THE PREHISTORIC COMPONENT OF THE DRY MEADOW SITE (CA-Tuo-2604)

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ABSTRACT

The Dry Meadow Site (CA-Tuo-2604) is a multicomponent occupation site located in the central Sierra Nevada adjacent to Stanislaus National Forest. Test-excavated in 1987 by the author, its historic component was described at the 1992 SCA Chartkoff 1993), but the prehistoric materials were discussed only briefly. The present paper describes evidence for Late Period occupations at the site, at least some which can be associated with the protohistoric Central Sierra Miwok people. In addition to data reflecting seasonal occupation and resource exploitation, involvement in regional exchange relationships also is outlined.

INTRODUCTION

At the 1992 meetings of our society I presented a paper which described a historic site in the central Sierra Nevada. The site, Tuo-2604, known as the Dry Meadow Site, is located at the 1700 m. elevation north of the Middle Fork of the Stanislaus River. It was noted at the time as being one of the few examples of an excavated cattle ranching camp from the Sierra Nevada and also one which might be associated with culture change among the historic Central Sierra Miwok people.

Also present at the site, but not described in any detail in the 1992 paper, is a complex of prehistoric remains. Some of them are associated with the protohistoric Miwok, while others may possibly predate the Miwok expansion into the region of Tuolumne County an estimated 700 to 800 years ago. The site's prehistoric component appears to reflect patterns of adaptation to middle-elevation Sierran habitats during the Late Period. As such, it can be linked with contemporary remains from other sites studied in the region to help expand understanding of Late Period strategies in this part of California.

SITE DESCRIPTION

The Dry Meadow Site (CA-Tuo-2604) occupies a montane meadow at an elevation of about 1700 meters above sea level. It lies north of the Middle Fork of the Stanislaus River and about 5 km NW of Beardsley Reservoir. The meadow covers about 20 hectares. It is bordered on the north and west by Dry Meadow Creek, which crosses the flat on a NE/SW angle. To the east and south, low local rocky ridges rise. Extensive stands of conifers, dominated by Douglas Fir cover these ridges and the higher parts of the flat. Elsewhere around the flat, black oak occurs in scattered stands.

The flat area itself otherwise has two plant associations of note. One is a complex of meadow grasses which blanket much of the higher areas, including the site. The other is an assocation of water-tolerant, low, broad-leaf species. This complex is especially prevalent in the eastern part of the meadow, where local springs and seepages keep the soil especially moist and where marsh conditions prevail after the spring's snow melt-off.

The site locality includes two separate midden areas. On the west side of the meadow, but east of the creek, lies the first deposit, called Area I. It involves a linear deposit which extends along the southeastern bank of the streamside for more than 100 meters and has a breadth of up to 20 meters. Our test excavations found midden to depths of 70-80 cm. A second deposit, Area II, lies along the south side of the meadow, separated from the first midden by at least 40 meters of culturally sterile soil. This second deposit is much smaller, extending about 15 meters E/W by 10 meters N/S. Its depth was found not to exceed 40 cm. Area II also has two small rock outcrops exposed at the surface, on which bedrock mortars are found.

Area II is even smaller than it once was. Construction many years ago of a Forest Service access road around the meadow cut through the south half of Area II's deposit. A combination of cutting and filling has seriously damaged the cultural deposit, but some of the deposit has been piled south of the road as backfill. Although the original provenience of materials in this fill deposit has been destroyed, the fill does provide samples of materials that were originally deposited in the midden of Area II, so it does retain a certain cultural value.

Another bedrock mortar group was recorded in the valley, but not within the site. This group lies on a large outcrop of volcanic rock, some 500 meters west, or downstream, of Area I, on the south side of Dry Meadow Creek. No testing has been done there to determine whether a midden deposit is associated with the mortar group. Its outcrop is much larger than any exposed at the Dry Meadow Site, however.

SUMMARY OF FIELDWORK IN 1987

Fieldwork was done at Dry Meadow on weekends during the summer of 1987, from June 27th to August 16th. The site was owned by the Louisiana Pacific Lumber Company, which kindly authorized excavations to take place. A concrete datum was constructed off the visible midden, and a metric grid system was imposed over the site. The grid system was oriented along compass coordinates. Unit dimensions of one by one meter were established. The southwest corner of each square was used as unit datum. Four phases of data collection were undertaken.

The first phase involved mapping the site by transit and photographing its surface features. The second phase involved making a surface collection in order to predict where test excavations might be usefully conducted. Surface collection was concentrated in the area 40-50 meters north by 3-15 meters east of datum because of the remains of a historic cabin there, but collection was extended over the two middens of Area I and Area II. Recovered artifacts were provenienced according to the meter square within which they were found. Fifty percent of the squares in the vicinity of the historic cabin were surface-collected. Five percent of the remaining units across the site were chosen randomly for surface collection. In all, more than 250 units were collected, of which 52 yielded artifacts. Because we did not stratify the site's surface, most sampling units for surface collection fell near or beyond the site's margins, which accounted for the high percentage of sterile units.

The third phase involved subsurface sampling using a version of the transect-interval sampling method described in Chartkoff 1978. This approach employed the collection of ten-liter bucket samples taken at ten-meter intervals along transects. The contents of each bucket were sifted through 1/8 inch mesh screens. The purpose of this effort was to measure the limits of the cultural deposit using soil samples of equal volume. By starting in an area of visible midden in which subsurface ten-liter samples all contained samples of artifacts, we hoped to determine along transects where the density of artifacts fell below one per ten liters of midden, and to use that figure as a basis for defining initially the dimensions of the deposit.

One transect was begun at N45/E10 and was extended for 110 meters on the bearing of N45°E. This transect proceeded from the known midden deposit into a wooded area. Bucket samples were taken at ten-meter intervals along the transect. Each sample was provenienced according to the meter square unit in the site's grid system within which the bucket sample fell. Twenty-five bucket samples were taken. Samples yielded artifacts out to N122/E89, but not beyond. A second transect was begun at S10//E0 and was extended along a bearing of S73°E. Twelve more bucket samples were taken along this transect, also at ten-meter intervals. Only the first, at S10/E0, yielded any remains. Available time did not allow for more extensive collection.

The last phase involved excavation of four test pits in order to collect more substantial samples. Each test pit measured a meter square and was excavated in ten-centimeter arbitrary levels. As with all units on the grid, the southwest corner of the unit was used as reference.

Three test pits were excavated in ten-centimeter arbitrary levels. Unit N30/W10 lay at the center of the darkest part of the midden in an area with abundant surface artifacts. It extended to 80 cm. below surface before sterile soil was encountered. Unit N47/E8 lay in the middle of the cabin ruin. It was excavated to a depth of 30 cm., but the ruins of the cabin made further excavation impractical and sterile soil was not reached. A third unit was opened at S10/E0, where subsoil was encountered at the bottom of the first level. In addition, a test pit was opened in Area II, at S45/E62, near the bedrock mortars. It reached a depth of 40 cm. when sterile soil was encountered.

