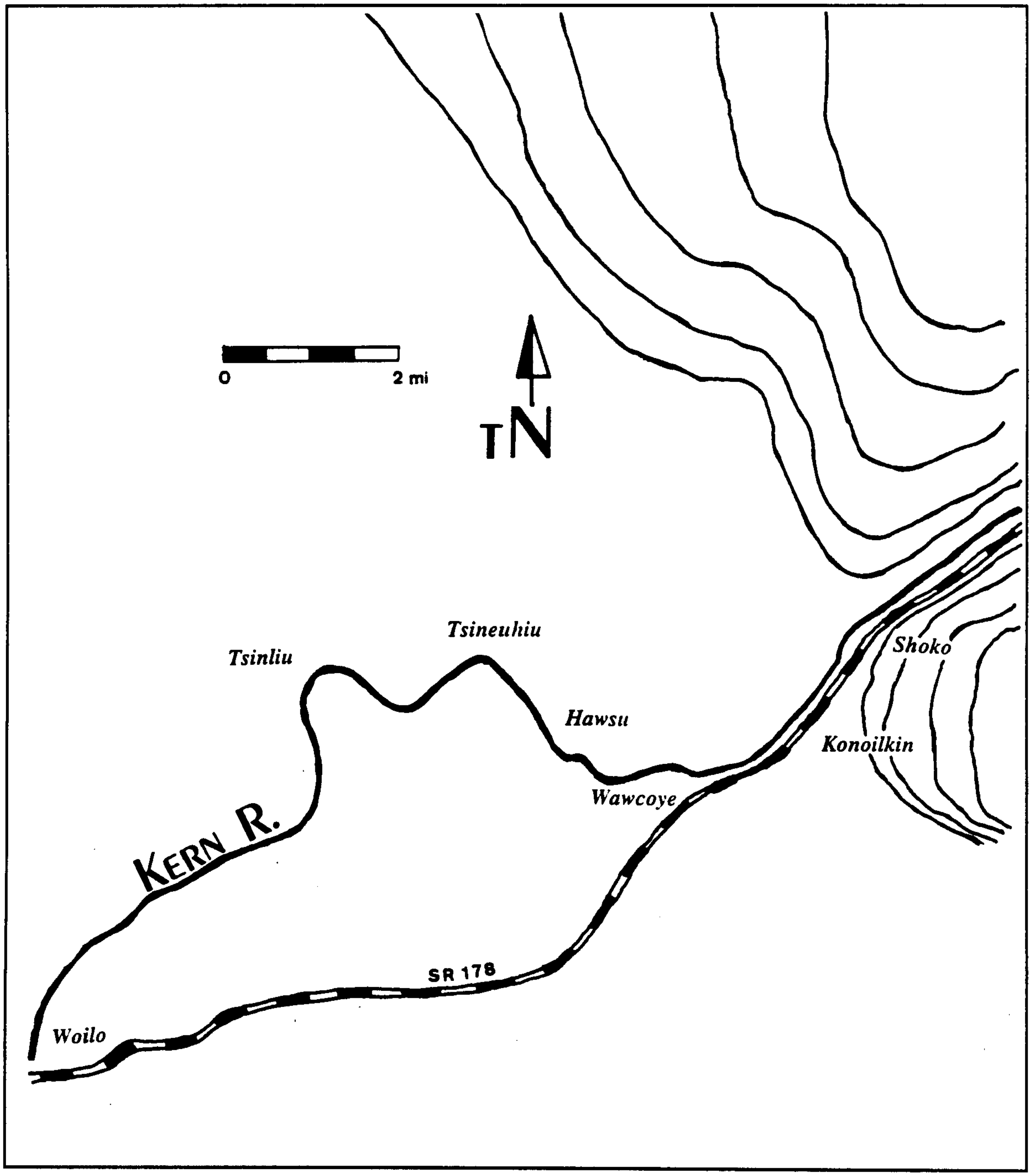

Fig. 2. Approximate territorial boundaries of the Yowlumne Yokuts. Village locations indicated on the map are the author's revised placements based on reanalysis of ethnographic and archaeological data.

at the Rio Bravo Rancho, another Yowlumne Indian village straggled downstream for about a mile. It was named *Hawsu*'' (Latta 1949:45; italics in original). The village site of Konoilkin, the ''place where the water falls,'' was located near the mouth of Kern River Canyon and was a well-known Yowlumne landmark and ''noted fishing place'' (Latta 1949:45). Shoko, located on the north bank of the river in Kern Canyon, ''was the most easterly Yowlumne village'' (Latta 1949:45). Shoko appeared to have been a shared village location with the Paleuyami, a different group that lived further upriver (Latta 1949:26). In Yowlumne, Shoko means "windy place" (Latta 1949:45).

REANALYSIS METHOD

This reanalysis of prehistoric/protohistoric Yowlumne Yokuts village placement is based upon a review of the above archaeological data. Some of these original data were reviewed in conjunction with known ethnographic data, but many times this was not possible as virtually all of the previous analyses failed to provide a comprehensive review of sites within this ethnically and geographically well-defined area. One exception to this is the Macko and Weil (1984) study of the Elliot Ranch site, which came the closest to achieving a regional, intrasite analysis.

An in-depth review and interpretation of the translated diaries of the Spanish missionary Padre Francisco Garcés, as well as Latta's *Handbook of Yokuts Indians* (1949, 1977) yielded some productive data. By incorporating the currently accepted body of archaeological data with a second look at the rich ethnographic record, changes in the placement of these Yowlumne villages in the lower Kern River Canyon must be considered. Additionally, this reanalysis provides new insights into the placement of villages that, as of yet, remain unidentified.

Ethnographic Data: Garcés

Departing from the Los Angeles basin, missionary explorer Padre Francisco Garcés crossed the Antelope Valley and the Tehachapi Mountains, entering the San Joaquin Valley via Tejon Canyon on April 26, 1776 (Walker 1974:34). On May 1, 1776, he came out of Cottonwood Creek (which Garcés named Arroyo de Santa Catarina) and proceeded downriver to a rancheria, at which time he saw another rancheria across the river and visited that village as well (Walker 1974:40). According to his journal diaries, Garcés was well received at the village across the Rio de San Felipe [Kern River]. After a large feast at the rancheria across the river (the village this author believes to be Hawsu), Garcés "reciprocated to them all [Yowlumne] with tobacco and glass beads," and congratulated himself on "seeing the people so affable and affectionate" (Walker 1974:41).

On May 1, 1776, Garcés continued northward towards Poso Creek, only to return to Yowlumne territory several days later on his way back to the Los Angeles basin. On May 7, 1776, Garcés arrived back near the rancheria (Hawsu?) where the feast occurred, one league (approximately two miles) above his original crossing point across the Kern River. His first crossing "had been accomplished 2 or 3 miles below the mouth of the canyon hence he must have come out very close to the mouth" (Cook 1955:55). Garcés finally reached the rancheria, and then traveled two leagues further southwest along the river to another village that had at least "150 souls" (Walker 1974:48). This village was most likely Tsinliu.

Ethnographic Data: Latta

The majority of Latta's data on the Yowlumne Yokuts came from two informants: Wahumchah, 86, also known as Henry Lawrence, from the Woodlake and Visalia area; and Ihalut, 90, also known as Mrs. Mary Santiago, from the Tule River Indian Reservation. Wahumchah and Ihalut claimed to be the last surviving full-blooded Yokuts alive when Latta was conducting his ethnographic research (Latta 1949: 46). Wahumchah and Ihalut were full brother and sister, and both "were born at the old Yowlumne Indian village of *Wawcoye* on the south side of Kern River between the Rio Bravo Rancho and the mouth of Cottonwood Creek" (Latta 1949:48).

Latta was told that Wahumchah's grandfather and a brother of this grandfather apparently had been "two of the four Yowlumne Yokuts who swam with Padre Garcés across Kern River at the Rio Bravo Rancho in May of 1776" (Latta 1949:66). Wahumchah's grandfather's brother lived to relate this experience to Wahumchah, as well as to tell him of the old trade routes (Latta 1949:67). One old trade route trail in particular was the one from Tejon that crossed the Kern River where Garcés came across from Los Angeles (Latta 1949:67).

