ARCHAEOLOGICAL INVESTIGATIONS AT THE KETT SITE, SHASTA COUNTY, CALIFORNIA

by

Peter M. Jensen
California State University, Chico

Prepared Under:

U.S. Department of the Interior
Bureau of Land Management
Contract No. CA-030-CT9-004
"Archaeological Investigations
of Kett Site, CA-SHA-491."

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TABLE OF CONTENTS

I. INTRODUCTION. 1

II. BACKGROUND DATA, RESEARCH OBJECTIVES, AND RESEARCH METHODOLOGY 4

Background Data 4
Map 1, CA-SHA-491 5
Research Objectives 7
Research Methodology 9

III. PROGRAM RESULTS 10

The Cultural Deposit and Stratigraphic Data 10
Figure 1: Profile Drawing 11
Table 1: pH Readings from Units 3 and 10 . 12
Excavation Units 12
Table 2: Summary of Excavation Depths . 13
Artifact Description 14
Table 3: Summary of All Materials Recovered from Units 1-11 15
Table 4: Summary of Materials Recovered from Unit 4, 20-70 cm 16
Table 5: Metric and Provenience Data for Type 1 Projectile Points . . . 21
Table 6: Metric and Provenience Data for Type 2 Projectile Points . . . 22
Figure 2: Types 1 and 2 Points . . . 23
Table 7: Metric and Provenience Data for Projectile Point Types 3-5 . . . 25
Figure 3: Types 3,4,5 Points . . . 26
Table 8: Metric and Provenience Data, Projectile Point Types 6-8, Unclassified Point Tips, and Drills . . . 28
Figure 4: Types 6,7,8 Points, Unclassified Tips, and Drills 29
Table 9: Metric and Provenience Data for Cores, Scrapers, and Hammerstones . . 31
Figure 5: Cores and Scrapers . . . 32
Table 10: Metric and Provenience Data for Pestles and Manos 33
Table 11: Metric and Provenience Data for Pestles and Manos 35

Figure 6: Manos and Pestles . . . 36
Figure 7: Millingstone -- Hopper mortar . 37
Historic Artifacts 39
Features 41
Figure 8: Feature 1, House Pit . . 42
Figure 9: Feature 3, Suspected Burial Pit 45

IV. PROJECT SUMMARY, CULTURAL SIGNIFICANCE AND RECOMMENDATIONS 46

Summary 51
Significance and Recommendations . . 53

BIBLIOGRAPHY 56

EXPLANATION OF PLATES 58

APPENDIX

I

INTRODUCTION

The Kett Site is a moderate-sized aboriginal midden which occupies the southwestern exposure of a small knoll located about ¼ mile west of the Keller Lumber Company and Iron Mountain Road and about 5 miles northwest of Redding, California. A dirt road, believed to be the remnants of the Old Shasta-to-Waugh's Ferry (survey plats of 1866) stage route, passes along the southern perimeter of the site and exits the site heading in a westerly direction. Although the site was formally recorded by Ed Clewett on April 23, 1971, local residents have known about, and some unauthorized archaeological excavation as well as vandalism have been conducted at the site, for at least the past two decades. By 1976, in fact, it had become clear to the Bureau of Land Management that local relic hunters and vandals would soon destroy what remained of the site if something was not done to afford protection under Federal regulations. As noted, the site is located within a short distance of the Redding city limits and is surrounded on three sides by private land with semi-rural residences. With dirt roads cutting through the site area, access is quite easy and always available.

In 1978 the Redding Office of the Bureau of Land Management sent out requests for proposals to conduct archaeological excavations at the site. In this sense the present project is another example of the increased scale of archaeological excavation within northern California which in turn is due to the increased attention given by Federal and State agencies as mandated by The Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800).

However, there is more to the explanation for the present project than simply the existence of appropriate Federal legislation. By the time that Federal funding had been approved for the project, it was also abundantly clear that a lot of "extra (i.e., volunteer) work would have to be expended if the project was to become a reality and the site at least partially salvaged from the predations of relic hunters and vandals.

The first "volunteer", and the individual most responsible for bringing the project to fruition, was Bureau of Land Management archaeologist Clark Brott. After securing the core funding, Clark then proceeded to organize Redding-area volunteers and to secure cooperative agreements between the Bureau, local Native American Indian groups and the State Historic Preservation Office in Sacramento. Without Clark's diligent efforts this project would have ended on the "cutting room" floor back in the spring of 1978.

James Dotta also provided invaluable assistance in organizing and supervising the contingent of volunteers from the Redding Historical Society. I am grateful that Jim was able to find time in his own busy schedule to provide us generously with his time, skills and resources.