CHARACTERIZATION OF THE DEPOSIT

The prehistoric deposit at Dry Meadow can be characterized as a friable anthrosol, dark brown in color, rich in powdered charcoal though poor in larger charcoal fragments, and minimally greasy in texture. No visible stratigraphic divisions were seen within either midden. Most artifact categories had too few specimens in them to allow for a valid characterization of change with depth. The category of debitage, however, provides an exception. Over 2300 pieces of debitage, or chipping waste, were recovered in the sample. The distribution of debitage in the deepest test pit, N30/W10, provides some patterning that suggests vertical patterning.

A total of 1740 pieces of debitage was recovered from N30/W10. They came from eight levels, each 10 cm. deep, for an average of 215 pieces per level. Actual quantities varied considerably from the mean, however, as the following figures show:

Table 1: Frequency of Obsidian Debitage by Level in N30/W10

Level	*Depth*	*Quantity*	*Value relative to mean*
1	0 to -10 cm	212	98.6%
2	-10 to -20 cm	834	386.0%
3	-20 to -30 cm	231	107.4%
4	-30 to -40 cm	146	67.9%
5	-40 to -50 cm	3	1.4%
6	-50 to -60 cm	273	126.9%
7	-60 to -70 cm	14	6.5%
8	-70 to -80 cm	27	12.5%

As this table shows, the quantity of debitage decreases dramatically from Level 4 to Level 5, where it nearly disappears, before increasing again in Level 6. Not even the base level, 8, has as little debitage as Level 5. This pattern, while insufficient to demonstrate it for the site as a whole, is sufficient to suggest that at least in this area an occupation break is suggested. As the discussion below on obsidian hydration values indicates (see Table 2), Level 5 also marks a break in the consistent pattern of increase in obsidian hydration measurements with depth in the levels above, and the start of inconsistent, even chaotic, hydration patterns below. Possible reasons for these anomalies will be discussed later.

THE DRY MEADOW SITE COLLECTION FROM 1987

The 1987 testing program recovered more than 3000 specimens, inlcuding both historic and prehistoric materials. The historic assemblage was described in an earlier paper (Chartkoff 1993). Although some preliminary notes on the prehistoric assemblage were included then, subsequent analyses have changed the results to some extent as well as expanded them.

The Dry Meadow collection from 1987 has a prehistoric component that is dominated by lithics. Thirty-six retouched pieces were recovered, along with 35 utilized flakes, 17 cores and core tools, and nine manos. The unmodified flakes numbered 2374. They have been divided into two major groups. Primary flakes and somatic removals together number 313. An additional 2061 flakes are termed debitage, reflecting both their small size (less than 5 mm. longest dimension) and their modest striking platforms. Debitage is presumed to represent the last stages of flake removal during manufac-turing or resharpening. About 91% of the debitage, and nearly 87% of all unmodified flakes, are of obsidian. Sourcing done to date links the obsidian to the Bodie Hills source, which is consistent with other sites in the area. At New Melones, for example, over 90% of the sourced obsidian was from Bodie Hills. How the people who occupied Dry Meadow acquired Bodie obsidian, and how trans-Sierra relationships might have evolved over time, is still not fully understood, and should be a topic for continuing research.

The retouched pieces from Dry Meadow indicate a range of activities. Among the two dozen pieces were 14 flake scrapers with a range of edge forms, four notched pieces, one nosed scraper, one drill, and three miscellaneous retouched pieces. In addition, 12 projectile point fragments of various degrees of completeness were found, only two of which were complete enough to be typed. Thirty-five other flakes showed use-damage on their edges. Another six cores showed edge modification through further retouch and can be regarded as core tools. This limited collection, when contrasted to nearly 2400 pieces of chipping waste, suggests either that tools were being removed from the site through curation, or that tasks using tools that were performed at the site were limited in scope compared with tool-making, or both.

The collection includes nine pieces of ground stone. All nine appear to be manos or mano fragments, and exhibit systematic abrasion with defined shoulders on at least one face. They lack the indications of percussion typical of pestles. The occurrence of bedrock mortars with no pestles, and of manos with no milling slabs, presents an interesting quandry. Milling slabs should be too massive for their absence to be explainable as a result of curation. The bedrock mortar outcrops are not rich in milling surfaces, although minimal evidence for some can be found. Sampling error in excavation seems to be the most likely explanation at this time for the absence of milling slabs in the assemblage.

Unmodified flakes are abundant, and constitute more than 97% of all chipped stone recovered. This finding is certainly consistent with the inference that tool-making was a major activity at the site. The obsidian waste, in particular, can be seen to represent all stages of tool manufacture. On the other hand, the assemblage so far lacks hammerstones entirely, and also lacks any bone tools that might be associated with tool finishing. While sampling error may be involved, the liklihood of tool curation seems more probable in this respect.

SUBSISTENCE AND SEASONALITY

Occupants of the Dry Meadow Site left behind only a moderate array of indicators of subsistence among the data analyzed to date. Faunal remains, for instance, are scanty. Only 72 bone fragments were recovered, and all but a handful are too fragmentary for classification. As a result, there is no meaningful basis for quantitative assessment of the relative importance of faunal resources. Four pieces can be identified as mule deer *(Odocoileus hemionus)*. Another ten fragments appear to represent larger mammals. At least some of them probably also reflect mule deer, but some may represent smaller creatures such as wild canids or felids. The other 58 fragments represent even smaller creatures, mostly small mammals but probably including some bird and reptile remains as well.

The typical pattern for sites at this elevation in the Sierra Nevada is for the dominance of deer in faunal exploitation, especially during the Late Period. It is commonly found that 90% or more of the meat actually acquired is from deer, and there is no reason to suspect that Dry Meadow was significantly different. Typically deer hunting could be pursued by stalking or snaring during the summer and early fall. In autumn, deer start to congregate and to migrate to lower elevations for the winter, one indication that that people exploiting deer might also have moved with them (Chartkoff 1990; Woolfenden 1988).

The occurrence of both manos and bedrock mortars at the site is usually taken to suggest that the processing of hard seeds (by mano and milling stone) and acrons and pine nuts (by mortar and pestle) were done. Recent advances in the identification of organic traces on stone tools is starting to indicate that milling tools may also have been used to process animal matter (e.g. Flint 1996). These tests have not yet been made for Dry Meadow but the possibility of doing so needs to be considered. Hard seeds, marsh-plant roots and tubers, acorns and pine nuts all occur near the site today and would have been readily available prehistorically. Varieties of animals, including many small mammals, also would have been abundant locally. The occurrence of scraping tools at the site would be consistent with animal processing, among other things.