ETHNOGRAPHIC DESCRIPTIONS OF THE YOWLUMNE YOKUTS VILLAGES

Tsinliu and Tsineuhiu

According to Chavez (1981:5), the "village site of T'sinleu, which is reported to be on the north bank of the River and northeast of Wawcoye, has yet to be confirmed." The original references for this site, namely the 1949 Latta reference to T'sinliu and the 1977 Latta reference to T'sinleu, are problematic because of their contradictory nature in that their individual placements for this single village do not correspond. In fact, their locational descriptions are not even close to one another. In addition, both of the Latta placement descriptions seriously conflict with Chavez's (1981) placement of T'sinleu, which may have only been the result of a simple textual error.

Latta (1949:46; italics in original) observed that "Villages down stream from those at the Rio Bravo Rancho were located a short distance above the Discovery Well [State Historic Landmark No. 290] on the Means Ranch . . . The village on the south side of the river was near the weir known as *The First Point of Measurement*. About two miles upstream from this point, on the north side of the river, was the village of *Tsinehiu* (Tsin-e-he'-oo)." There are two possible interpretations from this reading. The first is that the village Tsinliu is Gifford and Schenck's (1926) Site No. 36, and the second is that their Site No. 13 is Tsineuhiu (Latta 1949). However, the placement of *The First Point of Measurement* was not discovered through the course of this research. Woilu may have been the "principal, or head village," the next most important Yowlumne village was Tsinliu, situated "on the north bank of Kern River about three miles above the Discovery Well of the Kern River Oilfield" (Latta 1949:50). That would place Tsinliu in the complex of Site No. 13 (Gifford and Schenck 1926) and Elliot Ranch (Weil and Macko 1983; Macko and Weil 1984). Therefore, approximately two miles upriver, the Hart Park site would be the location of Tsineuhiu.

Some 28 years later, Latta (1977:277) noted that "T'sinleu (T'sin-le-oo) was a Yowlumne village located on the north bank of Kern River northeast of Grade." There appears to be a typographical error in this description; the "Grade" Latta mentioned was undoubtedly China Grade Loop, as was referred to in Latta (1949). This revised 1977 placement for Tsinliu moved the village less than an eighth of a mile west of the Discovery Well, a sharp contrast to the 1949 placement of Tsinliu nearly "three miles above the Discovery Well" (Latta 1949:50).

It is possible that Gifford and Schenck's Site No. 13 is the village of Tsinliu. However, the author's revised placement has Site No. 13 *and* Site No. 36 representing the main village of Tsinliu. The Elliot Ranch site may also be a component of the village, or may be an individual processing/camp site. Site No. 36, south-southeast of Site No. 13, was originally thought to be the location of Konoilkin (Gifford and Schenck 1926); however, most ethnographic information contradicts this placement. Given the minimal amount of detail they provided about the Yowlumne (albeit informative), it is more than likely that Gifford and Schenck were incorrect in naming Site No. 36 the village of Konoilkin. Site No. 36 may represent significant portions—or perhaps a "suburb"—of Tsinliu, or it may be a different site altogether.

Wawcoye

In the 1860s, Solomon W. Jewett came to the Bakersfield area from Vermont and brought not only his family but a large herd of French merino sheep. He bought the property where the historic Rio Bravo Ranch was located, and began to cross his sheep with the local Mexican varieties of sheep (Chavez 1981:8). Wahumchah's father herded sheep for the Jewetts, near the hills beside Cottonwood Creek, above the Rio Bravo Rancho and the village of Wawcoye (Latta 1949:45, 67). Currently, however, the Olcese Ranch site is thought to be the location for the village of Wawcoye (Schiffman 1986).

Latta's (1977) ethnographic location for Wawcoye placed it squarely underneath present-day Rancheria Road on the south side of the river canyon, and in between Cottonwood Creek and Rio Bravo Rancho—at least one mile further west of Wawcoye's currently recorded location, based on archaeological research conducted by Schiffman (1986). In fact, an archaeological survey near the Latta (1977) placement found no evidence of cultural remains. The area was "scattered with granitic boulders," making "habitation less desirable" than other areas nearby; thus, no village site was detected (Schiffman 1992:2). Another possible explanation for the absence of cultural material may be that erosion and/or postdepositional actions have impacted the site to the point of near obliteration of any such remains (Schiffman 1992:5). One such impact was a flooding episode in 1966 that completely inundated the river's lowlands (Lewis and Schiffman 1982), including the parcels where these villages had been reported.

Konoilkin

At or near the mouth of the Kern River Canyon was the village the Yowlumne called Konoilkin, situated "where the waters of Kern River made a slight fall" (Latta 1977:277). According to Latta (1977:277), "On the flat just east of the mouth of the canyon, many tribal ceremonial meetings were held" at Konoilkin. Could this be the site where an unnamed seasonal drainage empties into the Kern River? Konoilkin may represent the Olcese Ranch site (upper Wawcoye), and does seem to match the ethnographic placement for this village. It is also possible that Konoilkin is located further up the canyon.

On one of ethnographer John P. Harrington's place-name trips between 1933 and 1934, Harrington interviewed Tubatulabal consultants. Two of his Tubatulabal informants were women with the identical name "Petra." One was identified as "Petra K.," and the other as "Petra Mi." When Harrington and Petra Mi. were heading down old Kern Canyon Road (portions of which are present-day State Highway 178) from Lake Isabella, they passed a place that Petra Mi. identified as "poycat." Poycat (perhaps a reference to Wawcoye) was "just (close) to konnow'ilkin" (Harrington 1984). Petra Mi. noted that "konno'ilk'in [was] not in the very mouth of Kern Canyon but a little below." Then Harrington's handwriting becomes almost indecipherable, but he appeared to record an abbreviation referring to the "North Fork-symbol? [of] Cottonwood Creek" (Harrington 1984). Thus, the placement of Konoilkin could be right below the unnamed drainage above Cottonwood Creek—or it is possible that prehistoric Cottonwood Creek at one time received more water and had a much stronger flow than at present, creating several points of discharge into the Kern River.

Hawsu and Woilu

The village of Hawsu has yet to be located definitively. Ethnographers and archaeologists have postulated that it is situated along the north banks of the Kern River, and further downriver from Wawcoye, south of Rancheria Road (Chavez 1981:5; also see Latta 1949:45 and Wallace 1978:448).

The main village of Woilu was in present-day Bakersfield; its placement is undisputed by ethnographers, archaeologists, and historians. Supporting ethnographic evidence for the placement of Woilu was documented by Latta (1949:64), wherein he stated that Wahumchah's father was born in Woilu, "right where Bakersfield is now." Wahumchah died in Visalia in 1960 at the age of 97; his father had lived to 120 years of age (Latta 1977:275).

Other Observations

Further up the river canyon in an easterly direction, past the canyon mouth, is another unique archaeological site. It is a pictograph site on a granitic boulder depicting faint, curvilinear patterns preserved in red paint. Another interesting observation is that the Olcese Ranch site, less than a half mile away, contained significant concentrations of (among other things) yellow ochre. Yellow ochre is important to note because it was commonly used by the Yokuts as a base for yellow pigments in pictographs (e.g., Latta 1949, 1977). Perhaps these two sites are related in a socioreligious context.

REVISED VILLAGE PLACEMENTS

Based upon this author's research, revised placements for the Yowlumne Yokuts villages discussed above are offered as follows (from west to east) (see Fig. 2):

1. *Woilu* (also *Woilo, Wawlu*): Downtown Bakersfield near 16th and F Streets; the paramount village of the Yowlumne.

2. *Tsinliu* (also *T'sinleu, T'sinliu*): In the vicinity of Gifford and Schenck's (1926) Site No. 13; along with Woilu and Wawcoye, one of the three major villages for the Yowlumne.

3. *Tsineuhiu* (also *T'sineuhiu, T'sinheu*): Could be in the area of Gifford and Schenck's (1926) Site No. 13, but may be further up the river near the Hart Park site. The village was definitely located on the north side of the river in between Tsinliu and Hawsu.