From Chico and the Redding area we received volunteer field assistance from no less than 32 people, all of whom worked very hard and are to be congratulated on a job well done. By excavation unit number, these persons are:

Unit 1:

Paul Bowman, Gueran Runyan

Unit 2, 7, 8, and 9:

Tammy Brott, Geoffrey Dunn, John Zancanella

Unit 3:

Will Shapiro, Mike Dugas

Unit 4:

Marlys Barbosa, Pat Folsom, Amy Foster, Howard Gard, Pam Nix, Sharon Westphal, Ken Wilson

Unit 5:

June Kavan, Lou Kavan, Ruth Moore, Wilbur Moore, David Steele

Unit 6, 10:

Logan Beal, Carol Bradshaw, Charles Crane, Don Miller, M.J. Nelson

Unit 11:

Clark Brott, James Dotta

Profile 1:

Jan Gandy, Joanne Johnson, Mary Noel, Ted Noel, Joyce Wahl, Lynne Waltuch

To Don Miller I am grateful for photographic documentation of all phases of the project, as well as for production of the location and site maps which appear in the present report. I am also grateful for visits to the site by BLM California State Office Archaeologist William Olsen and Redding avocationalist Ray Hullinger who shared with us the information which he possesses

concerning the Kett site. To John Zancanella I am grateful for all of the artifact drawings and other figures which he prepared for this report.

A number of Wintu representatives were present at the site during the course of fieldwork. We are all especially grateful for the time which Al Thomas spent at the site observing our endeavors and correcting some of our misconceptions about the function and significance of various artifact classes and features. In addition, I want to thank Mr. Robert Burns and Mr. and Mrs. George E. Grant and family for their cooperation and good humored company.

As the Kett site experience demonstrated, there is a growing concern and interest on the part of local citizenry in regional history and prehistory. The benefits derived from this concern include personal satisfaction and fulfillment derived from pursuing an interesting subject matter as well as a feeling that studies of the past may be very important in planning our individual and collective future. But while a large number of people were responsible for assisting in this project and should be credited for any positive contributions which may have been realized, the author alone accepts responsibility for any shortcomings in the analysis and conclusions which follow.

II

BACKGROUND DATA, RESEARCH OBJECTIVES, AND RESEARCH METHODOLOGY

Background Data

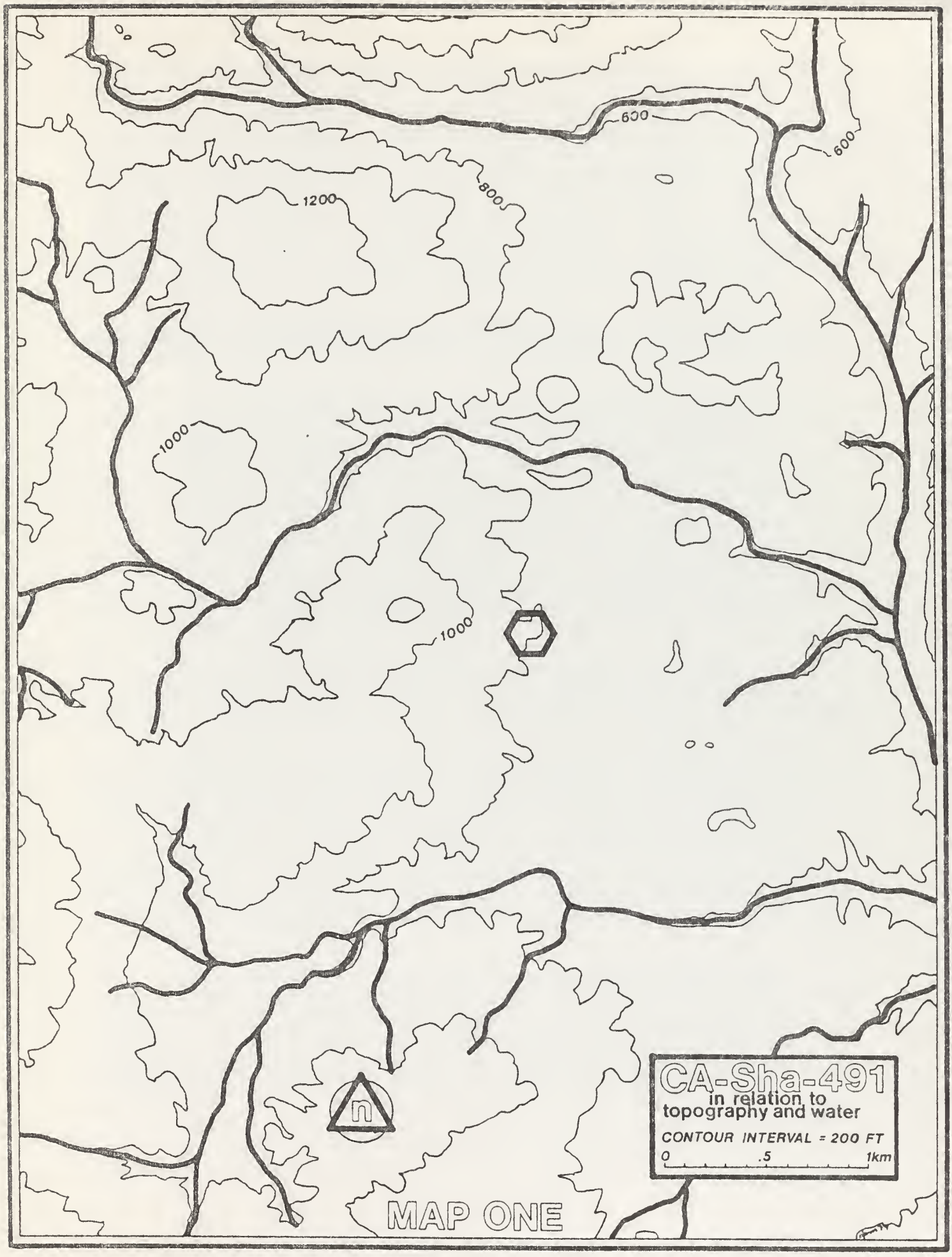
Site CA-SHA-491, popularly referred to as the "Kett Site" and known to Redding-area Wintu Indians as "Nō' sai" has been recorded as lying within the NE ¼ of the NE ¼ of the NE ¼ of Section 30, Township 32N, Range 5W, M.D.M. Elevation at the site ranges from approximately 785 feet to slightly more than 820 feet above mean sea level. The Kett Site measures approximately 120 meters east-west by 80 meters north-south, and was identified on the basis of (1) an exposed black midden deposit in which dense concentrations of basalt and obsidian flakes and artifacts are present, and (2) the results of an earlier excavation project during which burials and grave-goods were extracted from the deposit along with Euroamerican trade goods (Hullinger n.d.: 1-13). A total of 8 circular house pit depressions are evident within the northwest quadrant of the site area. Additional depressions may have been present at one time, but subsequently destroyed by road grading and/or other historic activities at the site.

