CRACKING AND GRINDING, CHIPPING AND SWAPPING:

SUMMERS ON SKUNK CREEK

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ABSTRACT

The Skunk Creek Site (CA-Tuo-1284), a seasonal exploitation site in the central Sierra Nevada, was tested in 1980, 1986, and 1987 by Michigan State University. This late prehistoric seasonal campsite includes eight bedrock mortar clusters with associated middens. About 2% of the site was excavated, and about 25% was surface-collected. The resulting collection included over 30,000 items, including more than 20,000 pieces of debitage (92% obsidian) and 7000 mammal bone fragments. Results suggest a Mariposa Phase (A.D. 1200-1800) seasonal occupation from late summer to mid-autumn, emphasizing obsidian acquisition by Miwok speakers who also processed surplus acorn and venison harvests for transport to winter base camps.

INTRODUCTION

Sometimes understandings about the past spring forth in finished form from the mind. More often, though, our ideas go through many stages of development as they are hammered, refined, tested, evaluated and modified. Many scholars try to undertake this evolution in private, reserving public presentation for the final products. The most thorough assessment and refinement of understandings, however, takes place in open dialogue. There is value to the sharing of such ideas among colleagues even when the concepts are still in early stages of development. Research still underway at the Skunk Creek site is presented in that spirit.

The Skunk Creek site (CA-Tuo-1284) is a seasonal exploitation site in the Central Sierra Nevada (Figure 1). It lies at the 1300 m. elevation several km. west of Cherry Lake in eastern Tuolumne County. The site, which extends along this tributary of Jawbone Creek for some 300 m., contains eight separate bedrock mortar outcrops with an aggregate of more than 80 mortar holes and a few grinding slicks (Figure 2). Among the outcrops are several midden areas.

Tuo-1284 is not especially old, large, rich or unique. To the contrary, its significance stems from the fact that it is none of these things, but rather is a modest but crucial element in a pattern of cultural adaptation which poses some interesting conundrums. The site seems to reflect patterns which deviate in certain significant ways from the ethnographic record.