4. *Hawsu*: On the north banks of the Kern River, northwest and across the river from Wawcoye. This village was referred to as "straggling down the river for about a mile" in numerous sources, and may be a component to the larger village of Wawcoye.

5. *Wawcoye*: Located south of the mouth of Cottonwood Creek, and currently placed below an unnamed drainage. It is believed by the author that the ethnographic evidence placing the village below the Cottonwood Creek drainage and above Rio Bravo Rancho is correct. A survey and excavation report by Schiffman (1986) referenced the Olcese Ranch site area as "upper Wawcoye," largely based upon the recovery of historical glass beads (presumed to be associated with contact from Garcés in 1776). This village was also one of the three major villages for the Yowlumne, and probably was a gateway trading center with the Kawaiisu or Tubatulabal, being situated closer to the mouth of the Kern River Canyon.

6. *Konoilkin* (also *Konnow'ilkin*): Literally means "place where the water falls" in Yowlumne. Its placement is thought to be north of Wawcoye on the same side of river (the south banks). This village site may actually represent the currently recognized placement for Wawcoye. One of Harrington's Tubatulabal interviewees from the 1930s, as well as Latta's Yowlumne interviewees from the 1940s, identified Konoilkin as just below the mouth of the canyon, and not *at* its mouth. The religious significance attached to this place-name may help to explain the presence of rock art in the vicinity.

7. *Shoko*: Refers to the Yowlumne place-name "where the winds blow." This village site is thought to be up in the Kern River Canyon beyond the first Pacific Gas and Electric (PG&E) powerhouse, but ethnographic sources contradict this placement. The Paleuyami Indians frequented the site of Shoko (Kroeber 1925:482), and the village was actually part of Paleuyami territory that overlapped (ethnohistorically) with the Yowlumne. The site may have been destroyed by the construction of State Highway 178 or the PG&E powerhouse, or the site may be right at the mouth of the river canyon.

CONCLUSIONS

Clearly, there are discrepancies between the currently accepted placements for at least one major and a few smaller Yowlumne Yokuts villages along the lower Kern River. Often, the ethnographic evidence does not concur with the archaeological evidence, much of which is piecemeal. It is important to note that this region is one of significant anthropological and historical importance. There is a complex prehistory in the lower Kern River Canyon which has only begun to be examined on a regional basis. There is also a definite Protohistoric Period component in the river canyon, which is all the more rare in this region of California.

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EXPERIMENTAL REPLICATION OF A TULE BOAT[1]

Richard H. Osborne, Jeremy R. Kempf, Pete J. Keeney, Daniel Recendez, and Virginia M. Osborne, Social Science Division, Porterville College, Porterville, California.

INTRODUCTION

The construction of tule rafts is a worldwide phenomenon occurring primarily in temperate and tropical regions. In general, these watercraft are constructed by bundling reeds and then lashing several of the bundles together. They are not meant to exclude water; instead, they rely upon the buoyant nature of the reeds, each of which has an internal structure similar to the polystyrene foams used in modern-day flotation devices. The most common means of propulsion is paddling or poling; however, on occasion, vessels of this type are fitted with sails (Cunningham 1989:35).

A variety of appellations, including balsas (Latta 1977:505), balsa canoes (Cunningham 1989:35), reed boats (Kendell 1973:156), tule balsa canoes (Harrington and Fernando 1978:27), rush rafts (Kroeber 1925:813), and tule boats (Donnan 1978:102-106), has been applied to boats with this general configuration. The purpose of this article is not only to provide a brief overview of reed boats in historical and ethnographic records, but also to describe an experimental replication of this type of craft by the authors as part of a class project in 1997 at Porterville College.

WORLDWIDE HISTORICAL AND ETHNOGRAPHIC REFERENCES

While the origins and earliest employment of reed boats are not precisely known, they are thought to have been in use prior to 6,000 years ago in Egypt and Mesopotamia (Courtlandt 1963:9). Both iconography and models of reed craft have been noted in Egyptian tombs, and the earliest plank ships from that part of the world appear to be modeled after papyrus reed boats (Heyerdahl 1972:21, Plates 8-14). In the western hemisphere, the art of the Moche culture of Peru (first appearing around A.D. 400) exhibits the balsa motif extensively in two-dimensional (Fig. 1) and three-dimensional works (Donnan 1978).

Reed boat technology is still in use in many areas of the world today. Perhaps the most famous examples are produced by the descendants of the Moche and the Inca along the northwest coast of Peru and at Lake Titicaca to the southeast (Fig. 2). Using the abundant totora reed (*Scirpus totora*), contemporary boatbuilders fabricate watercraft that bear a striking resemblance to the vessels depicted in the art of their forebears (Donnan 1978:102). African examples of balsa technology are found at Lake Chad in the north-central portion of the continent, at Lake Zwai in Ethiopia, and at Lake Tana at the source of the Nile (Heyerdahl 1972:64). Additionally, the Seri people of western Mexico used balsas for fishing and turtling into the early decades of this century (Felger and Mosher 1985).

Ethnographic References in the Southern San Joaquin Valley

Prior to the middle of the nineteenth century, the environment of the southern San Joaquin Valley was quite different from what it is today (see Fig. 3). Principal features of the eastern and central portions of the valley were lakes, rivers, creeks, sloughs, and associated marshlands. The ethnographic inhabitants of this area were the Yokuts, who spoke a Penutian language, and who were divided into numerous subgroups, often referred to as tribelets (Kroeber 1925:474). Due to the lacustrine/riverine

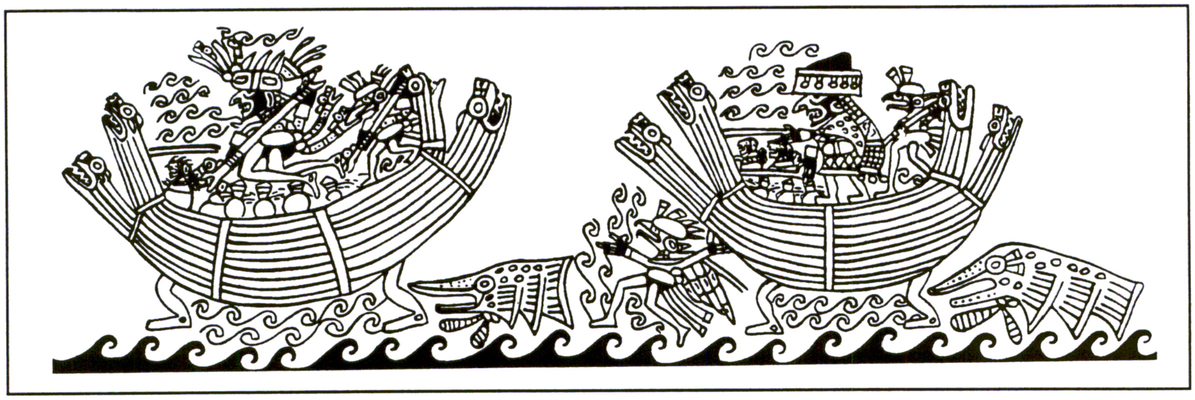

Fig. 1. Moche two-dimensional balsa motif. Illustration by Donna McClelland (from Donnan 1978:104).

Fig. 2. Contemporary reed boat on Lake Titicaca, Peru. (Photograph by Fred Springe.)

nature of their environment and the prolifera-tion of tule reeds, the Yokuts made extensive use of balsa technology (Kroeber 1925:531; Farquhar 1933:34-35; Powers 1976:376-377). Vessel size varied quite a bit, with the aver-age accommodating about six people (Gayton 1948:21). Some small, one- or two-person versions were built (Powers 1976:394), as were some larger craft, measuring 50 feet in length and 10 feet in width (Latta 1977:503). These reed boats were used primarily for transportation, fishing, fowling, and turtling.