Charcoal samples are far too fragmentary to allow the identification of any plant food species. No carbonized nut hulls, for example, have been found, although both acorn-bearing black oaks and several nut-bearing conifers grow nearby in abundance. No other traces of edible plant remains have yet been identified in the deposit. The close proximity of meadow, marsh, streamside and hillside plant associations makes a variety of edible resources conveniently available, though. Whether flotation would yield useful results remains to be determined.

Test excavations and surface collections both yielded substantial amounts of fire-affected rock. Table 3 indicates totals for the three major test pits. Over 200 fire-affected rocks were recovered from those three units alone, with combined weights in excess of 21,000 grams. While such totals are not high when compared to yields for major village sites, they do suggest that a significant amount of burning took place at Dry Meadow. If so, the modest amount of charcoal that was recovered would not be a good reflection of the level of burning activity involved. It may be that site disturbance from taphonomic factors, discussed below, has reduced the charcoal sample significantly. Given the presence of milling tools, there is a reasonable probability that the fire-affected rock may be associated with acorn-processing, among other things (see, for example, Levy 1978:402-403).

SEASONALITY OF OCCUPATION

Currently it is assumed that site occupation was restricted to the summer and early Autumn. Winter snowfalls in the area cause accumulations of 1-4 meters or more at a time, making the local area quite difficult for forager adaptation at that time of year. The absence of any evidence of winter-tolerant housing in the site is also indicative, as is the amount of charcoal and fire-affected rock, both of which might be expected to be much more abundant if people were keeping themselves warm throughout the winters for several centuries.

Notably absent from the 1987 data were any traces of prehistoric architecture or architectural features, such as post molds, storage pits, formal hearths, or compacted living floors. Also missing were sociotechnic and ideotechnic artifacts such as beads, pendants, figurines, or large shell fragments. The absence of many types of domestic tools such as awls, needles, shaft straighteners, and knives is notable. Although negative evidence is rarely conclusive, and sampling error must be considered as a serious possibility, these absences are consistent with both the status of the site as a summer seasonal or temporary campsite, and with the cultural practice of curation, or the removal of important artifacts to other sites when seasonal migration resumed.

The absence of storage facilities, and lack of accumulations of autumn food stores also suggests temporary or seasonal occupation in the summer part of the year. Contemporary sites in the region that are at similar elevations also have not produced evidence for winter occupation (c.f.. Moratto et al. 1988; Chartkoff 1990). Ethnographic models of protohistoric communities in the area, of the Central Sierra Miwok culture, also indicate that communities wintered at base camps in the lower foothills and came into the higher elevations of the Sierra Nevada only between late spring and early autumn (e.g. Levy 1978). These indicators suggest that the site was occupied seasonally, by a small population, which subsisted through diversified foraging using locally available resources.

SITE CHRONOMETRICS

The age of the prehistoric component of the Dry Meadow Site currently is based on two factors: projectile point typology and obsidian hydration. Neither line of evidence provides a very strong data base at present, but they tend to agree with each other and do offer some preliminary suggestions about the age of the deposits.

Of the 12 projectile point fragments found at the site, only three can be identified by type. This suggests that seasonal site occupation produced artifact curation so that diagnostic forms did not tend to accumulate at the site.
The three diagnostic specimens inlcude a Desert Side-Notched point and two different side-notched points with convex bases that seem to fit the Rose Springs Side Notched pattern reasonably well. A fourth point is fairly complete, but is heavily reworked. It now forms a diamond-shaped lozenge not associated with any regularly-defined type.

Desert Side-Notched types are generally associated with the first half of the Late Period, or the period between AD 1300 and 1800. The Rose Springs Side-Notched type is more characteristic of the first half of the Late Period, or the period between AD 600 and 1300 (Moratto et al 1988:315-327).

Two of these points happened to come from the same level of the same pit: Level 3 of N47/E8. One was the Desert Side-Notched example, and the other was one of the Rose Springs Side-Notched forms. They were found near the outside edge of the base of a historic cabin, indicating that the locations of the points were likely disturbed. The two flakes from this level that have been measured for hydration show a wide discrepancy in hydration values. One has a rind 1.3 microns thick, while the rind on the other is 4.1 microns thick. This discrepancy also suggests localized disturbance to the deposit. Taken together, however, they are consistent with the understanding that the site may have a substantial occupation history, one lasting a thousaand years or more.

The other points are only somewhat less indicative. The second Rose Springs Side Notched point and the diamond-shaped point both come from Level 2 of N30/W10. The former can be associated with the first half of the Late Period, while the latter is untyped.

This occupation would be roughly coincident with California's Late Period, or locally with what Moratto identifies as the Redbud Phase (A.D. 500-1300) and Horseshoe Bend Phase (A.D. 1300-1600) along the lower Stanislaus River (Moratto 1984:312-313; also see Fig. 4). In the more recent summary of New Melones Rservoir archaeology (Moratto et al. 1988:326-328), the less-localized phase names reflecting projectile point series are used. The period from A.D. 600 to 1300 is associated with the Rosegate point series, among which is the Rose Springs Side Notched type found at Dry Meadow. The period from A.D. 1300 to 1800 is the Desert series period, including the Desert Side-Notched type also found at Dry Meadow. The hydration rim thickness values identified by Origer (see Table 2) from Dry Meadow specimens are also relatively consistent with values on obsidian from the same source obtained in the New Melones studies for occupations dating to the Rosegate and Desert timeframes.

The obvious conclusion, then, would be that the Dry Meadow occupation extends through the Rosegate and Desert phases. Occupation may or may not have begun as early as A.D. 5-600 but seems likely to have been well-established by or before A.D. 1200. The recovery of manufactured glass that had been broken and retouched to make tools similar to stone tools (c.f. Chartkoff 1993) at Dry Meadow suggests continued occupation through the rest of prehistory and into the 20th century.

Some other dimensions to the interpretation of the site's chronology may also be suggested, however. One is that the occupation of this area by the Miwok-speaking peoples who are known for the region in historic times may not have an extreme time depth. Current linguistic and ethnographic thinking suggests that the Miwok people may not have expanded into the Sierra Nevada uplands until perhaps 700 years ago, possibly coincident with the onset of the Desert phase above. If so, the ethnic identity of the occupants of the Dry Meadow Site may have changed during its history of use. Whether any more substantial evidence reflecting on this possibility can be found at the Dry Meadow Site may be an object for future research.

It may be useful to note that downstream, at the New Melones Reservoir, evidence showed there had been a substantial and relatively sedentary occupation during the Middle Period (1000 B.C. to A.D. 500). The onset of the Late Period saw both a decline in intensity of occupation and a shift to a more extensive subsistence strategy (Moratto et al. 1988: 510-517). The establish-ment of the Dry Meadow Site may reflect this change.