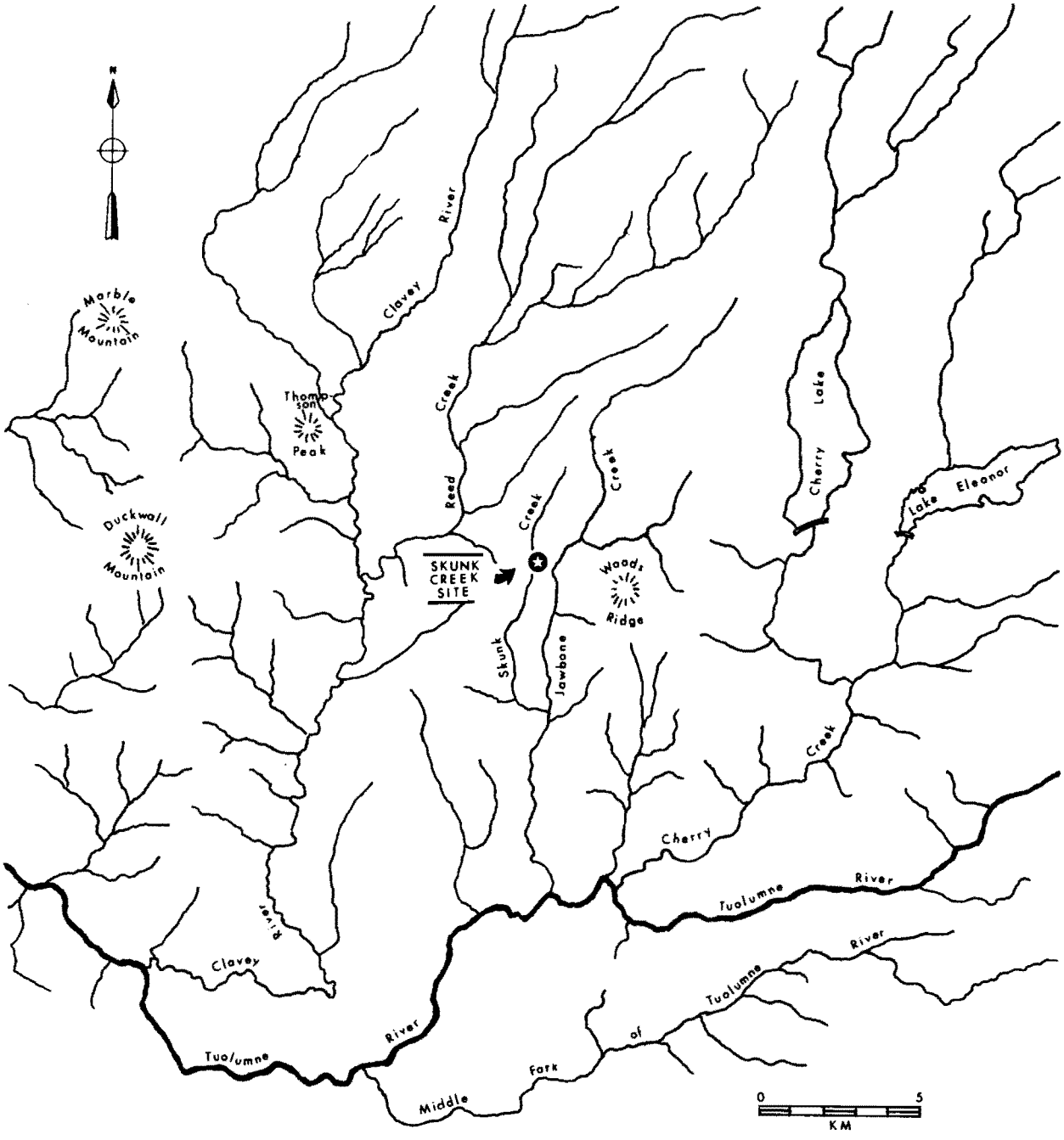

Figure 1: Location of Skunk Creek Site (CA-Tuo-1284) in Tuolumne County

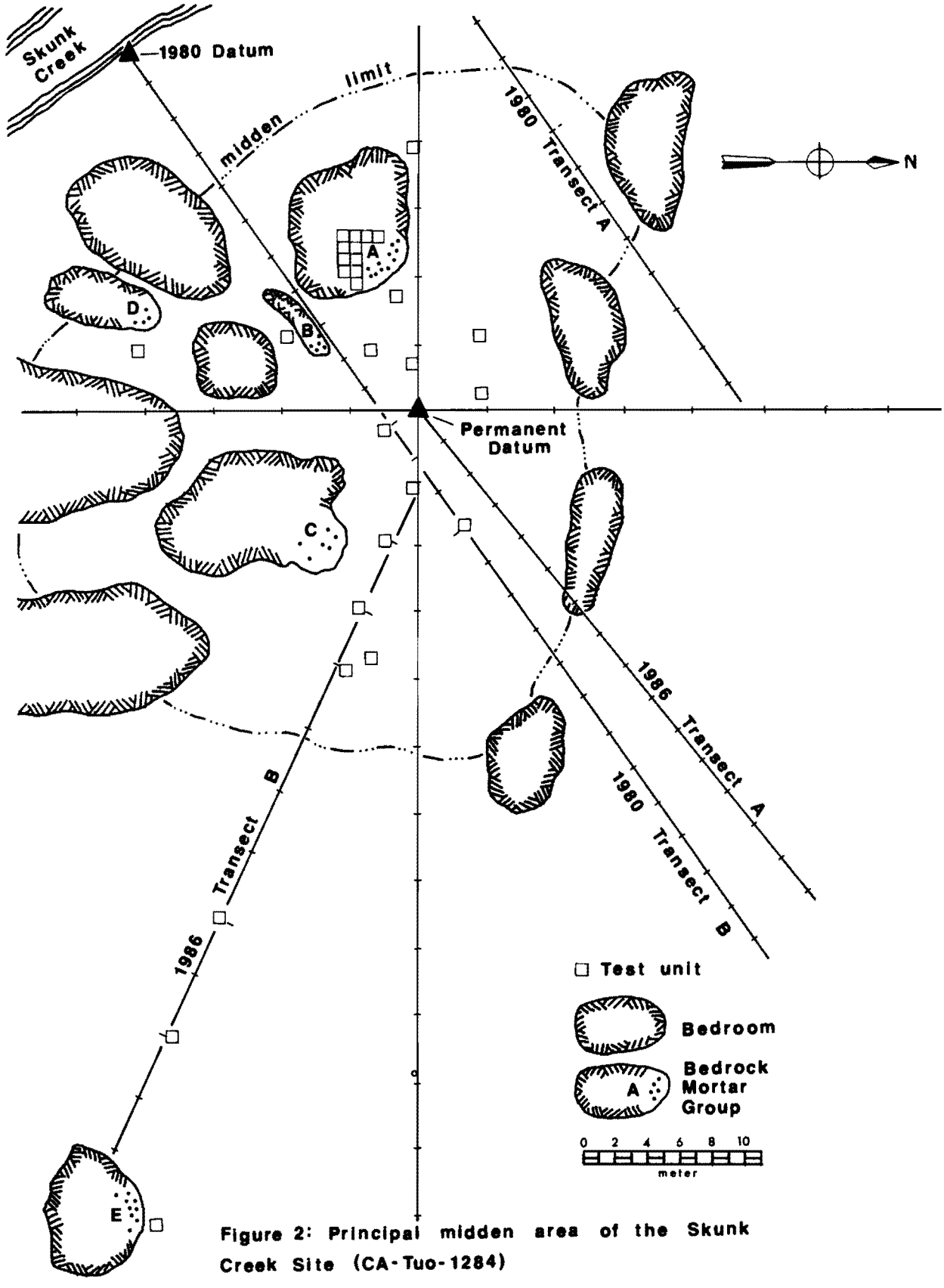

Figure 2: Principal midden area of the Skunk Creek Site (CA-Tuo-1284)

Skunk Creek is a late prehistoric site. If it deviates significantly from patterns known in the ethnographic record only decades later, that variance and its causes are important to understand. Ideas about these patterns, variances and their causes are still under development. Consideration at this time is useful, however, because it allows us to ask, and begin to answer, significant questions about the entire fabric of a way of life which may have been the region's cultural fluorescence.

COMMENTS ON THE NATURE OF THE SITE

The Skunk Creek Site is typical of a number of bedrock mortar stations at the middle elevation of the Sierra Nevada. It dates mostly to the late prehistoric period, which in the nearby Yosemite region is called the Mariposa phase, AD 1200-1800 (Chartkoff and Chartkoff 1984; Moratto 1984). The site may contain elements dating back to the earlier Crane Flat phase (500 BC-AD 1200), but these elements do not seem to be spatially clustered either horizontally or vertically, suggesting that post-depositional processes of soil mixing have been active. The largest midden area covers about 1200 sq. m.; its depth ranges from 10 cm to over 70 cm, averaging about 50 cm. The anthrosol itself has a dark brown color. It is highly friable and is rich in charcoal, ash, grease and fire-affected rock.

HISTORY OF INVESTIGATION

Scientific investigation at the Skunk Creek site began in 1976 when L. K. Napton and Elizabeth Greathouse (1976) first recorded the site during an inventory project for Stanislaus National Forest. Title to the site shifted to the Louisiana Pacific Corporation of Standard, CA, in 1981 during a land exchange.

My wife and I first worked at Skunk Creek in the summer of 1980. Wallace B. Woolfenden, then the forest archaeologist at Stanislaus National Forest, directed us to the site. He wanted to obtain archaeological data from the site, which had been damaged by logging and pot-hunting, for cultural resource management purposes. We were looking for appropriate sites at which to conduct some experiments in site discovery methods (see Chartkoff and Chartkoff 1988).