Topographically the site occupies the southwestern slope of a small knoll situated between Rock Creek on the north and Middle Creek on the south, both of which flow eastward into the Sacramento River which in turn is located about 1 mile to the east (see Map 1). The site is also situated about mid-way between Keswick, located 1 mile north, and Old Shasta, located about 1 mile southwest of the site. The dirt road which passes through the site is believed to represent a portion of the 19th Century wagon route between these two towns and other locales along the Sacramento River and elsewhere.

Present vegetation at the site consists of a mixture of manzanita, ceanothus, scrub oak, digger pine, and a variety of grasses. The nearest water is a spring, now in private ownership, located approximately 30 meters south of the access road which cuts through the southern edge of the site area.

Within the heavily-disturbed southeastern portion of the site area is a narrow ditch which was probably constructed to carry water to nearby placer mines in the mid- to late-19th Century. In this same area are a few foundation remains and scattered broken artifacts associated with an early Euroamerican homestead.

The site lies within the territory of the Keswick sub-


600
600
800
1200
1000
1000
n
CA-Sha-491
in relation to
topography and water
CONTOUR INTERVAL = 200 FT
0
.5
1km
MAP ONE

group of the Wintu Indians (Du Bois 1935: Map 1). The Wintu were a hunting and gathering people who, at the time of Euroamerican contact, occupied most of the western side of the northern Sacramento Valley and northward into the Klamath and Cascade Mountains along the Trinity, Sacramento and McCloud River drainages. Considerable ethnographic research has been conducted in regard to the Wintu Indians. The reader is referred to the primary sources, which include Du Bois (1935), Kroeber (1925), Powers (1877), Merriam (1957), and Lapena (1978), for detailed information on Wintu settlements, economy, and social, political and religious life.

Du Bois' description of the Keswick territorial boundaries provides information which bears directly on the Kett site. Her description is as follows (Du Bois 1935:7):

> This (Keswick Wintu) region extends from a point somewhat south of Kennett on the Sacramento chiefly along the west bank southward almost to Redding, and includes the former Indian settlements around the mining town of Old Shasta. The Wintu camps used to cluster about the present station of Coram...During the gold rush and later mining activities many Indians were attracted to the vicinity of Old Shasta...In a radius of three to five miles around Old Shasta at least three large earth lodges existed within the memory of a man about fifty years old...

La Pena also acknowledges the presence of Wintu settlements and a substantial Wintu population residing near the town of Old Shasta in the mid-1800's (La Pena 1978:324-25).

Although the Kett Site possesses no visible remains of a structure large enough to be clearly classified as an earth lodge, the site does contain a number of well-defined house pit depressions and a significant historic component. It is therefore at least plausible to suggest that SHA-491 was utilized and perhaps occupied during the period of early Euroamerican contact and settlement within the Redding area, and could thus represent one of the village sites within the vicinity of Old Shasta referred to by Du Bois' informant and as noted by La Pena.