OBSIDIAN HYDRATION MEASUREMENTS

A sample of 27 pieces of obsidian artifacts and debitage was sent to Sonoma State University, where Thomas M. Origer kindly provided hydration readings and estimated sources. Hydration measurements are summarized in Table 2. Twenty-six of the flakes yielded measurable hydration bands.

Although the sample is very small for statistical confidence, two related points are suggested. One is that site occupation is not likely to have been solely protohistoric. The other is that occupation is likely to have extended over a considerable period of time. The 26 specimens yielding readings provided a total of 156 hydration measurements. The value of the smallest reading mean is 1.3 mU while that of the highest reading is 5.6 mU, more than four times greater. There is no demonstrated basis to claim that, at this site, hydration band width increases arithmetically with time, but a significant span of time is implied.

A comparison of these readings with those reported by Moratto, Tordoff and Shoup (1988: 318-327) at New Melones Reservoir to the west provides some comparative patterning. There, readings averaging 2.45 mU were found with Desert Series projectile points (Cottonwood Triangle and Desert Side-notched), a series dated by other means to the period between A.D. 1300 and 1850. Points of the Rosegate Series (Rose Springs and Eastgate) had average measurements of 3.53 mU. This series is dated between A.D. 600 and 1300. Points of the Elko Series (Elko and Triangular Contracting Stem) had hydration averages of 4.70 mU. This series is dated between 1000 B.C. and A.D. 500.

The extent to which hydration rates are similar at Dry Meadow and New Melones is not known at this time, so any parallels must be viewed with caution. New Melones lies some 45 km SW of Dry Meadow and is at a much lower elevation. At this time, it is suggested, but not independently confirmed, that the Dry Meadow occupation might have extended from as early as 1000-1500 years ago on up to the protohistoric era. If so, the site might reflect a change from a pre-Miwok cultural pattern to a Miwok mode. At the same time, whether one or two cultural parrerns are present at Dry Meadow, the site may reflect on the incorporation of this ecological niche into a Late Period adaptive strategy following the change of climate from Middle Period times.

Initial XRF studies indicate that the obsidian at Dry Meadow is from the Bodie Hills source east of the Sierra Nevada some 80 km. to the east. This finding is not surprising, since Bodie Hills is the nearest source, and a series of major reduction stations has been found at Sonora Pass, about halfway between Dry Meadow and the Bodie Hills source. In addition, at New Melones, over 90% of the obsidian was from Bodie Hills (op. cit.). A larger sample from Dry Meadow might reveal some pieces of obsidian from other sources--a useful objective for future studies.

The anomalies in the distribution of Dry Meadow hydration values pose interesting problems and could be accounted for by several different hypotheses. One is that the lower-depth specimens represent several sources, while the upper-level specimens are all from the Bodie Hills source, so that hydration rates would not all behave consistently with time or depth. So far, obsidian from other sources has not been identified, but only a limited number of pieces has been sourced yet. It also could be that taphonomic factors might have disturbed the deposit. Site taphonomy is discussed below. Why it should have disturbed the lower levels but not the upper ones is not easily explained, however. Evidence was not found to support the idea that the deposit as a whole was disturbed, or that rodents had caused extensive localized distrubance.

Another possibility is that ground water conditions affected hydration values. Since the site is located next to a seasonal marsh with running springs, and since the obsidian at lower elevations showed the most inconsistency, this hypothesis currently seems to enjoy some support.

Finally, the small sample size recovered in the 1987 season allows sampling error to have occurred. Sampling error can be evaluated through further excavation.

SITE TAPHONOMY

Test excavations have revealed some minimal evidence for the operation of non-occupational taphonomic processes on the deposit which may have affected patterns of artifact dispersal in the site. First of all, the site is located next to a seasonal wetland area. Although the midden does not appear to have been inundated, soil moisture has made the deposit particularly soft. It therefore would seem attractive to burrowing rodents. Evidence of burrows was not found in our test pits, however, suggesting that localized displacement from rodent activity will be difficult to demonstrate. Burrowing is one factor that might have affected the patterning of obsidian hydration measurements, but currently evidence does not seem to support it.

Another mechanical factor, use of the site as pasture for cattle, is known to have affected the upper part of the deposit, however. The ranging of cattle in the area is known throughout the 20th century. We observed cattle at the site in both 1986 and 1987. The accumulation of cattle dung over and surrounding the site is also in ample evidence. The effects of cattle meandering across the soft soil of the deposit can be estimated because deep hoof prints are not hard to find. It can easily be estimated that at least the top 10 cm. of the deposit have been regularly churned by hoof action over the past century. On the other hand, the upper zone is not the part of the site showing important anomalies in artifact distribution, so the effects of cattle on the integrity of the deposit remains to be determined.

DISCUSSION AND CONCLUSIONS

The Dry Meadow Site reflects one example of Late Period adaptation to the Sierra Nevada biome. This strategy has proved to have been quite complex, and no single site can reveal very much of it. Because of this factor, it is necessary to sample a wide range of sites in order to put together a comprehensive enough model to account adequately for each component. Studies such as the Dry Meadow project therefore are necessary elements of what must be a more regional approach.

Dry Meadow seems to reflect a seasonal occupation, assumed to have occurred in the summer. It is associated, at least in the second half of the Late Period, with the Eastern, or Central Sierra, Miwok culture. It likely is associated with a settlement pattern of winter congregation at low-elevation base camps to the west, and summer dispersal into units of one or a few families which circulated at higher Sierran elevations.

The presence of milling tools and the abundance of fire-affected rock suggest that late summer was used to harvest and process nut crops, especially acorns, and that some surpluses may have been carried downhill for later use. The food base used while camping at Dry Meadow is not understood yet and should be an object for future study. Of particular interest may be the role that marsh-associated resources may have played, since they are not widely discussed in either the archaeological or ethnographic literatures. It also should be interesting to develop and test predation models for the site, given the paucity of faunal remains in a region known to have been fairly rich in animals.

The abundance of debitage and the poverty of the chipped-stone tool assemblage suggest that a good deal of manufacturing and retouch were conducted while the camp was occupied. The dominance of obsidian in the debitage indicates that obsidian acquistion was a significant activity. The prevalence of Bodie Hills obsidian indicates that techno-economic ties across the Sierra crest and socio-economic relationships with people of a different language group were important parts of the Late Period adaptive strategy in this part of the state. How obsidian reached Dry Meadow, among the several possible mechanisms, is not yet understood, and probably will require regional site analyses up the western slopes of the Sierra to determine. Why nearer lithic raw material sources, such as cherts from the Sonora area, did not play larger roles in this area's technology also is not well enough understood. The cultural significance of having a role in the long-distance exchange system for exotic raw materials may well have played an important part.