Our work at that time partially involved gathering baseline data about the deposit by digging two 3 x 3 foot (90 cm x 90 cm). test pits. In addition, we laid two transects across the site from within the midden to beyond its recognizable limits. Soil samples equal to 15 liters in volume were collected at 10 foot (3 m) intervals along each transect and yielded additional data. The results were described in Chartkoff and Chartkoff (1980).

Through the cooperation of the Louisiana Pacific Corporation we returned to the site in the summer of 1986. At that time we constructed a permanent site datum. Twenty-five 1 x 1 m units were excavated. About 20% of the site's surface was collected within 1 m^2 grid units. In addition, two more transects were sampled to measure site limits. In 1987 we returned briefly again with students from U.C. Berkeley who helped us dig three more units and surface-collect another 5% of the site. Only nine of the units were excavated in arbitrary levels. All other units proved too shallow. All excavated midden was sifted through 1/8 in. screen except for the 1980 samples, which were sifted with 1/4 in. screen.

To date, about 2% of the midden has been test-excavated, in addition to several units east of the site which proved sterile. About 25% of the midden's surface has been surface collected. Several dozen more bucket samples provide additional data on site limits.

COMMENTS ON THE COLLECTION

Study of the Skunk Creek collection is still underway. It includes about 30,000 catalogued items. Over two-thirds consist of debitage, some 20,000 pieces of which measure one cm long or less. In addition, there are 7000 mammal bone fragments, almost all of which also are a cm or less in length. The tool collection is modest in size and variety. The great bulk of modified flakes consist of utilized and miscellaneous retouched pieces. In addition, over 800 kg of fire-affected rock was recovered. The fire-affected rock, however, was not catalogued.