The preferred method of construction was to use three or five bundles of rushes to form the hull. Butt ends of the individual reeds were lapped together, thus giving each bundle a cigar-shaped appearance (Latta 1977:505). The prow at each end was turned up, tied, and the uneven ends trimmed (Cunningham 1989:35). Some small, single-person craft were pointed and elevated in the front and squared off at the stern (Powers 1976:376). A completed boat was relatively light in weight; however, once they entered the water, they increased in weight rather rapidly. For this reason, when not in use, a boat was pulled up on land, set on end to drain, and then allowed to dry out until it was needed again (Latta 1977:506). Seldom did they last more than "a season or two" (Kroeber 1925:243).

TULE

The term "tule" is commonly used to refer to the aquatic plants that grow along the various waterways of the San Joaquin Valley of California (Osborne 1996:61). The name stems from the Aztec word *tullin* (or *tollin*) that denotes cattail or similar plants with sword-like leaves (Gudde 1969:346). Early Spanish explorers in the southern San Joaquin Valley used the term "tule" when referring to such marshland vegetation, and the places where they grew were called *tulars*. They also alluded to the marshy areas of the valley as *los tulares* (the tulares). In Spanish, the word "tulare" signifies "a swamp with flags" (Caughey 1952:5; also see Osborne 1996:61), and the Yokuts who inhabited this area were called *Tularenos* by the Spanish (Kroeber 1925:476).

Fig. 3. Overview of Kern National Wildlife Refuge, where a small portion of the valley is maintained as it appeared prior to the middle of the nineteenth century.

Probably the most prominent and utilized plant in the marshlands community of the southern San Joaquin Valley was the common tule (*Scirpus acutus*). However, it should be noted that in many instances, when ethnographic accounts mention tule or tule exploitation in the valley, they may actually be referring to any member of the genus *Scirpus* (bulrush) or the genus *Typha* (cattail) (Osborne 1996: 64).

Tule (*Scirpus acutus*) is a perennial herb with thick brown rhizomes and an erect culm (Mason 1957:323; also see Osborne 1996:62). It is not unusual for culms to be as thick as 2 cm. (0.8 in.) and may reach up to 5 m. (16.4 ft.) tall. Some examples from Tulare Lake have been reported to have reached 6.1 m. (20 ft.) in height (Hittell 1866:107). The culm is terete, and the leaves form a basal sheath around the stem. The flower is capitate (a globular or head-shaped cluster), and is located at the upper end of the unbranched culm. As mentioned above, the single characteristic that makes *S. acutus* so suitable for balsa construction is its pithy, styrofoam-like interior.

EXPERIMENTAL REPLICATION

One method of obtaining insight into the production, operation, and capabilities of prehistoric and historical artifacts is through experimental replication. By utilizing the same materials and construction techniques (if known) as aboriginal peoples, researchers may gain knowledge regarding archaeological artifacts and features that might otherwise be unavailable. During a discussion among the authors, questions were raised regarding the degree of difficulty involved in constructing a reed boat, and about the buoyancy and durability of such craft. In order to address these questions, the authors replicated one of the tule boats that figured so prominently in the prehistory of the southern San Joaquin Valley.

Fig. 4. Gathering reeds at the Kern National Wildlife Refuge.

The goal of the project was to fabricate, launch, and paddle a faithful reproduction of a two- to three-person balsa canoe. A literature search was conducted, and several ethnographic and contemporary accounts of balsa building methodology in California were encountered (e.g., Wheat 1967:40-47; Latta 1976:77-79, 1977:504-508; Harrington and Fernando 1978:27-31; Hudson and Blackburn 1979:331-337; Jamison 1985:21-30; Baugh 1993:34-35; Southworth-Kidder 1993:36-40; M. Macko, personal communication 1997). Ultimately, each article contributed in some way to the finished product.

Gathering Raw Materials

Permission was obtained to collect raw materials (*S. acutus*) at the Kern National Wildlife Refuge near Delano, California. Research indicated that tule is at its best if gathered from June until late fall, as the reeds "tend to get firmer from late summer into fall" (Kidder 1993:26). However, due to time constraints, materials for this project were recovered in early May. In the initial harvesting session, five individuals gathered 850 reeds in three hours (Fig. 4). All plants were growing in six to 18 in. of water.

Although several ethnographic accounts (e.g., Wheat 1967:41; Latta 1976:78-80; Harrington and Fernando 1978:28) indicated that the tule stalks were harvested with knives, the technique employed in this project was to pull up on the reeds until they "popped" off near the base of the shoot. This method was suggested by a previous researcher/boatbuilder (M. Macko, personal communication 1997), who contended that this would minimize the absorption of water at the base of each reed. The tule stalks were then dried for one week; however, this process can take up to several weeks, depending on the condition of the reeds and the weather. When the plant becomes spongy as it is squeezed between the fingers, the drying process is complete. If the plant is brittle, it must be dampened with water before use (Jamison 1985:25).

Soon after the initial harvest of reeds, it was determined that in order to construct a suitable boat, more reeds were required, so a second trip to the refuge was arranged. On this occasion, six individuals recovered 880 plants in approximately two hours, bringing the tule total to 1,730. The second batch was also dried for a week. The collected reeds ranged from about six to ten ft. in length.

Boat Construction

It was decided that the current construction would incorporate design elements from several of the ethnographic and contemporary boat building accounts mentioned above (see Fig. 5). Hence, the fin-

Fig. 5. Completed tule boat constructed by the authors.

ished product would be a generic representation of this type of vessel. The agreed-upon format was a three-bundle configuration similar to the craft described by Harrington and Fernando (1978:28). The central bundle was to be considerably larger than the two outboard bundles, with the idea being to construct a "V-shaped" keel that would provide greater stability.

The bundles were individually fabricated according to plan. Stalks were placed butt end to butt end, but they were staggered to provide greater strength. The three bundles were then lashed together. Due to time and material constraints, synthetic rope was used, as opposed to a more authentic fastening material of cattail rope (Wheat 1967:42-43) or willow withes (Latta 1976:78). It should be noted that no stiffening poles were incorporated into the current balsa, although it seems that such devices were common in craft of this type (Latta 1976:79; Harrington and Fernando 1978:28). The bundles were secured with the rope at approximately 12-in. increments. Each end of the craft was pulled up, lending an overall curvature to the boat. All loose reeds and ropes were then trimmed.

The entire construction took only about one and a half hours from start to finish. The completed vessel was 19 ft. long and 26 in. wide at the widest point. We had no means of weighing the finished product, but estimated the weight at approximately 100 to 120 lbs. Two people could easily lift and maneuver the dry boat.

Launching the Craft

The canoe was taken to Lake Success, east of Porterville, California, for launching. Uncertain as to the boat's seaworthiness or ability to support weight, an extremely light (95 lbs.) pilot (Fig. 6) was

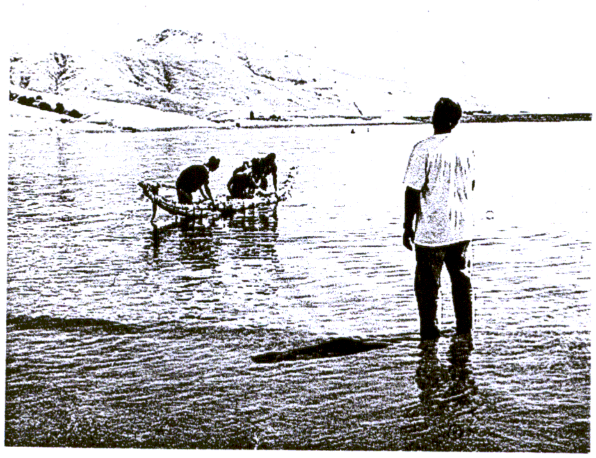

Fig. 6. Paddling on Lake Success with the lighter pilot.