The ecological setting of the site also provokes some interesting questions. Jackson (1988), for example, has examined site patterns in the central Sierra Nevada in terms of site locations compared to geological features. He examined the possible relationship between the occurrence of granitic/volcaniclastic nonconformities and the occurrence of prehistoric settlements. His article appeared after our fieldwork was done, so we did not look specifically for the features he discussed. Nevertheless, the Dry Meadow Site conforms well to the model he describes for the Cuneo, Schoettgen and White Springs Timber Compartments in the adjacent Stanislaus National Forest.

In his analysis, Jackson looked at four classes of sites found in the area between 4200 and 5600 feet of elevation. They included: (1) flake scatters; (2) flake scatters with associated bedrock mortars; (3) flake scatters associated with bedrock mortars and middens;, and (4) bedrock mortars alone. He found a recurring relationship between increasing site complexity and increasing water dependability. Water dependability, in turn, he found to be correlated in this area with the occurrence of nonconformities between the underlying Mesozoic granitic foundation of the Sierra Nevada and overlying Pliocene volcanics.

Emergence of these nonconformities provides circumstances where springs and seepages appear. Jackson notes the probable relationship between activity magnitude and variety, and duration of settlement, on the one hand, and degree of water dependability on the other. I would add that the water, aside from being directly useful for human settlement, also provides greater local ecological diversity and abundance. In a second-cybernetics or deviation-amplification sense, these circumstances reinforce each other to promote richer local resource bases. In turn, people stay there longer, carrying on more tasks, more kinds of tasks, creating more archaeological remains, and therefore more complex sites.

Using Jackson's framework, the Dry Meadow Site fits his third class of site, that of flake scatters associated with bedrock mortars and middens. It is the most complex of the four classes. The occurrence of springs, a seasonal marsh, and associated aquatic plant resources likely made Dry Meadow a more attractive location for Late Period summer settlement than many other possible locaitons in the region.

The Dry Meadow Site, then, provides an interesting variation among middle-elevation sites on the western slopes of the Sierra Nevada, but one which fits understandably into established patterns. As is normal with the progress of research, however, at least as many new questions have been raised about the site and its significance as old ones have been answered.

NOTES

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TABLE 2: OBSIDIAN HYDRATION RESULTS

In 1993, Thomas M. Origer at Sonoma State University provided 27 obsidian hydration readings on debitage specimens from the Dry Meadow Site. Results are kept under Accession No. 93-H1196 at Sonoma State. Readings are summarized as follows:

Catalog#	*Unit*	*Depth*	*Measurements in microns*	*Mean Value in microns*
DM-462	N30/W10	10-20 cm	2.3; 2.4; 2.4; 2.5; 2.6; 2.6	2.5
DM-463	N30/W10	10-20 cm	2.3; 2.4; 2.4; 2.4; 2.4; 2.6	2.4
DM-591	N30/W10	20-30 cm	2.7; 2.9; 2.9; 2.9; 3.0; 3.1	2.9
DM-618	N30/W10	20-30 cm	2.9; 3.0; 3.0; 3.0; 3.1; 3.1	3.0
DM-620	N30/W10	20-30 cm	2.9; 2.9; 3.0; 3.0; 3.0; 3.1	3.0
DM-628	N30/W10	30-40 cm	4.1; 4.2; 4.2; 4.2; 4.3; 4.3	4.2
DM-633	N30/W10	30-40 cm	3.7; 3.7; 3.8; 3.8; 3.9; 3.9	3.8
DM-635	N30/W10	30-40 cm	2.9; 3.0; 3.0; 3.0; 3.1; 3.2	3.0
DM-676	N30/W10	40-50 cm	4.4; 4.4; 4.4; 4.5; 4.5; 4.7	4.5
DM-690	N30/W10	50-60 cm	2.4; 2.4; 2.4; 2.4; 2.4; 2.5	2.4
DM-814	N30/W10	60-70 cm	1.9; 1.9; 2.0; 2.1; 2.1; 2.3	2.1
DM-815	N30/W10	60-70 cm	2.6; 2.7; 2.7; 2.7; 2.7; 2.7	2.7
DM-816	N30/W10	60-70 cm	5.5; 5.6; 5.6; 5.6; 5.7; 5.8	5.6
DM-825	N30/W10	70-80 cm	2.6; 2.6; 2.6; 2.6; 2.6; 2.7	2.6
DM-702	S45/E62	0-10 cm	1.7; 1.7; 1.8; 1.8 1.8; 1.9	1.8
DM-705	S45/E62	0-10 cm	2.6; 2.7; 2.7; 2.9; 2.9; 2.9	2.8
DM-718	S45/E62	0-10 cm	1.6; 1.7; 1.7; 1.8; 1.8; 1.8	1.7
DM-722	S45/E62	10-20 cm	3.6; 3.7; 3.8; 3.8; 3.8; 3.9	3.8
DM-756	S45/E62	30-40 cm	2.3; 2.4; 2.5; 2.5; 2.5; 2.5	2.5
DM-758	S45/E62	30-40 cm	1.2; 1.2; 1.3; 1.4; 1.4; 1.4	1.3
DM-873	N47/E8	0-10 cm	4.3; 4.3; 4.4; 4.4; 4.4; 4.7	4.4
DM-1022	N47/E8	20-30 cm	3.9; 4.1; 4.1; 4.1; 4.1; 4.2	4.1
DM-1032	N47/E8	20-30 cm	1.2; 1.2; 1.3; 1.3; 1.4; 1.6	1.3
DM-420	S10/E0	0-10 cm	2.4; 2.4; 2.4; 2.5; 2.6; 2.6	2.5
DM-351	N45/E10	0-10 cm	1.3; 1.4; 1.4; 1.6; 1.6; 1.6	1.5
DM-383	N10/E67	0-10 cm	4.1; 4.1; 4.1; 4.2; 4.2; 4.3	4.2
DM-393	N122/E81	0-10 cm	[no visible bands or NVB]	NVB

Table 3: Firecracked rock counts and weights

Unit	Level	Depth in cm.	No.	Weight
N30/W10	Level 1	00 to -10 cm	13	432.4 gr.
	Level 2 -	10 to -20 cm	15	926.8 gr.
	Level 3 -	20 to -30 cm	20	1917.5 gr.
	Level 4 -	30 to -40 cm	37	3026.5 gr.
	Level 5 -	40 to -50 cm	27	5217.5 gr.
	Level 6 -	50 to -60 cm	11	892.7 gr.
	Level 7 -	60 to -70 cm	00	000.0 gr
	Level 8 -	70 to -80 cm	00	000.0 gr
	Total:		123	12,413.4 gr.
N47/E8	Level 1	00 to -10 cm	11	370.9 gr.
	Level 2 -	10 to -20 cm	3	376.4 gr.
	Level 3 -	20 to -30 cm	4	343.9 gr.
	Level 4 -	30 to -40 cm	2	55.6 gr.
	Total:		20	1,146.8 gr.
S45/E62	Level 1	00 to -10 cm	20	1,199.4 gr.
	Level 2 -	10 to -20 cm	23	5,254.1 gr.
	Level 3 -	20 to -30 cm	10	1,108.7 gr.
	Level 4 -	30 to -40 cm	8	564.9 gr.
	Total:		61	8,127.1 gr.