About 92% of the debitage consists of obsidian. Most of the rest consists of siliceous material, much of which probably is quarry material from the Sonora area. Preliminary study of the obsidian indicates that almost all of it is from the Bodie Hills source. The source lies about 90 km by air to the east-northeast of the site.

ETHNOGRAPHIC IDENTITY OF THE SKUNK CREEK SITE

Ethnographically the site lies within the traditional territory of the Eastern division of the Central Sierra Miwok (Levy 1978). Goldberg and Moratto (1983) suggest that prior to about 800 years ago, the area was held by Yokuts speakers. Subsequently, a southward expansion of Miwok speakers displaced the Yokuts. Chronometric data from Skunk Creek, including the predominance of desert side-notched points (Figure 3) and the lack so far of hydration readings exceeding 1.5 microns, suggest the site belongs mainly to the Mariposa phase, and therefore presumably is ethnically Miwok.

The site is not a named ethnographic village, however. The nearest named villages are Olawiye and Kulamu, both of which lie to the west some 15-20 km, near modern Tuolumne City, and some 500-600 m. lower in elevation. (Levy 1978:400). Whatever relationship might have existed between Skunk Creek and these named villages is an important, but still unanswered, question.

SOME QUESTIONS ABOUT DATA IMPLICATIONS

A report on the Skunk Creek material is in preparation, and will not be summarized here. Instead, the paper will explore some patterns, implications and questions involved with four areas of data. They include acorn exploitation, deer exploitation, the procurement and processing of obsidian, and settlement and seasonality.

Acorn Exploitation

One objective of this study is to clarify the place of acorn exploitation at the site. There are a number of indicators of the importance of acorn processing at the site. Skunk Creek's eight separate bedrock mortar outcrops contain more than 80 mortar holes. The site's midden is dark, greasy, and full of ash, charcoal and fire-affected rock. When Napton and Greathouse recorded the site 13 years ago, they observed at least a dozen cobble pestles still sitting in mortar cups. Unfortunately all were gone by the time of our 1980 field work. Nevertheless, the procurement, shelling, mashing and leaching of acorns were clearly very important activities at Skunk Creek.