Fig. 7. Paddling on Lake Success with a heavier pilot.

chosen for the maiden voyage. Once the craft was in the water, it was easy to see that we had underestimated the buoyancy of the rushes. Rather than sinking low in the water, the vessel bobbed like a cork on the surface. The large keel bundle that we had built was now doing the opposite of its intended purpose. Rather than lending stability and enhancing handling characteristics, the large keel caused the boat to ride too high in the water. The craft was very unstable and was like trying to "ride a telephone pole," in that the pilot was required to straddle the craft and to constantly adjust balance. Succeeding pilots weighed more than the first (Fig. 7) and had a slightly easier time of it, but all were forced to straddle the boat with their legs in the water on either side. While we have a photograph of a man on Lake Titicaca, Peru, riding in this fashion (Donnan 1978:102), the norm is to sit cross-legged or to kneel inside the balsa, and this had been our intended mode of riding and operating our vessel.

A single-bladed canoe paddle was used for propulsion. This compounded the pilot's balancing problem, as the paddle needed to be switched from side to side. A double-bladed paddle like the ones used in kayaks would probably have worked better. Ethnographically, there are numerous accounts referring to the use of double-bladed paddles (e.g., Hudson and Blackburn 1979:334; Cunningham 1989: 39). As was suspected, the boat increased in weight rather dramatically after about 45 minutes in the water.

DISCUSSION

All individuals involved in this project agreed that it was an interesting and educational experience. As often is the case in the field of experimental archaeology, ethnographic and other preproject research did not totally prepare us for some of the problems that were encountered. A second vessel is presently in the planning stages. Lessons learned and questions raised during this project will be integrated into the forthcoming effort.

One obvious alteration will be in the hull design. The confidence gained in the current project regarding the bouyancy of reed craft will be put to good use. Our intent is to fabricate a vessel that is a bit wider and more raft-like. Such a boat was replicated by Native Americans from Kern County in the 1950s and appears in Latta (1976:81). Use of this design will also facilitate a variety of additional experiments concerning the weight and volume that could have been accommodated by this class of balsa boat.

As noted above, synthetic rope was used on this project to lash the reeds together. For future experiments, we will utilize tule or cattail cordage, or perhaps willow withes, to assemble the hull. We will also employ a full-time photodocumenter. During the current experiment, the photographer also participated in all other aspects of the project and, consequently, photodocumentation was not as complete as it should have been.

CONCLUSIONS

Historically and prehistorically, boats constructed of reeds provided—and in some areas, still provide—a simple and efficient means of transporting people and materials across the water in many parts of the world. Craft of this type are easy to construct, are buoyant, and are relatively durable.

The value of this project was twofold. In addition to learning the basics of reed boat construction, group members were also introduced to some of the principles that underlie the field of experimental archaeology. Hopefully, some of our experiences will aid others embarking on a project such as this in the future.

NOTE

1. This paper was originally presented at the Society for California Archaeology Northern Data Sharing Meetings, Yosemite, California, November 8, 1997.

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INSECT USE BY THE YOKUTS INDIANS

Jill K. Gardner, Dept. of Sociology and Anthropology, California State University, Bakersfield.

INTRODUCTION

Insects have long been recognized as a food resource for native peoples in North America, as well as for ritual, medicinal, mythological, and other purposes. Ethnographic information is somewhat limited regarding the practice of entomophagy, or "the study of the human consumption of insects (usually for food) . . ." (Sutton 1995:257), as well as with respect to the use of insects for nonfood purposes. With some notable exceptions, what information is available is frequently vague as to the species of insects used, how they were collected, how they were processed, or even what native group was referenced. This article is not intended to address such issues, but instead to provide a compilation of available information on insect use by the Yokuts Indians of California, along with general references that may have applied to the Yokuts.

Insects have always been consumed, at least on an occasional basis, by most human populations, including western societies, albeit sometimes unintentionally (Sutton 1988:1). However, early Euroamerican observers of native life considered insects repulsive and dirty, and consequently may have been reluctant to inquire into or record information about insect use (Sutton 1988:5). As a result, much information, if it was recorded at all, was usually brief and often biased (Sutton 1988:5). Nevertheless, Essig (1934:181) reflected that "Indians probably knew a great deal more about certain facts concerning the natural instincts and habits of insects than the white race will ever know." Essig (1934:181) further commented that, "The few entomological scraps which have fallen from the tables of anthropology are meager indeed, but they may serve to stimulate our imaginations of what might have been."

Although insects have never been known to constitute the primary staple in the diet of any Native American population, "they were often critical resources, forming more than just an occasional addition to the diet," and do not, as proposed by many anthropologists, "constitute famine food or backup resources, usually taken on an individual encounter basis" (Sutton 1988:2-3). In fact, what evidence is available indicates that insect procurement was purposeful and organized (Sutton 1988:3). While insects were undoubtedly taken opportunistically, "an examination of the ethnohistoric and ethnographic data indicates that considerable planning, travel, and effort was often involved in insect procurement" (Sutton 1988:83).

In western cultures, there is the popular opinion that the consumption of insects is harmful and unhealthy. While it is true that a few poisonous insects do exist, and some are parasites or are vectors of disease, for the most part, insects can be ingested without detriment (Sutton 1988:1-2). Although most people would not choose to eat insects such as grasshoppers and caterpillars, "the fact remains that they are perfectly harmless and wholesome and, if prepared in more modern ways, might even be palatable" (Essig 1934:186).

Species names are seldom delineated in the ethnographic literature; consequently, it is impossible to do an in-depth analysis of the biology or seasonality of particular species in this review. However, although the data are incomplete, many of the insects that were accessible to Native Americans are avail-

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able for collection from April through October. Additionally, storage of processed insects was a customary procedure, providing this resource throughout the year (Sutton 1988:84).

YOKUTS TERRITORY AND GENERAL SUBSISTENCE ECONOMY

Based primarily on geography, anthropologists generally split the Yokuts Indians of California into three groups: the Southern Valley Yokuts, the Northern Valley Yokuts, and the Foothill Yokuts (e.g., Wallace 1978a, 1978b; Spier 1978) (Fig. 1). The Southern Valley Yokuts inhabited much of the San Joaquin Valley "from the lower Kings River to the Tehachapi Mountains" (Wallace 1978a:448). Their territory included Tulare, Buena Vista, and Kern lakes, as well as portions of the Kings, Kaweah, Tule, and Kern rivers (Wallace 1978a:448). The Northern Valley Yokuts also occupied parts of the San Joaquin Valley, but extended north to "a line midway between the Calaveras and Mokelumne rivers," although their northern border has been disputed by the Plains Miwok (Wallace 1978b:462). The territory of the Foothill Yokuts encompasses "the western slopes of the Sierra Nevada from the Fresno River southward to the Kern River" (Spier 1978:471).

The subsistence economy of all three groups was similar, with an emphasis on fishing, snaring waterfowl, and the collection of shellfish, roots, and seeds, as well as some hunting of land mammals (Wallace 1978a:449-450). However, there were some cultural differences; for example, the Northern Valley Yokuts had greater access to salmon and acorns than the other two groups, and therefore placed more emphasis on these resources (Wallace 1978b:464). The Foothill Yokuts placed less importance on fishing and more on hunting and gathering (Spier 1978:472). When insects are mentioned as a resource at all, they are usually not considered a regular part of the subsistence economy of the Yokuts.

INSECTS AS A FOOD RESOURCE FOR THE YOKUTS

It is evident from the ethnographic record that the Yokuts exploited insects as a food resource in their own territory. It should also be noted, however, that the Yokuts had a fairly elaborate trade and exchange system with other Native American groups in California, often traveling beyond their borders for this purpose (Davis 1961:8-9). It is possible, therefore, that they could have collected insects in other territories along the way, thereby expanding their resource universe from time to time. It has even been recorded that certain insect foods were being imported and exported by some groups (Davis 1961:13).

Grasshoppers

Grasshoppers appear to have been a widely utilized food resource for many Native American groups, judging from the evidence available in the ethnographic literature (e.g., Powers 1877; Hutchings 1888; Gayton 1948a, 1948b; Schulz 1967). In fact, according to Sutton (1988:21), grasshoppers "may have been vastly underrated in the anthropological literature." Sutton (1988:21) further stated that grasshoppers were "prepared in a variety of ways, but cooking them, rather than eating them raw, seems to have been preferred."