The possibility that the Kett Site represents the remains of a village established by local Wintu in post-Contact times had been considered by Bureau of Land Management personnel. In modified form, this possibility also figured importantly among the hypotheses guiding research during the course of the present project, to which we now turn our attention.

Research Objectives

A number of research objectives were sought in conjunction with the present project. They include the following:

1) Establishment of the time span during which the site was occupied.

2) Refinement of regional artifact taxonomies, including especially temporally diagnostic forms such as projectile points and ornamental objects.

3) Definition of socio-economic activities engaged in at the site as determined from an analysis of all artifacts and other residues of human activity.

4) Definition of the role of the site in the overall settlement pattern of the Sacramento Valley/Foothill region.

5) Determination of the importance and nature of trade/commerce which may have existed between the occupants of this site and the growing Euroamerican settlements in the region, especially Old Shasta.

Discussion. Based on available ethnographic information as well as the results of an earlier excavation project undertaken at the site (Hullinger op. cit.), hypotheses and test implications had been developed for some of the research objectives noted above.

Regarding the time period during which the site was occupied, all available evidence indicated that the site was no older than the prehistoric California Late Period and was thus probably not occupied before about 1600 A.D. Moreover, the relatively large number of Euroamerican artifacts dating to the middle and late 1800's and even into the early 1900's suggested the possibility of a totally historic occupation of the site, perhaps in conjunction with early White settlements within the region, particularly at Keswick and at Old Shasta.

Not only was it believed that the site may have been occupied solely during the historic period, but the possibility also existed that the site was occupied because of its proximity to Old Shasta. If this was true, then it was anticipated that the research program might produce data on "modified" or "affected" aboriginal life for comparison with materials excavated from other Redding-area Wintu sites which had been abandoned prior to Euroamerican intrusion. As a result of such comparative studies we would be in a position to infer some of the mechanisms by which initial White occupation impacted the Wintu, and some of the adjustments in economy and socio-political life which attended this period of contact. We could perhaps acquire an understanding

of some of the options which were available to aboriginal groups faced with an altered set of environmental and social conditions to which to adjust. In any case, we hypothesized that if no pre-contact component underlay the historic artifact-bearing component which had already been documented by Hullinger, then we would have documented the existence of an aboriginal deposit accumulated totally during the period of Euroamerican contact and could thus analyze the site's deposit in terms of the impacts of the latter on the former.

In light of the hypothesized very late period of occupation, it was not anticipated that much could be accomplished with regard to refinement of regional artifact taxonomies, particularly if the site occupants had dramatically altered their original economic orientation and life style and had begun to rely extensively on Euroamerican artifacts and on trade to secure a large number of needed items.

No clear hypotheses regarding socio-economic activities which might have been engaged in at the site were formulated prior to fieldwork. Our approach here was based on the assumption that inferences regarding such activities would have to await analysis of the recovered data, particularly the non-burial related items associated with subsistence and perhaps trade.

Definition of the role of the site within northern California settlement patterns would likewise have to be inferred on the basis of recovered and analyzed data. Again, the approach was visualized as one in which key site features and artifact classes/frequencies would be compared with data recorded for other prehistoric sites within the region. In this way, similarities and dissimilarities between this site and other Wintu sites could be identified and some tentative conclusions concerning site function could be advanced.

Finally, it should be noted that the present project was undertaken at least in part simply to evaluate the potential of the site to provide the quantity and quality of data necessary to answer questions of the type outlined above, rather than actually providing definitive answers to these questions at this time. This is emphasized by the fact that only about ½ of 1% of the estimated total site deposit was recovered during the present project, a sample size less than desirable for dealing completely effectively with these questions. Nevertheless, to have structured this investigation around the above questions has ensured that the recovered data will at least be used most efficiently and that the research potential of the site can be evaluated against criteria other than subjective impressions such as "interesting", "revealing", "a productive site", etc.

Research Methodology

In order to produce the kinds of data needed to meet the research objectives outlined above, the following classes of data were recovered during the fieldwork phase of the project.

1) A contour map of the site and immediately adjacent areas was produced. The map includes all surface features and manifestations occurring at the site except for individual trees and manzanita stands. Primary data for the map was compiled by Bureau of Land Management surveyors, and the map was drawn by BLM archaeologist Don Miller.

2) Excavation data from eleven (11), 1m x 2m excavation units. These units were subjectively placed at the site in order to maximize areal coverage of the main midden area and were variably aligned with respect to True North in order to avoid placing units within earlier excavation pits and other holes resulting from previous unauthorized excavation. All units were excavated in arbitrarily-defined 10-centimeter levels, except for the following: (1) the initial 20 centimeters of deposit within each unit was excavated as a single level, and (2) a portion of Unit 4 between 20 and 70 centimeters below the surface represented a feature and was excavated as a single unit. All material excavated from the units was passed through ¼" mesh screen.