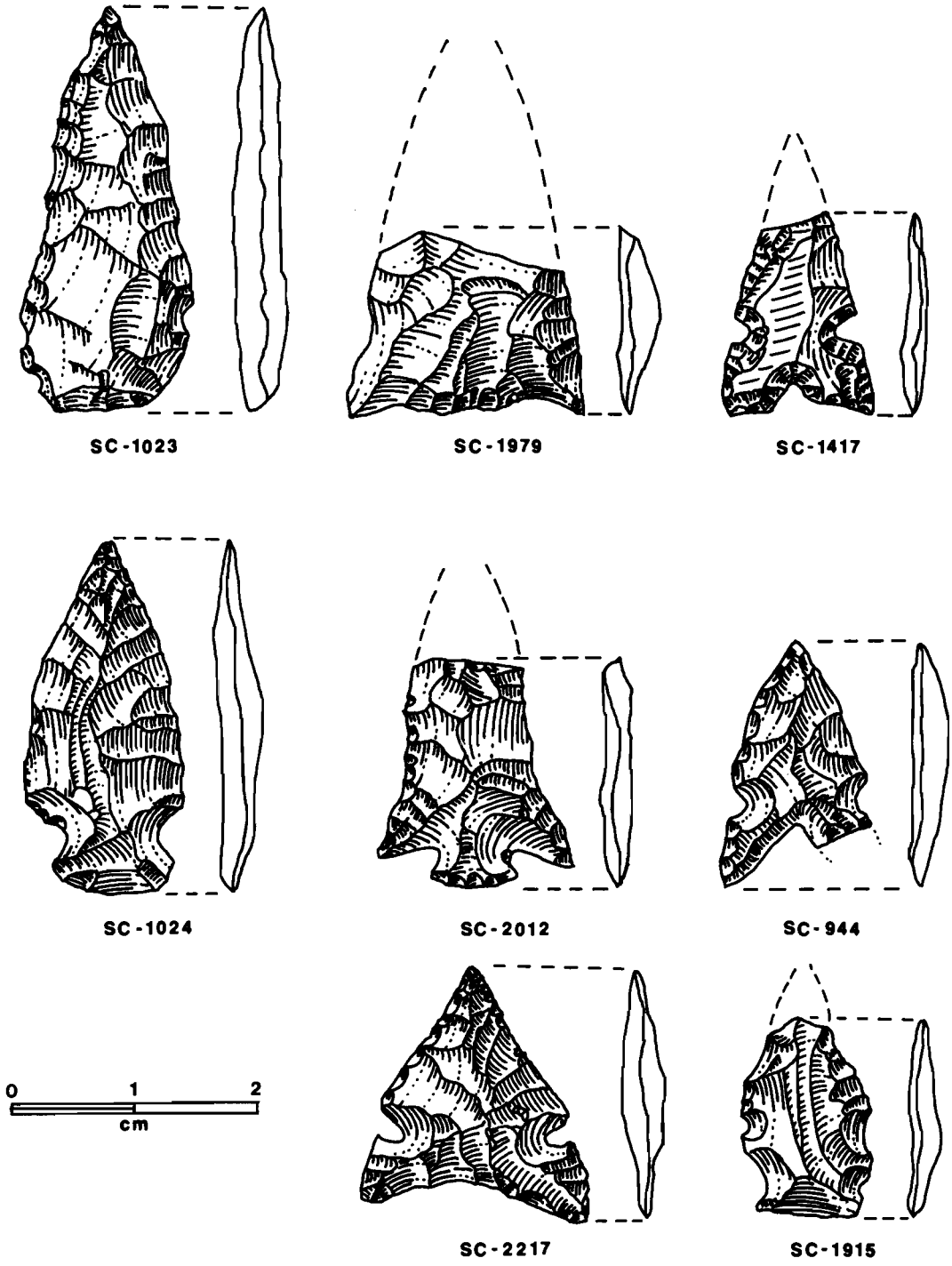

Figure 3: Projectile points from the Skunk Creek Site (CA-Tuo-1284)

This degree of acorn production may be somewhat discordant with the status of the site as a seasonal montane station. The site lacks all the attributes of a major village. It lacks evidence for permanent architecture, storage facilities, a cemetery, or other features characteristic of long-term occupation. Its midden is shallow and not very large. The tool collection is not very large or varied. Symbolically significant artifacts are not represented. These indicators all suggest that Skunk Creek was occupied seasonally, and was abandoned in cold weather.

It should also be noted that the local oak tree, the Black Oak (Quercus kelloggii), is a late-bearing tree. Typically its crop matures in October and early November at this altitude. That is not long before snow starts to fall. People at Skunk Creek did not have many weeks in which to process acorns. The apparent intensity of acorn production, then, may seem somewhat out of context with the relatively brief period available each year.

The ethnographic record does not provide much help in resolving this incongruity. It is generally assumed that food collected at acorn harvesting sites is consumed at the site when the site lies some distance from the base camp, since transportation of bulky commodities over long distance is difficult. Such may still be the case at Skunk Creek. Other possibilities might also apply, however, and need to be evaluated.

It may have been, for example, that part of the acorn crop was being processed to reduce bulk and weight so that part of the crop could be carried to the winter base camp. Shelling may reduce the weight of acorns by 20% or more. Mashing reduces the foodstuff's bulk by more than 50% compared to whole acorns in shells. Even leached acorn meal does not spoil immediately.

Ten adults could carry 200 kg or more of cargo from Skunk Creek to their winter base camp. Twenty kg per capita would be a significant addition to stored foods when added to the stores of Blue Oak acorns and Digger Pine nuts collected around the base camp.

The strategy of intensive food processing at seasonal camp sites and the strategy of moving food stores in bulk over distances are not reflected in the ethnographic literature, nor are they discussed much in the archaeological literature. It is not definite that these strategies were followed at the Skunk Creek Site, but they may well have been. They would help explain the evidence suggesting intensive acorn use at the site. If confirmed, they also would indicate a degree of task specialization not normally associated with temporary camp sites.

Mammal Exploitation

Another interesting facet of the Skunk Creek collection concerns mammal bone. Several implications can be derived from the abundance of mammal bone in the site.

Although the sample included over 7000 mammal bone fragments, essentially none is identifiable as to species. The bone is extremely fragmented. More than 90% of the fragments are a cm or less in length. The bone is bleached white, possibly calcined, with about 20% of the fragments showing blue or black streaks characteristic of burning. Even though these fragments cannot be positively identified with traditional

methods, clearly almost all derive from the long bones of large mammals, and therefore mainly represent California mule deer (Odocoileus hemionus californicus).

The sample size appears impressive. By projection, the site as a whole should contain over 300,000 bone fragments. Because of its fragmentary nature, however, the 7000 pieces form a small volume and mass. The entire amount weighs less than one kg. In addition, the total need not represent vast numbers of animals. One long bone can be divided into 300 or more fragments of one cm length. This means that all 7000 fragments might have come from as few as three or four deer. Almost certainly they came from many more individuals, however. Sampling error alone would suggest so, as would the practical improbability that all long bones would be systematically and uniformly reduced to corn-kernel-sized fragments.