Speaking of California Indians in general, Essig (1934:183-184) related that

> Grasshoppers were universally eaten wherever available, and in the large interior valleys and along the foothills of the Sierras they often occurred in immense swarms. Then it was that the entire Indian populace turned out to gather a large part of the winter's food supply. Several methods were employed to capture the insects, but usually a fire was first built on level ground or in a pit,

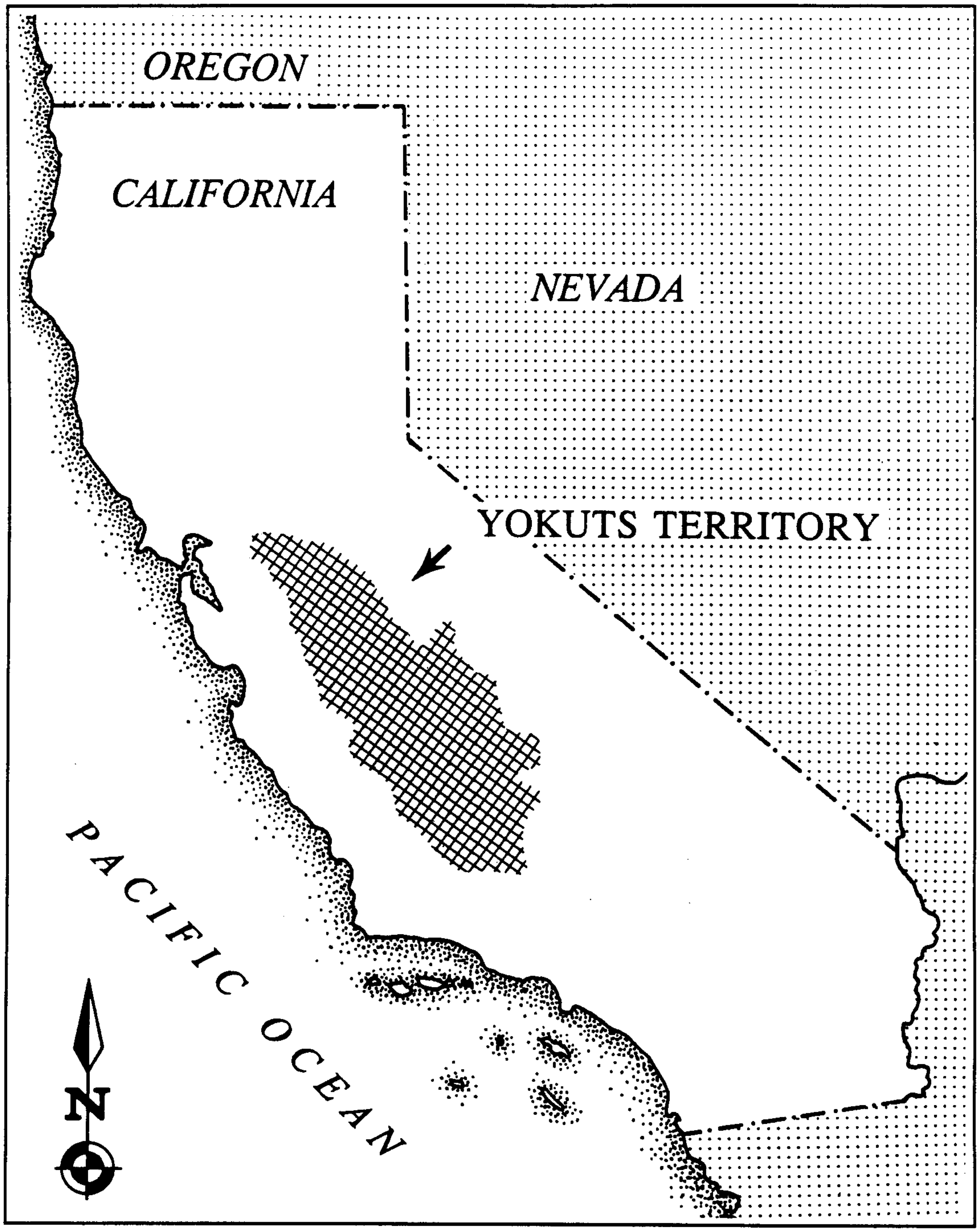

Fig. 1. General map of Yokuts territory.

and when reduced to coals the drive began from afar. In an ever-contracting circle the Indians beat the ground and vegetation with bushes and finally forced the bewildered grasshoppers into the masses of coals, where they were quickly roasted and subsequently stored away in bulk or impaled or strung on sticks to be eaten as we might dispose of roasted peanuts, or to be ground into a meal and mixed with pinole, or acorn meal, and boiled in baskets with hot stones. Literally tons

> of hoppers were thus consumed, but the annual supply never seemed to diminish for locusts were among the most serious pests which devastated the fields, orchards and gardens of the early white settlers throughout the state.

In his chapter on the Yokuts, Powers (1877:379) stated that

> [i]n the mountains they used to fire the forests, and thereby catch great quantities of grasshoppers and caterpillars already roasted, which they devoured with relish, and this practice kept the underbrush burned out, and the woods much more open and park-like than at present. This was the case all along the Sierra. But since about 1862, for some reason or other, the yield of grasshoppers has been limited.

Schulz (1967:25-28) discussed the use of grasshoppers by groups in the lower Central Valley, which include the Northern Valley Yokuts (Schulz 1967:5). He stated that the grasshopper was significant "not only for its potential dietary importance, but also because its acquisition entailed a form of habitat modification which has elsewhere been considered of special importance" (Schulz 1967:25). This "habitat modification" involved the frequent use of fire drives for the purpose of obtaining grasshoppers (Schulz 1967:26).

Hutchings (1888:428-429) described various methods of catching grasshoppers in the Yosemite Valley, an area that abutted territory occupied by the Foothill Yokuts:

> These are eaten as meat and cooked in various ways. Sometimes they are caught, threaded on a string, and hung over a fire until they are slightly roasted, then eaten from the string. At others the grass is set on fire, which both disables and cooks them; when they are picked up and eaten, or stored for future use. The most effectual method for securing grasshoppers, when they are abundant, is to dig a hole sufficiently deep to prevent their jumping out; then to form a circle of Indians, both old and young, with a bush in each hand, and commence driving them towards it until they fall in, and are there caught. They are thence gathered into a sack, and saturated with salt water; after which a trench is dug, in which a good fire is built, and when it is sufficiently heated, the ashes are cleaned out, a little grass put upon the bottom, when the grasshoppers are put in, and covered with hot rocks and earth until they are sufficiently cooked. They are then eaten in the same manner as we eat shrimps; or are put away to mix with acorn or seed mush, when they are ground into a kind of paste.

Although specific references to the Yokuts' use of grasshoppers are scant, the evidence of the use of grasshoppers in general by Native Americans in California, along with the sheer numbers and availability of this insect, provide a reasonable inference that the Yokuts regularly took advantage of this resource.

Moths, Caterpillars, and Butterflies

Although not specifically naming the Yokuts, but referring to "western Indians" in general, Essig (1934:185-186) described the large caterpillar of the pandora moth,

> which feeds on the needles of the yellow pines of the Sierra and Cascade mountains. The full-fed caterpillars are from 2 to 2½ inches long, or almost as large as your index finger. They live in the pine trees far out of reach — and only descend to the ground to enter the soil to pass into the chrysalis or pupal stage. Therefore the Indians were either compelled to await their natural descent or to resort to some means of forcing them to drop off. This they did by building a fire un-

der the infested trees and making a smoke smudge to stupify [*sic*] the caterpillars which rained to the ground. These were gathered in baskets by the women, children, and old men; killed and dried in a bed of hot ashes, coals, and sand; and stored away for future consumption.