In addition to excavation units, a two-meter long section of exposed midden located within a disturbed area near the center of the site was cut vertically and generally cleaned up in order to expose a surface-to-sterile profile through the deepest portion of the midden. This cut was labeled Profile 1 and provided a guide as to what to expect in terms of midden depth and configuration within the units being excavated (see Map 2).

Excavation of the eleven units resulted in removal of a total of 14.8 cubic meters of midden and the recovery of a total of 6,171 cultural items (this count excludes charcoal and mineral ochre samples also recovered from the units). The description and analysis of the midden, features and recovered cultural materials constitute the subject of the next section of this report.

III

PROGRAM RESULTS

The Cultural Deposit and Stratigraphic Data

As noted in the introduction of this report, the Kett Site consists of a well-defined black ashy midden. Prior to disturbance by vandals and others, the site's surface sloped downward from northwest to southeast, declining at the rate of approximately 1 meter for each 15-20 meters of lateral distance. In addition to the black midden, other surface indications of the deposit include fire-fractured stream cobbles, substantial quantities of basalt and obsidian flakes, obsidian nodules, some ground stone artifacts, and 8 circular house pit depressions averaging 3.25 meters in diameter with the largest measuring 7.30 meters in diameter. The surface lithic scatter tends to be concentrated within the area of midden, except where some of these materials have been washed or scraped off the surface of the site and found their way downslope to the southwest. This downslope erosional activity has also covered a portion of the southeastern periphery of the midden with a yellow sterile soil, while the same activity has tended to expose the steeper northern and northwestern areas of the site where dark, ashy midden has been exposed in many areas.

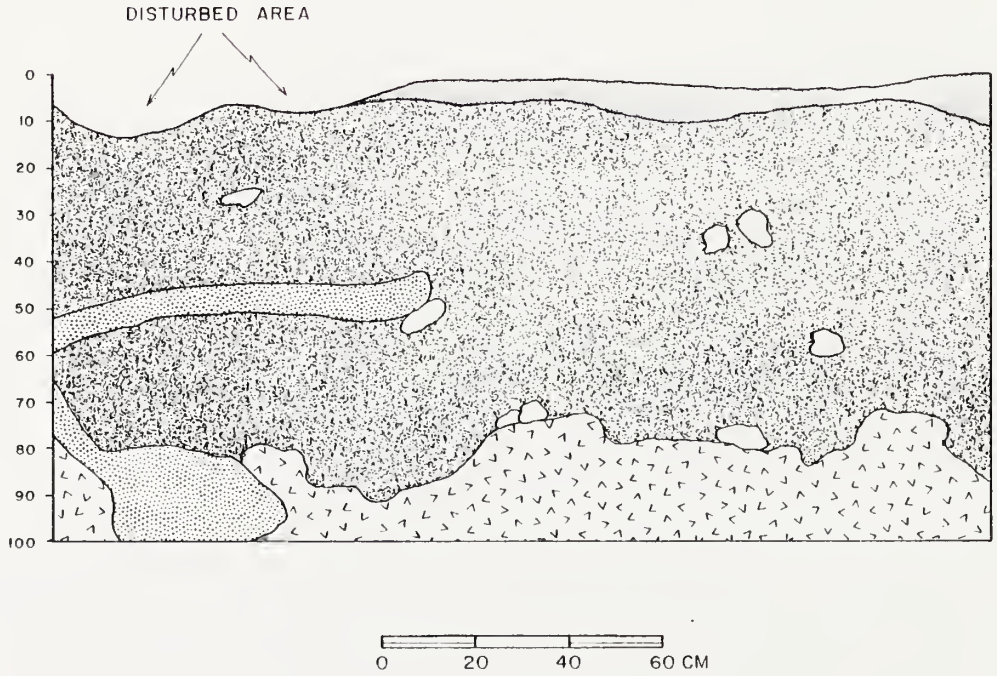
The test excavations were confined to the main midden area in which only one of the 8 house pit depressions occurred. It was also in this area that Hullinger had earlier undertaken his excavations and removal of burials. Hullinger had removed approximately 20 cubic meters of cultural material and only partially backfilled his excavation pits and trench. As a result, a profile of the midden deposit had been exposed from the ground surface to the sterile decomposing granite beneath. In the interest of examining the nature of the deposit and providing a guide for what to expect during the excavation of test pits within undisturbed areas, a 2-meter long section of exposed midden was cut vertically revealing a stratigraphic profile exhibiting (1) a surface layer of humus and fine windblown sand averaging about 10 centimeters in thickness, followed by (2) the black, rocky aboriginal midden deposit averaging 70 centimeters in thickness, which in turn overlies (3) a sterile subsoil, yellow to tan in color consisting of granular deposits of decomposing granite. As illustrated in Figure 1, the midden and sterile subsoil have been infiltrated with rodent burrows and tunnels of substantial size, an activity which has no doubt displaced a number of artifacts within the cultural deposit. Aside from the two non-cultural and one cultural layer noted,

PROFILE 1

FIGURE 1.