The degree of bone fragmentation also poses an interesting problem. Late prehistoric sites in the central Sierra Nevada commonly yield little bone, and it invariably is highly fragmented. The large quantity of bone at Skunk Creek is somewhat unusual, but its degree of fragmentation is not.

The cause of fragmentation is not clear. One common assumption is high soil acidity. Tests for pH at Skunk Creek have yielded readings in the range of 6.0 to 6.5 so far, however, suggesting that soil acidity is not a severe problem. In addition, most of the bone is not especially friable or degraded, suggesting that soil conditions are not severe. Archaeologists in other parts of the state have also discovered cases of highly fragmented bone. Mark Sutton (personal communication) told me of cases in the Mohave Desert with such fragmentation. Soil conditions unique to the central Sierra Nevada would therefore seem to be excluded.

Another possibility might be animal-caused breakage of the bone. This hypothesis is difficult to support, though. The uniformity of fragmentation is at odds with the generally unsystematic actions of animal degraders. It also is hard to identify appropriate candidate species in the area. Inspection of the bone also has failed to turn up tooth marks or other evidence of animal-caused reduction.

Cultural factors might be responsible. Food processing, for example, could be involved. I have not yet found any ethnographic descriptions of Miwok people pulverizing bone, but a prehistoric pattern might have existed. Bone might have been smashed to maximize the recovery of marrow and nutrients during stewing, for example. Cuisine-based hypotheses are not featured in the literature, so it is hard to tell. Replicative experiments might help to identify patterns of breakage and stewing, however.

Hunting season also is a question. Were deer hunted at the same time that acorns were being harvested, or were the two activities mutually exclusive? If so, the Skunk Creek site may have had sequential functions as well as multiple functions.

Sierran deer herds are seasonally migratory, as Woolfenden (1988) has noted in his study of the Stanislaus deer herd. The deer winter at low elevations. In the summer, they move to higher elevations and disperse. Some deer can be found throughout the summer around Skunk Creek but most of the herd moves to higher

elevations. This means that the bulk of the animals migrate past Skunk Creek twice each year.

Precisely when these migrations occur and what their relationship is to the dropping of the Black Oak's acorns is not clear. Leslie Quintero (personal communication) indicates that California mule deer do not migrate to oak groves to feed systematically on acorns, but do eat acorns which happen to be encountered. In the higher central Sierras, deer start getting pushed downhill by snowfall, which begins earlier than the dropping of the Black Oak acorns. In addition, the drop of acorns for the Blue Oak, at lower elevations, takes place earlier than that of the Black Oak.

I would suggest, then, that most of the deer hunting potential at Skunk Creek was realized earlier than the acorn harvest. This would imply that the Skunk Creek site was occupied for a longer time span than just the acorn harvest. It would also suggest that the greater amount of cooking involved might be partly responsible for the charcoal and ash in the midden. Pre-harvest cooking might have involved bone stewing. People may have worked at the processing of deer carcasses for hides, meat, bone and sinew while waiting for the acorns to ripen.

Obsidian Procurement And Processing

The place of Skunk Creek in the procurement and processing of obsidian also deserves consideration. Over 20,000 waste flakes were recovered, almost all of obsidian and almost all a cm or less in length, from two dozen test pits, the surface collection, and transect sampling units. By projection, the site may yield a million obsidian waste flakes. This scale of flake production seems rather out of context for an acorn processing station.

The fact that almost all the flakes were tertiary retouch removals suggests that a great deal of tool finishing took place at the site. Subsistence activities done at the site which would produce so much debitage do not seem to be evident. The number and variety of formal tool types in the collection is too meager to argue that tool making and refurbishing for immediate use was responsible. The relative abundance of bladelet-like removals, characteristic of the production of bifacial tools by pressure-flaking, suggests that a great deal of tool production took place that is not evident in the site's assemblage. The implication is that numbers of tools were being manufactured for curation to the winter base camp, either for use there or for later exchange. The scale of production suggests systematic craftwork on a scale of concentration appropriate for craft semi-specialization, not for household-level subsistence.

The source and timing of obsidian procurement also are relevant. Preliminary results show the obsidian is almost entirely from the Bodie Hills source, which would be expected for this locality. The Bodie Hills source lies across the Sierran crest from Skunk Creek some 90 km to the east-northeast. It is most directly accessible via Sonora Pass or Tioga Pass, both of which are about equally far from a line drawn between the site and the source.