Table 4: Charcoal counts and weights

Unit	Level	Depth in cm	No.	Weight
N30/W10	1	00 to -10 cm	29	0.8 gr.
	2	-10 to -20 cm	63	7.1 gr.
	3	-20 to -30 cm	4	0.1 gr.
	4	-30 to -40 cm	42	1.7 gr.
	5	-40 to -50 cm	51	4.1 gr.
	6	-50 to -60 cm	17	1.8 gr.
	7	-60 to -70 cm	5	0.1 gr.
	8	-70 to -80 cm	0	0.0 gr.
	Total:		211	15.7 gr.

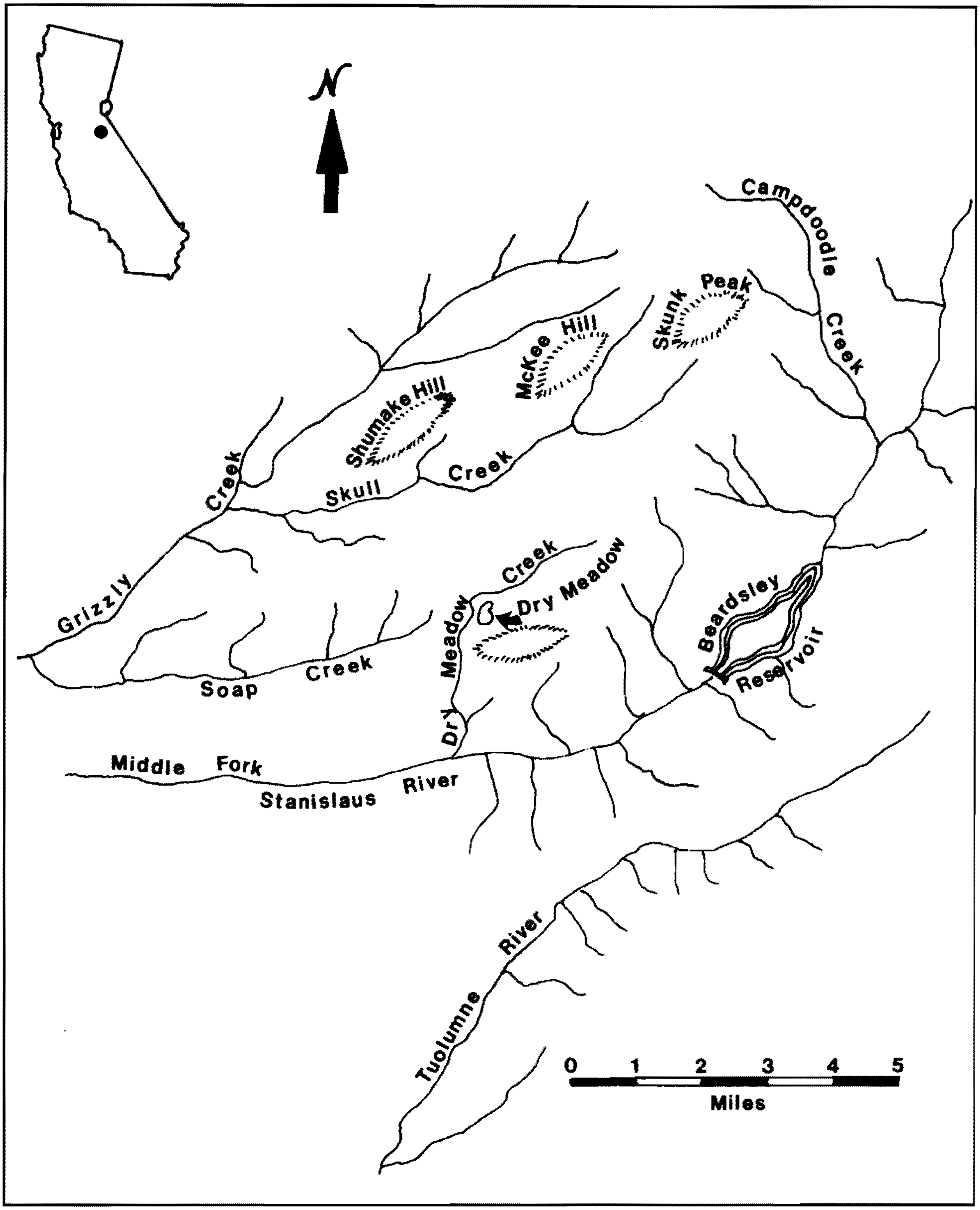


Figure 1: Location of Dry Meadow

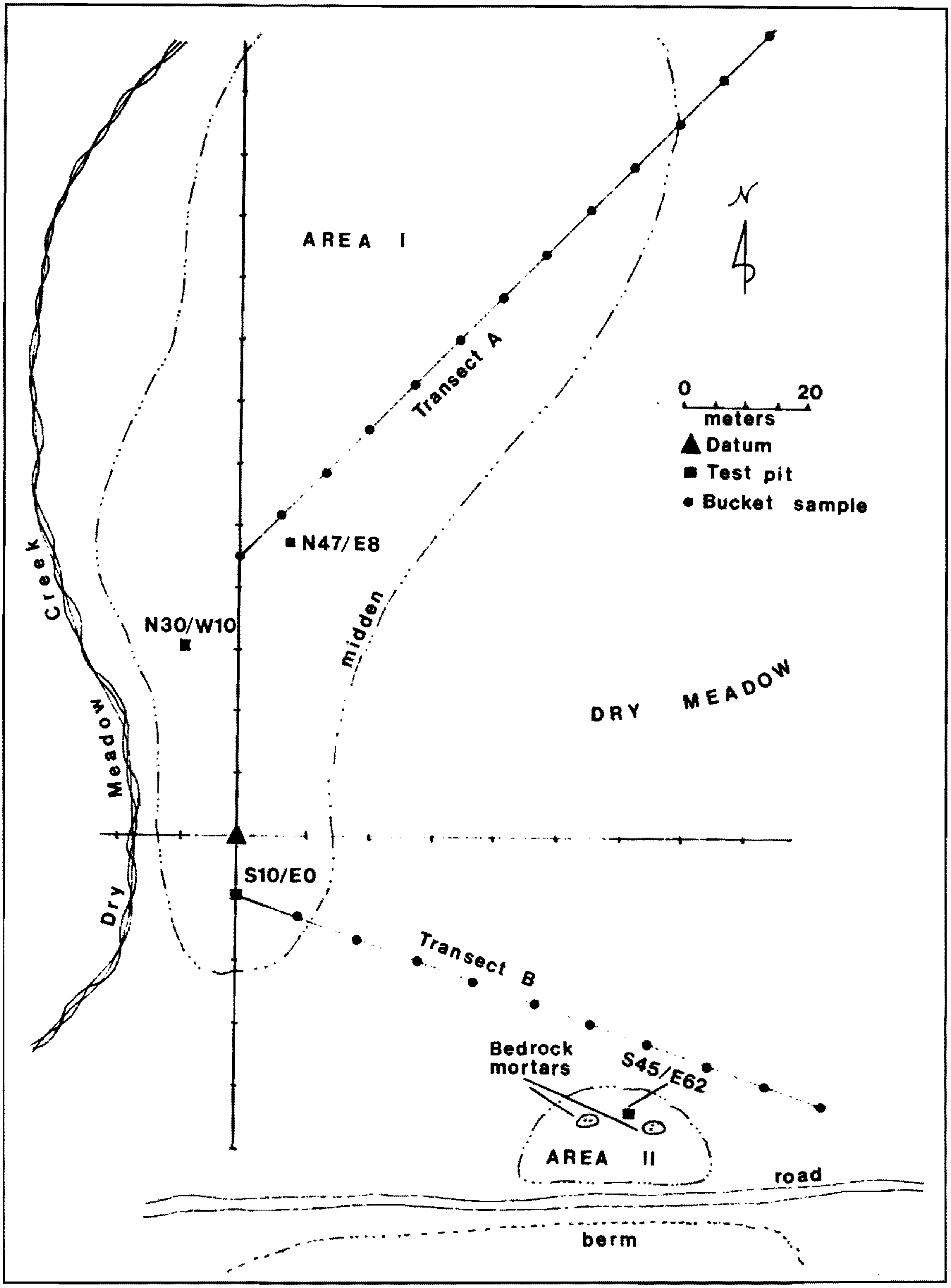
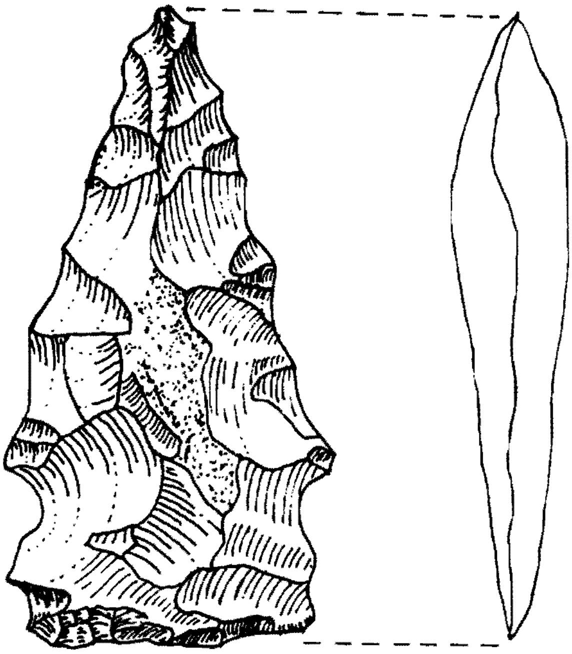
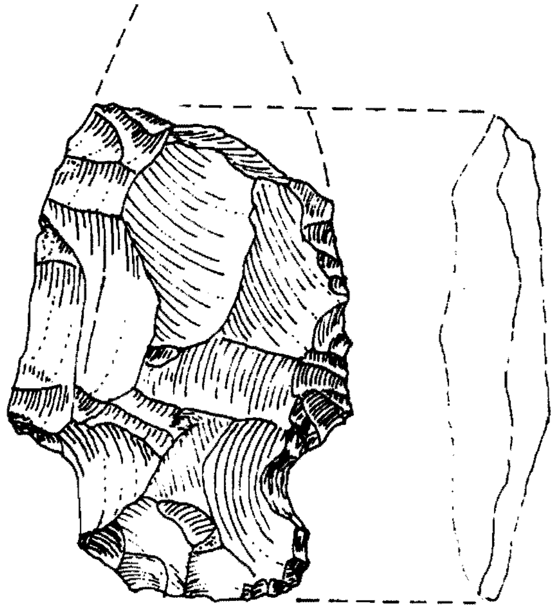