CA-SHA-491

PROFILE 1



LEGEND

- STERILE OVERBURDEN
- DARK MIDDEN
- STERILE SUBSOIL DECOMPOSING GRANITE
- RODENT BURROWS
- ROCKS

no physical evidence of cultural layering or stratigraphy was evident within the 70-centimeter depth of the cultural deposit itself.

The stratigraphic picture presented in Profile 1 (Figure 1) was substantially represented in the test pits which were excavated. The only departure from this occurred in those units which contained sub-surface features. The three recorded sub-surface features will be discussed in detail below.

Values for the pH samples taken from Units 3 and 10 ranged from 5.35 to 7.00 , exhibiting a tendency for slightly more basic readings for the deeper portions of the deposit. However, the generally acid soil is responsible for the poor preservation of faunal remains and other organic material within the midden, a feature common to other sites within the general region (see Jensen 1978:29-32).

Table 1: pH Readings from Units 3 and 10

Depth	Unit 3	Unit 10
0-20	6.75	6.00
20-30	5.90	5.95
30-40	5.55	5.35
40-50	5.70	5.95
50-60	6.80	6.40
60-70	6.90	7.00
70-80	6.70	----

Excavation Units

Eleven 1-meter X 2-meter test pits were excavated during the course of the project. The test pits were spaced to provide areal coverage within the main midden area as well as to expose a portion of one of the house pit depressions (Units 2, 7, 8 & 9). The units were variously positioned with regard to North in the attempt to avoid placing them within existing vandal or "pot" holes. Each of the test pits was excavated by shovel, mattock and trowel employing arbitrarily-determined 10-centimeter levels with the exception of the initial 20 centimeters of deposit which was removed as a single level. Vertical provenience was maintained by using the highest corner of the unit as the datum, with each such corner being plotted onto the site map by BLM surveyors (Map 2, in end jacket).

All excavated material was passed through 1/4" mesh screen. The material excavated from Unit 4, which contained a suspected burial pit (Feature 3, Figure 9), was passed through 1/8" screen. All cultural materials recovered were sorted in the field into

general categories such as projectile points, scrapers, waste flakes, ground stone implements, etc. Once sorted and counts made, the items were re-bagged by excavation unit and level and returned to the archaeology laboratory at Chico for final cleaning, detailed sorting and artifact typing, cataloguing, and analysis. These cultural materials, along with the original field notes, feature drawings, and other records are stored in the Museum of Anthropology, California State University, Chico, under Accession #175.

Table 2: Summary of Excavation Depths

Unit #	Depth of Ex.	Excavation Terminated In Midden	Sterile
Unit 1	100 cm		*
Unit 2	30 cm	*	
Unit 3	80 cm		*
Unit 4	70 cm		*
Unit 5	80 cm		*
Unit 6	80 cm		*
Unit 7	60 cm		*
Unit 8	50 cm	*	
Unit 9	50 cm	*	
Unit 10	70 cm		*
Unit 11	70 cm		*

Unit 2 was not excavated to sterile soil in order to avoid cutting through and removing the house floor which had been exposed. Units 8 and 9 were initiated late in the course of the allotted fieldwork time which prevented complete removal of all cultural material. The remaining units were excavated to sterile soil.

By utilizing the figures in Table 2, it can be calculated that a total of 14.8 cubic meters of midden was excavated from the eleven test pits. This volume of midden yielded a total of 6,171 cultural items, including all historic artifacts, all aboriginal items and lithic debitage, but excluding charcoal and mineral ochre samples which were also collected. This yields an average of approximately 417 cultural items per cubic meter of excavated midden. However, when the lithic debitage is excluded and only the historic and aboriginal artifacts considered in the calculation, the yield per cubic meter drops to slightly more than 46 items per cubic meter. When only the aboriginal artifacts are considered (excluding aboriginal waste flakes and historic artifacts), the yield per cubic meter drops only slightly to 43 items. This compares with 6 aboriginal artifacts per cubic meter recovered from site CA-SHA-543 located

on the North Fork of Clear Creek west of the Kett Site, and to 157 cultural items per cubic meter (including both historic as well as aboriginal artifacts) recovered by Johnson from site CA-SHA-192 located along the Clear Creek drainage (Johnson 1976:12).

Artifact Description

The artifactual and non-artifactual remains excavated from CA-SHA-491 have been assigned Accession #175 and shall be housed in the Museum of Anthropology, California State University, Chico for examination and study by others. The items shall, however, remain the property of the United States Government.

A total of 565 entries was made for Accession #175, indicating that on the average each entry (which represents a portion of the items recovered from a single excavation level within a single unit) includes approximately 11 separate items. This reflects the fact that most levels produced a number of waste flakes and/or other items which could be and were identically classified. The artifacts, debitage, and other materials recovered are described below, and provenience data presented in Tables 3 and 4.