Movement of obsidian across the Sierras is possible only during the summer, mainly from late June to early September, because of the deep snows that block the

high passes at other times. This implies that the period for obsidian procurement occurred at a different part of the season than the harvesting of acorns.

It should be noted that it is not clear how the Skunk Creek people obtained obsidian. They might have made expeditions to the source, although that seems very unlikely since the Great Basin people are known ethnographically to have brought obsidian over to the California side. They may have brought obsidian up from the previous year's stores at their winter base camp. This, too, seems unlikely. They would have had to carry the obsidian downhill the year before, and not used it at their base camp, which seems most improbable as well as energetically wasteful. It also begs the question of how they got the obsidian earlier. In addition, the Skunk Creek data shows that some silicates were brought up to the site from the Sonora area and were worked there, apparently to provide some kinds of tools for household tasks during occupation.

It may have been the case that Skunk Creek was a receiving point for shipments from the Great Basin. That would help explain why the site has eight separated bedrock mortar groups and several separated midden areas. There is no other evidence to support this idea, though. For example, if the site were an exchange point, evidence of other exchanged materials, such as shell beads and ornaments, steatite or other exotic chippable stone would be expected, and there is none.

It may also have been the case that another nearby site was the receiving point so that bulk quantities of obsidian were brought to Skunk Creek by its occupants for reduction. So far no such site has been found, so the possibility remains real. It would be unusual to have that level of regional redistribution take place in a summer camp setting, however, with no other evidence for it.

It may also be possible that people from Skunk Creek made expeditions to higher elevations to obtain obsidian. This hypothesis is not directably testable yet, but is likely on ethnographic grounds and does not seem to pose any serious difficulties.

More certain is the point that a considerable amount of obsidian reached Skunk Creek and was used in tool-making. The lack of large primary flakes, decortication flakes, large cores, and much quantity of hammerstones suggest that the obsidian did not arrive in block form. Evidence from the modest number of small pyramidal and block cores suggests that the obsidian was obtained as preforms or bifaces.

Settlement and Seasonality

The acquisition of obsidian seems to have occurred at Skunk Creek well before the onset of the acorn harvest. Thus it would appear that occupation of the site involved three sets of extractive activities, and that these activities were organized sequentially.

Obsidian procurement probably occurred during mid- to late summer. People at Skunk Creek seem to have used the time between the acquisition of obsidian and the onset of the acorn harvest for the systematic production of pressure-flaked tools. Not only would the time have been available for these activities, but the impetus would have been available to reduce the bulk and weight of artifacts to be transported for the later trip back to base camp.

To feed people during the time between the acquisition of obsidian and the onset of the acorn harvest, deer hunting seems to have been featured. The acquisition of deer carcasses, or segments of carcasses, provided additional opportunities for intensive production at Skunk Creek.

The sequence concluded with the acorn harvest, which probably lasted well into October. It is possible that acorn processing went beyond immediate needs and produced stored surpluses to be transported to the winter base camp.

It is generally assumed that the winter base camps for higher summer camp sites lay to the west, closer to the foothills. While this is the most probable case for Skunk Creek, it also is possible that Skunk Creek people went downhill to the south, toward the Tuolumne River. The relationship between the Tuolumne River and the sites upslope from it has yet to be determined. It also is unknown whether prehistoric winter base camps existed along the river, forming a contrast with the ethnographic record.

SETTLEMENT, THE MARIPOSA PHASE AND THE YOKUTS DISPLACEMENT

Goldberg and Moratto (1983) have suggested that the onset of the Mariposa phase coincided with the displacement of Yokuts-speaking peoples by Miwok-speaking peoples. Whether or not this linguistic hypothesis is ultimately confirmed, a comparison can be made between the Mariposa Phase and its predecessor, the Crane Flat Phase. This, in turn, is related to the question of how one Penutian-speaking people could outcompete and displace a neighboring and closely-related people.

The change from Crane Flat to Mariposa is normally defined in two ways: stylistic and techno-economic. Mariposa sees the appearance of smaller projectile points, with new types such as desert side notched. Possibly the bow and arrow appears then. Manos and milling slabs give way to mortars and pestles, suggesting that acorn processing appeared then (Goldberg and Moratto 1983). It is tempting to feel that the introduction of the bow, and acorn exploitation, were responsible for the perceived Yokuts displacement.

It is not really reasonable to suppose, however, that the Miwok acquired either the bow or acorn use earlier than the Yokuts did. Acorn use is present in the foothill areas earlier than the end of Crane Flat times in both Miwok and Yokuts territories (Moratto 1984), and so are smaller projectile points.