Lynch (MS:passim), recorded a fascinating account of ''Bantook,'' a large caterpillar used by the Kocheyali Yokuts. Quoting or paraphrasing his consultants, the following accounts are found in his ''Miscellaneous'' and ''Caterpillars as a Food'' sections:

> Kau'num ''Farewell to Spring'', Godetia Amoena. This flower was frequented by a large caterpillar ''Bantook'', which was a favorite food.
>
> ''Ban'took'' was used as a general name as well as a specific name. The favorites were as follows: Ban'took, Dunlap, Calif., May 22, 1954---found around ''Farewell-to-Spring'' a pink flower---Godetia- deflexa. Green caterpillar, about 3 inches long, thick, with little black and orange markings as . . . Sho'muh-li. Green caterpillar, about 3 in. long, thick, There are two long Black strips on top of back, next to which are the following:
>
> About 3 inches long, thick. Aichauk'wu-i Yellow, thin black bands on top of caterpillar, with minute dots of orange red. THE ABOVE THREE CATERPILLARS IN SIZE AND COLOR of similar type.
>
> Hu'ya Squaw Valley--Brown, length about 1 inch, with brownish or yellowish strips from one end to the other, slender. Lucey stated it was her favorite--possibly because more ''delicate''?
>
> Bantook was usually found where there were fields of the Farewell-to-Spring. Jennie, Lucey's mother, would fill a burden basket with them. The proper way to handle the Bantook was to pinch off the head immediately and throw the rest over the shoulder and into the basket. Novices would have ''Farewell to Spring'' all over their heads, and in the basket, with Bantook crawling in their hair and over their shoulders.
>
> George Dick stated that the large Bantook were squeezed of excrement in the lower part of the digestic track [*sic*], making them clean. Lucey stated that Bantook was clean as they grew in flowers (Farewell to Spring.) She stated they cleaned and washed the Bantook with ashes.
>
> George Dick said he saw the ''old people'' just throw the Bantook on a hot stone, and eat.
>
> Also they would dry the Bantook and keep it for use later, to be eaten with acorns. Lucey said they used to keep them in a barley sack--she didn't know where they kept the Bantook in previous years.
>
> A soup was made of the dried Bantook, which was pounded up in little pieces so that it looked like ''corn''.
>
> Lucey stated that some times several kinds of Bantook would be mixed together. George Dick said, however that usually one kind would be abundant for a very short time, and then the next day there would not be any seen, and later some other kind of caterpillar would be found in great numbers.

Gayton (1948a:14) reported that ''Caterpillars . . . were skinned (singed?) and eaten'' by the Chunut and Tachi Yokuts of Tulare Lake. Also referring to the Yokuts of Tulare Lake, Gayton (1948a: 23) further stated that

> [s]mall moths . . . and a ''night'' moth . . . were distinguished, while a very large spotted moth was called ''eats dead people'' . . . and literally was believed to do so. Butterflies in general . . .; the Monarch butterfly was called metaphorically ''big bee'' and the ''cabbage'' butterfly descriptively ''little white butterfly.''

It was not made clear in the reference whether these insects were consumed.

Demonstrating the western bias of insect exploitation as viewed by the Yokuts themselves, Lynch (MS) noted that ''The information is not complete, as many Indians would rather tell their most intimate thoughts rather than to talk about caterpillars, grubs, etc., due to criticism by the Whites.''

> . . . which was eaten with acorn mush. The furry bumblebee . . . was known and "a bee with a hard back . . ."

Gayton (1948a:14) further recounted that

> The grubs . . . of bees were eaten; the bees were smoked out with a damp tule smudge. The ground wasp . . . larva was said to be eaten by the Telamni (it was scarce in the tular). This was . . . roasted on coals and eaten with acorn mush.

The use of honey was also observed among California native groups, as reported by Essig (1934: 183):

> Aside from that obtained in the native fruits and berries, sweets were available in the form of the so-called Indian honey or honeydew, the excrement of plant lice, coccids and a few other homopterous insects. Small quantities of honey were to be found only in the nests of bumblebees and some other wild bees, since the honeybee was unknown in California until it was introduced by the American settlers only eighty years ago.

In addition, the Michahai and Waksachi Monache were also known to have utilized honey, as noted by Gayton (1948b:223):

> A bee (?) called in English "big stick bee" deposited honey all over a tree -- in its crevices, forks, or splits in the bark. This honey, while sticky, was sufficiently firm to be cut away in small pieces. An obsidian blade was used, and pieces obtained might be as large as a man's middle finger. The honey was taken back to camp on leaves, or in a leaf-lined basket, and was eaten immediately "just like candy." B.O. insisted that this was "old time" and that the bees did not come from Spanish sources.

It seems rather apparent, therefore, that the use of stinging insects, such as yellowjackets, hornets, wasps, and bees, was common among the Yokuts, as well as among their Monache neighbors.

Ants and Flies

Although the evidence is meager, it nevertheless suggests that it is probable that several species of ants and flies were utilized as a food resource by the Yokuts. In a brief and somewhat vague reference, Gayton (1948a:23) recorded

> Flies in general . . ., housefly . . ., blowfly. . . . Small ants, either red or black, were called by the same name . . .; tree ants . . . "smelled bad when killed"; the big ants which made hills were called "crazy ants . . ."

It is not clear in the above quotation if the ants and flies mentioned were consumed. Gayton (1948a:14) also related that "The grubs . . . of horseflies . . . were eaten." Additionally, on a list of subsistence materials, Gayton (1948b:224) recorded "fly." While the scant literature on ants and flies may indicate their infrequent use by the Yokuts, it is more likely that either the Yokuts consultants were reluctant to discuss it, or ethnographers were unwilling to acknowledge it.

It is interesting to note that some Great Basin groups, including the Mono Basin Paiute, whose territory overlaps the modern boundaries of California near some of the Yokuts groups, were known to have utilized brine fly larvae and pupae (*kutsavi*) on a regular basis. It was considered such an important resource that other Northern Paiute groups referred to the Mono Basin Paiute as *kucadikadi*, or "eaters of the brine fly pupae" (Fowler and Liljeblad 1986:464).

INSECTS AS A NONFOOD RESOURCE FOR THE YOKUTS

Insects were frequently employed as a nonfood resource by the Yokuts as well. They were often utilized for ritualistic, medicinal, mythological, and other purposes. Sutton (1995:255) noted that insects "play important roles in many other aspects of human society, including amusement, art, oral tradition, and social structure." However, attempts to expand our knowledge of these practices are hampered not only by the paucity of ethnographic evidence but also by the deficiencies of current archaeological techniques for recovering and analyzing insect remains.

Insects in Ritual Practices

There are several references in the literature to the ritualistic use of insect cocoons by the Yokuts Indians, as well as other California native groups. Essig (1934:182) observed that

> [i]n ritualistic ceremonies and for musical instruments, many tribes in middle and northern California used the cocoons of the giant wild silkworm moths for rattles. These cocoons were split open, the chrysalids removed, a few pebbles inserted, and then bound singly or in numbers to the end of a stick often further ornamented with feathers.

Among the Chukchansi, Kroeber (1925:516) related that "The shaman's rattle was the usual California one, but was a little thing with but one or two cocoons. Occasionally a larger number of cocoons were tied up in a mass of feathers." The cocoons that were used for rattles by the Wukchumni

> were those of the ceanothus silk moth which infested the oak trees of the roblar and chaparral of the foothills. The cocoon was carefully freed from its moorings, a twig inserted into one end and then held close to glowing coals to singe off the "silk" and kill the pupa within. At this time the cocoon shell was soft, and was pressed about the twig, being wrapped and held in place by a bit of sinew string. The cocoon was left in the sun until the pupa had become thoroughly dried and, shrunken to a hard small mass, rattled about inside. Pebbles were sometimes inserted. Two to four such cocoons were then tied onto a little handle about six inches long [Gayton 1948a:92].

Cocoon rattles were also used by the Yokuts in the ritual elimination of bad dreams. Gayton (1948b:170) related the story of E.M.:

> Long ago E.M. dreamed constantly of her dead mother and sister. A Kechayi doctor, Wewu'ki (Old Dick) was sent for. He was Tokelyuwich, but he could cure people of either moiety. He told everyone in the village to assemble for an all-night ceremony for the dead. With a cocoon rattle he sang for a very long time. Then he asked everyone there to tell their dreams about dead people. When it was E.M.'s turn, she told hers. He put ashes on her head, as he had done for the others, and called out the names of the dead who were bothering her. He told them to go away and never come back to bother the living. Then he blew the ashes off her head. Never again did she dream of the dead.