Aboriginal Artifacts. Chipped and ground stone artifacts as well as lithic debitage totaled 5,013 individual items. However, of this total, 4,831 represent unmodified waste flakes of obsidian (3,516, or 70.2%), basalt (1,101, or 22.2%), chert (104, or 2.0%), and quartz (110, or 2.2%), leaving 182 aboriginal artifacts having been recovered from the excavation units. This count excludes the items recovered from the 20-70 centimeter level of Unit 4 (see Table 4 for the 716 items recovered in Feature 3 of that Unit). Nor does this count include the beads, listed under "Ornamental" within Tables 3 and 4, all of which were historic in derivation although clearly associated with the aboriginal burials which had earlier been recovered from the site deposit by Hullinger.

With the exception of obsidian, local lithic resources appear to have furnished the primary materials for tool manufacture. However, many of the small obsidian waste flakes as well as some of the artifacts contained some appreciable cortex, and it is possible that the occupants may have obtained at least some of their obsidian from float nodules which are available in creeks within the general site vicinity.

As noted above, bone and shell objects were not expected to be preserved due to the acid character of the local soils, and while some quantities of bone as well as some carbonized seeds and burned mollusk shell were recovered within the midden,

Table 3: Summary of All Materials Recovered from Units 1-11*

Aboriginal Items	0-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	total
Chipped Stone										
Proj Pts										
Type 1	10	8	5	5	3	1	-	-	-	32
2	13	3	9	9	7	7	1	1	-	50
3	-	3	2	-	-	-	-	-	-	5
4	1	1	-	-	-	-	-	-	-	2
5	-	-	1	1	-	1	-	-	-	3
6	2	-	-	-	-	-	-	-	-	2
7	-	-	2	-	-	-	-	-	-	2
8	1	1	1	1	-	-	-	-	-	4
Tip Frags	1	4	4	1	1	2	-	-	1	14
Worked Flakes	2	1	2	-	1	-	2	2	-	10
Util Flakes	-	2	1	1	3	-	-	-	-	7
Cores	-	-	2	1	3	4	2	-	-	12
Drills	1	1	1	-	-	-	1	-	-	4
Scrapers	-	-	-	-	1	-	2	-	-	3
Hammerstones	1	1	1	2	1	1	-	-	-	7
Waste Flakes										
Obsidian	649	556	741	610	440	368	95	50	7	3516
Basalt	198	164	225	176	153	118	37	23	7	1101
Chert	25	9	11	20	17	15	6	1	-	104
Quartz	3	18	46	4	15	9	4	6	5	110
Ground Stone										
Manos	2	4	3	4	2	2	1	-	-	18
Pestles	-	1	1	1	1	2	-	-	-	6
Millingstone	-	-	-	1	-	-	-	-	-	1
Ornamental										
Beads	1	2	4	3	1	1	-	-	-	12
Ochre (grams)	18	18	69	13	39	18	4	-	-	179 g
Historic Items										
Bottle Caps	1	-	-	-	-	-	-	-	-	1
Shell Casings	2	-	-	1	-	-	-	-	-	3
Glass Frags	14	1	1	1	1	-	-	-	-	18
Misc Iron	8	4	5	2	1	-	-	-	-	20
Buttons	-	-	-	-	-	-	-	-	-	-
Organic										
Mussel Shell	14	11	9	9	-	-	-	-	-	43
Bone Frags	75	39	61	44	34	18	-	2	-	273
Human Bone	2	-	2	-	-	-	-	-	-	4
Nuts/Seeds	4	20	4	29	8	2	1	-	-	68
Charcoal (grams)	38	34	18	45	31	11	7	9	3	196
total	1030	854	1144	927	692	551	152	85	20	5455

* does not include items recovered from the 20-70 cm level of Unit 4 (see Table 4).

Table 4: Summary of Materials Recovered from Unit 4, 20-70 cm

Aboriginal Items	
Chipped Stone	
Proj Pts	
Type 1	-
2	2
3	1
4	1
5	-
6	-
7	-
8	-
Tip Frags	-
Worked Flakes	2
Util Flakes	-
Cores	-
Drills	1
Scrapers	2
Hammerstones	-
Waste Flakes	
Obsidian	508
Basalt	108
Chert	5
Quartz	21
Ground Stone	
Manos	-
Pestles	-
Millingstone	-
Ornamental	
Beads	11
Ochre (grams)	20.2 g
Historic Items	
Bottle Caps	-
Shell Casings	-
Glass Frags	1
Misc Iron	2
Buttons	3
Organic	
Mussel Shell	6
Bone Frags	42
Human Bone	-
Nuts/Seeds	-
Charcoal (grams)	0.7 g
Total	716

no bone or shell artifacts or ornaments were uncovered during excavation.