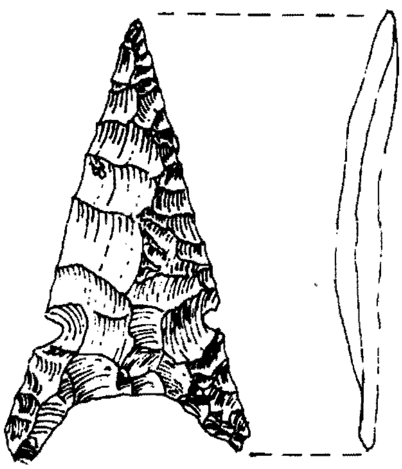
Figure 2: Test Units on the Dry Meadow Site (CA-Tuo-2604)



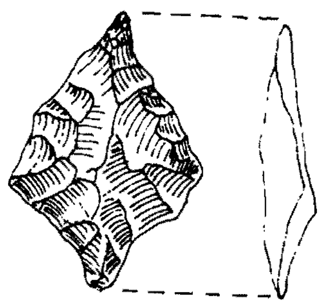
A
Side-notched projectile point made of tan chert, in two pieces: catalogue numbers DM-68, DM-512. L=40mm; W=21mm; T=9mm.



B
Side-notched projectile point made of tan chalcedony: catalogue number DM-1019. L=30mm; W=21mm; T=7mm.

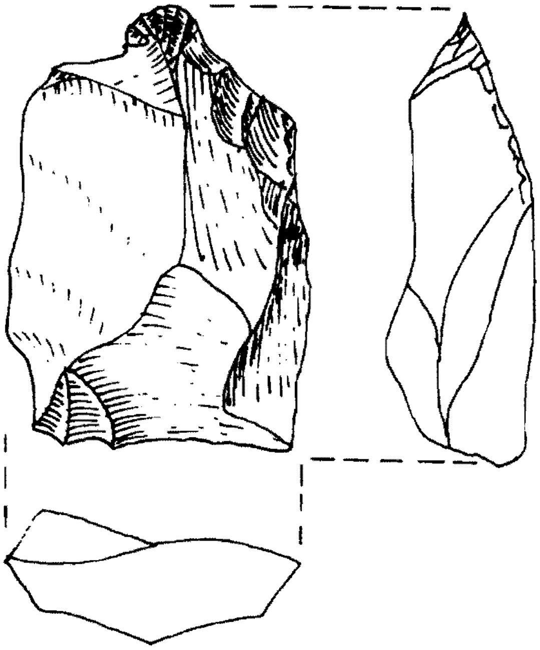


C Desert Side-Notched projectile point made of black obsidian: catalogue number DM-1018. L=27mm; W=16mm; T=3mm.