Driver (1939:99) reported that an "ant ordeal" was practiced by some Yokuts groups, in which ants were swallowed "[w]ith eagle down," with the further notation that "[a]nts crawl through to surface of body'' (Driver 1939:99). In an interesting reference to the Tübatulabal, a group that occupied the southern Sierra Nevada foothills (Smith 1978:437), Voegelin (1938:67-68; also see Blackburn 1976) further described the use of eagle down, as well as ants crawling out of the body:

> . . . on third day was taken into sweat house by either of his grandfathers and about 7 balls of eagle down, each containing 5 yellow ants, given him with water, ''like pills.'' When the boy's eyeballs turned red person administering ants knew he had had enough, and shook him so that ants would bite him inside. . . . next morning was given hot water to induce vomiting; ''the ants came out alive, in those little balls.''

Moth cocoons and ants appear to have played a prominent role in the ritual practices of the Yokuts. If so, perhaps other insects were also utilized for this purpose, but such information was never recorded by ethnographers. This may be due to unwillingness on the part of Yokuts consultants to share ritual information with outsiders.

Insects in Medicine

The use of ants for medical purposes is also documented. For the Chukchansi Yokuts, Kroeber (1925:516) noted that ''The use of irritants was not unknown. For stomach ache ants were applied to the abdomen; if the pain did not yield, the insects were wrapped in eagle down and swallowed.'' In his chapter on the Yokuts, Powers (1877:378) indicated that ''For diseases of the bowels they boil up a mess of a large and very stinking ant, and give it internally.''

For the Wukchumni Yokuts along the western slopes of the Sierra Nevada, Gayton (1948a:80) reported the medicinal use of yellowjackets:

> If a baby had a sore mouth, it was attributed to the mother's having eaten yellowjacket larvae (an extension of the meat tabu, because yellowjackets eat meat). To cure the infant, dried yellowjacket larvae were pounded up . . . and the baby's mouth swabbed out with the mixture.

This practice is reiterated in the same volume:

> If the mother should eat yellowjacket larvae . . . the baby would get a sore mouth. The cure for this was to wash the infant's mouth with a mixture of pulverized . . . (unidentified plant) and dried, pulverized yellowjackets [Gayton 1948a:103].

The above examples indicate the importance of insects, including ants and yellowjackets, as curative agents for various medical problems. Since they were often taken internally, it is possible that misinterpretations may have arisen in the ethnographic record regarding their use as a subsistence resource as opposed to a medicinal one.

Insects in Mythology

Mythology was an integral part of Yokuts society. However, few Yokuts myths have specific references to insects. One short example was provided by Essig (1934:181):

> There is a Yokut myth concerning the origin of the Pleiades. It is a little story of a flea and five girls whom the insect married and subsequently followed into the sky. ''That is why there are five stars now in the Pleiades and one at the side. That one is he, the flea.''

Gayton and Newman (1940:84-85) cited the Wukchumni story of "Coyote, the Yellow Jackets, and the Clam Shells [Mih-kit'-tee and Ki'-yoo Go to Waw'-cum-naw]" as follows:

> Mih-kit-tee and Coyote were going to a meeting in Antelope Valley. Coyote was to do Mih-kit-tee's eating for him, as the latter ate only tobacco. Coyote went to drink, saw some yellow jackets, asked them how they became small-waisted. They offered to fix it for him; they tied tule around his waist, pulled it so tight he died. Mih-kit-tee struck him with an arrow; Coyote revived, claimed he had been asleep. Coyote lagged behind. When near Tulare Lake a clam shell whirled past his head. Soon several more came while Coyote persistently shot at squirrels. A clam shell struck his head; he died. Mih-kit-tee revived him as before, scolded him for being unable to leave things alone.

Finally, in the section titled "Inanimate Objects and Animals Can Talk," Lynch (MS) related the Kocheyali story of how "Bumble bee sings--he asks the flower, 'Can I get sweet stuff off the flower?' The flower says 'Yes'."

The above illustrations demonstrate the importance of insects to the Yokuts not only as a tangible resource, but also as an ethereal resource in the form of their mythology.

Other Uses of Insects

Basket weaving was an art widely practiced by the Yokuts. In a reference to "our west coast aborigines," Essig (1934:182) noted that baskets were often

> made watertight by coating them with wax obtained from several species of coccids, or scale insects closely related to the famous lac insect of India, from which commercial shellac is produced. Insect wax was also used for fastening the sinew backing of bows and even for chewing gum.

One interesting example of the nonfood use of ants by the Kechayi was related by Gayton (1948b: 166):

> When the navel stump fell off it was put in a piece of buckskin and hung with a few strands of beads to the cradle hood for the baby to play with. If the stump were lost, the child would be subject to nausea. When the child left the cradle, the stump was removed from it; for a boy it was placed in an oak tree so he would become a good climber, but for a girl it was put in an anthill to make her industrious.

Similar to the Kechayi example above, Gayton (1948a:102) related that for the Wukchumni and the Yaudanchi, "The afterbirth was thrown in the river so the baby would never be sick, according to M.P., who added that often a girl's and occasionally a boy's, afterbirth was buried in an anthill: if the insects ate it, the child would be industrious."

Rattles were used not only for ritual functions, but for entertainment as well. However, the rattle material used for entertainment purposes was different from the ritual rattles. Clappers made of elder wood were used "for ordinary pleasure dances such as the watiyod, whereas the cocoon rattle . . . was used only for serious performances like the Bear Dance" (Gayton 1948a:92). Interestingly, Driver (1939:97) reported that the use of cocoon rattles for dancing was denied by all consultants except the Choinimni.

CONCLUSION

Although the evidence is somewhat meager, it seems clear that insects played an important role in the subsistence and daily routine of the Yokuts Indians of California, as well as other native groups in North America. Since obtaining information on insect exploitation by the Yokuts, or any other indigenous group, is virtually impossible at this time from an ethnographic standpoint, it now falls upon the field of archaeology to develop and implement the technology that will enable researchers to retrieve this information from the ground. However, "[i]n most archaeological field situations . . . insects are rarely considered when recovery methods are chosen" (Sutton 1995:266). Consequently, insect remains are often destroyed, and when they are preserved in sediment and flotation samples, they are rarely identified, since most researchers consider them insignificant (Sutton 1995:264-266).

It is important to remember that "the distinctive feature of subsistence [for the Yokuts] was not a dependence upon one abundant resource, but the omnivorous character of the diet" (Spier 1978:472), a diet that also included insects. As Sutton (1990:199) correctly pointed out, "In spite of the fact that few available detailed data relate to the role of insects in human diet, it is becoming increasingly apparent that insects form a portion of the diet of most human societies." The diverse uses of insects by the Yokuts attest to their significance not only as a food resource, but for ritual, medical, mythological, and other functions as well.

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CUMULATIVE BIBLIOGRAPHY FOR THE YOKUTS AND RELATED TOPICS

Compiled by

Jill K. Gardner, Dept. of Sociology and Anthropology, California State University, Bakersfield
Mary Gorden, Lemon Cove, California
Nelson Siefkin, Dept. of Sociology and Anthropology, California State University, Bakersfield

INTRODUCTION

The following references for Yokuts and related topics is a compilation of all prior bibliographies originally published in Volumes 3 (1992), 4 (1993), 5 (1994), 6 (1995), and 7 (1996) of the *Kern County Archaeological Society Journal*, as well as all of the articles published in this issue and others that have recently been obtained. There are an extensive number of cultural resource management reports—too numerous to include in this bibliography—that are available from a number of sources that also relate to the Yokuts. The most comprehensive local source is the Southern San Joaquin Valley Information Center (SSJVIC), located at California State University, Bakersfield. Interested readers may contact the SSJVIC if they wish to follow up on these references. Readers with additional references are encouraged to contact the Kern County Archaeological Society (address on back cover) in order to facilitate the continued updating of the Yokuts bibliography.

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INFORMATION FOR AUTHORS

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Editor, KCAS Journal
Kern County Archaeological Society
PO Box 9793
Bakersfield CA 93389