The Skunk Creek case suggests other possibilities, however, particularly social ones. People have been exploiting the Sierra Nevada for at least 11,600 years. During that time some activities were added to summer foraging, such as acorn processing and obsidian exchange. Mostly, however, similar sets of functions or activities have been practiced by different groups at different periods. Everyone, for example, has hunted deer. What has varied has been the intensity with which those functions have been followed, and the ways in which different functions have been integrated at particular sites.

At Skunk Creek, the exploitation of deer and acorns seems to have been combined with the intensive processing of obsidian. An inevitable tension or conflict arises between these two sets of functions. Summer food foraging in the mountains

selects for small group size and maximal dispersal of population, reflecting the dispersed nature of the resources being exploited. By contrast, obsidian procurement and processing selects for the concentration of population in small numbers of large groups to make the distribution of the material most economical.

Crane Flat and earlier peoples resolved this tension by minimizing the role of obsidian and maximizing summer foraging behavior. Crane Flat sites were occupied by small groups for short periods and were limited in the variety and intensity of activities practiced at them. Innovations of the Mariposa Phase include a major increase in the significance of obsidian procurement and processing. Skunk Creek indicates that this shift was accompanied by increases in the size of population aggregations, increases in the length of time spent at one summer site, increases in the number of major functions performed at one site, and the introduction of workshop-like craft production to montane summer seasonal campsites. The economic advantage that these changes created, and the effect of creating larger population concentrations at settlements of longer duration, may well have provided the sort of advantage allowing the Miwok to displace the Yokuts in the central Sierras.

SKUNK CREEK AND THE ETHNOGRAPHIC RECORD

The cultural characteristics attributed to the Skunk Creek Site in Mariposa times also stand in some contrast with the ethnographic record. Most data on traditional Miwok culture was recorded in the past 100 years. As elsewhere, it is generally assumed that the ethnographic record describes what prehistoric cultures were like during the last several centuries before contact. In some cases, however, this may not be so.

The Skunk Creek data have been interpreted to suggest extended stay at a montane summer campsite, large-scale procurement of obsidian, workship-like craft production of obsidian tools, and the procurement and processing of deer and acorns well beyond subsistence needs. The site is not historic: it lacks any contact-period evidence whatsoever, yet it was occupied until very late in prehistory. If these inferences are correct, how can this divergence from the ethnographic record be explained?

The disruption to Miwok culture caused by the 1849 Gold Rush has long been noted, but less attention has been given to the possibility that significant changes occurred to the Miwok before the Gold Rush. This possibility should be seriously considered. The Spaniards began to conquer the Central California coast by 1780, which destroyed the production system for shell beads. Shell bead money was the currency which enabled large-scale resource exchange to work throughout California. Thus the impact of trans-Sierran obsidian exchange could have been greatly reduced up to several generations before anthropologists began to record Miwok culture.

In addition, European-introduced diseases began to ravage native California peoples as soon as contact was made. Mission escapees were taking refuge in the Sierras by 1800, and could have acted as disease vectors. Anglo hunting parties had started to cross the Sierras in the 1820's, introducing more illness. Starvation, stimulated by the disruption to traditional subsistence systems, acted to worsen the impact of disease (Chartkoff and Chartkoff 1984: Chapter 5).

Given these factors, it is certainly possible that the cultures which existed around AD 1700-1800 had changed significantly by the time the ethnographic record began to be recorded. The Skunk Creek Site, then, could well reflect strategies of summer montane settlement, seasonality and site functions that are not reflected in the ethnographic record.

CONCLUSIONS

This analysis has been deliberately speculative. It should not be taken as demonstrated. Nevertheless, it is a useful exercise. There is a good deal of value in posing such hypothetical constructs. They help to clarify research issues, to lead to the development of testable propositions, and therefore to direct future research.

The analysis to date of the Skunk Creek Site suggests that some cultural patterns were followed in late prehistory that were significantly different from those of the post-contact period. It also suggests some new ways to understand the emergence of the Mariposa Phase in late prehistory. If these suggestions are supported by future research, they will provide some interesting new perspectives on the course of cultural development in the area.

NOTES

It is a pleasure to acknowledge the help of a number of individuals and agencies whose support has allowed this project to go forward. Initially, permission to do research at Skunk Creek was granted by Stanislaus National Forest through the cooperation of Wallace A. Woolfenden, who then was Forest Archaeologist. In 1981 title to the site was transferred to Louisiana Pacific Corporation during a land exchange. The courteous support and strong interest of William Snyder of Louisiana Pacific has allowed this project to continue.

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