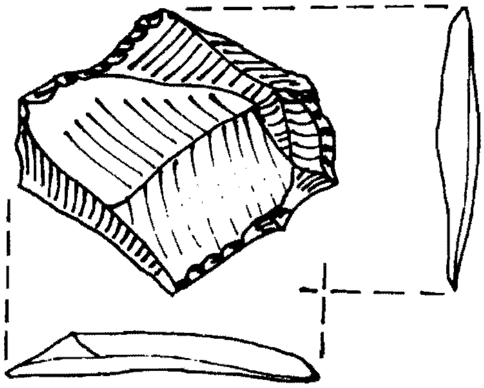


D Re-worked contracting-stem projectile point made of black obsidian: catalogue number DM-478. L=18mm; W=13mm; T=3mm.

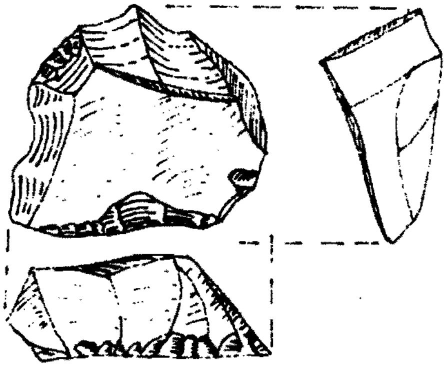
Figure 3: Projectile Points from the Dry Meadow Site



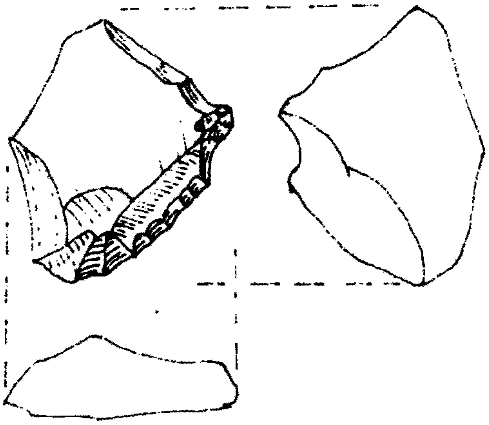
A Compound scraper (nosed, side) on a thick flake of black obsidian: catalogue number DM-758. L=33mm; W=24mm; T=11mm.



B Compound scraper on a black obsidian flake: catalogue number DM-756. L=24mm; W=20mm; T=4mm.



C Compound scraper (side, diagonal) on a thick black obsidian flake: catalogue number DM-618. L=18mm; W=12mm; T=8mm.



D Compound scraper (nosed, diagonal) on a black obsidian flake: catalogue number DM-701. L=32mm; W=28mm; T=10mm.

Figure 4: Retouched Stone Tools from the Dry Meadow Site

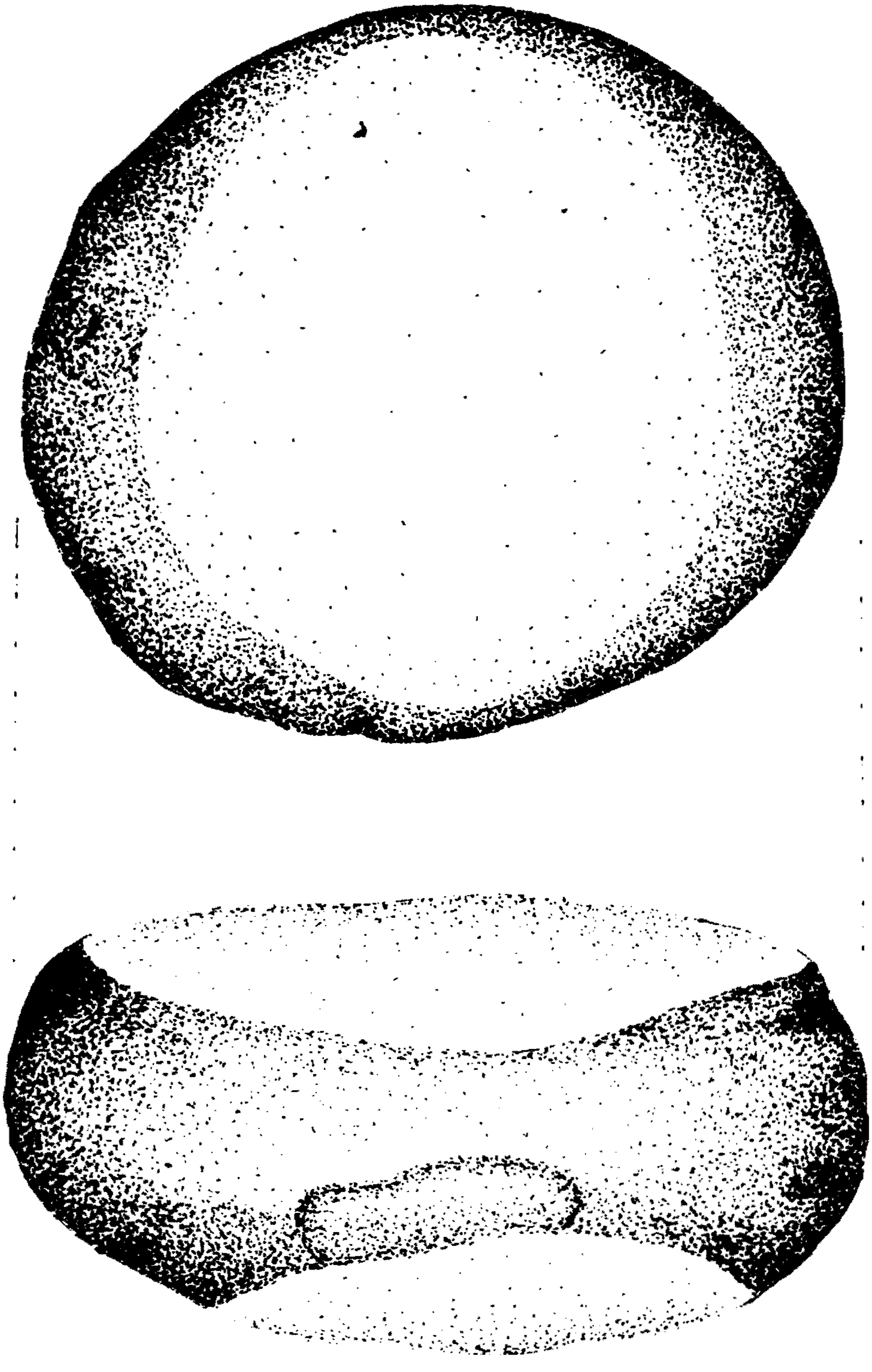


Figure 5: Ground Stone Mano from the Dry Meadow Site

Catalogue number DM-774. Bifacial, made of basalt. L=114mm, W=101mm, T=66mm, Wt=1061grams