The aboriginal artifacts have been subdivided into a set of essentially descriptive categories. However, it can also be assumed that several of the key categories must also have been at least functionally significant to the aboriginal occupants of the site. This statement holds with varying degrees of confidence, with the lowest confidence levels being reserved for the various generalized flakes and flake implements and the highest degree of confidence reserved for the projectile points, drills and ground stone implements.

Chipped Stone Artifacts. Chipped stone artifacts (excluding nonutilized flakes and chipping waste) totals 157 individual items, including 114 projectile points and point fragments, 4 drills, 3 scrapers, 12 cores, 7 hammerstones, 10 worked flakes, and 7 utilized flakes. So far as the problem of establishing temporal and cultural affiliations for the Kett Site is concerned, projectile points provided the single most important source of information.

Projectile Points. A total of 114 projectile points and point fragments were recovered from the eleven test pits, including four additional specimens from the 20-70 centimeter level of Unit 4, bringing the total number to 118. Tables 3 and 4 provide provenience data for the various forms recovered, which are described below.

Type 1 Projectile Points. A total of 32 small triangular projectile points with developed tangs or barbs were recovered from the site (see Table 3). All of the specimens were produced from obsidian, all were characterized by extended barbs and contracting stems, and all but one exhibited ovate lateral borders. The specimens, which included 13 whole and 19 fragmentary but typable examples, average 1.78 cm in length, with a range from 1.50-3.20 cm; 1,49 cm in width, with a range from 1.10-1.93 cm; 0.276 cm in thickness, with a range from 0.20-0.38 cm; and an average weight of 0.63 grams, with a range from 0.3-1.6. The average depth occurrence of the type was 30.00 cm. All metric and provenience data are given in Table 5, and 8 of the 32 specimens are illustrated in Figure 2a-h.

Type 2 Projectile Points. A total of 52 small triangular projectile points with straight to slightly rounded shoulders and contracting stems were recovered from the site (see Tables 3 and 4). All of the specimens were produced from obsidian, and all were characterized by contracting stems, the lack of well-developed tangs, and straight to only slightly ovate lateral borders. The specimens, which include 37 whole and 15 fragmentary

but typable examples, average 1.96 cm in length, with a range from 1.27-3.57 cm; 1.43 cm in width, with a range from 1.00-2.04 cm; 0.32 cm in thickness, with a range from 0.18-0.58 cm; and an average weight of 0.6 grams, with a range from 0.2-1.3. The average depth occurrence of the type was 38.30 cm. All metric and provenience data are given within Table 6, and 8 of the 52 specimens are illustrated in Figure 2i-p.

Discussion of Types 1 and 2. The two groups of projectile points here distinguished as Types 1 and 2 are morphologically quite similar (Compare Tables 5 and 6). However, when all were placed together on the sorting table for examination, it became apparent that those specimens with tangs or barbs equal to or longer than stem length were also more often characterized by ovate as opposed to straight lateral borders. In most previous studies, this distinction was not thought to be significant, and points of this general size and shape (small, triangular, obsidian points with contracting stems and moderately- to well-developed tangs or barbs) have been classified together as "Gunther Barbed" specimens. At the same time, however, some researchers have observed that the type category was quite broad and perhaps too encompassing, and that the category may actually be lumping together forms which might have separate temporal and/or cultural significance. For example, Johnson and Skjelstad (1974) have opted to restrict the Gunther Barbed designation to only those projectile points characterized by well-developed tangs which were as long as or longer than the stem, although these authors were unable to document that the type so designated was anything more than morphologically distinguishable from other small triangular points with contracting stems.

In the present study the decision was made to attempt to determine whether or not the distinction between those with and those without well-developed tangs and convex lateral borders was culturally (i.e., temporally and/or functionally) significant.

As noted in the type descriptions presented above, the two types were characterized by different average depth occurrences. The average depth of Type 1 was 30.00 cm within the Kett Site deposit, while the average depth of Type 2 was 38.30 cm. In comparing these two sample means, the question arose as to whether the difference could be due to a real difference between the two populations in terms of their occurrence within the cultural deposit, or whether the disparity should be attributed to chance alone. Indeed, the depth difference between the two "types" was not overwhelming, yet the sample sizes were adequate for attempting to assess whether the two populations did in fact represent different time periods of deposition. The method selected to attempt to resolve the problem was to define an appropriate expression of the t-ratio to test for a significant difference between two sample means.

The first problem was to estimate unknown population variances. It was assumed that the two populations (Types 1 and 2) would have identical variances, so that we could subsequently argue that any discrepancy which might be found between the samples related only to differences in central tendency rather than differences in shape of the distribution of variates about the mean. This seemed a reasonable assumption in this case, since the two items being compared were both functionally-equivalent artifact classes whose histories of appearance, growth, and eventual disappearance at the site might be expected to have been the same.

Having assumed the population variance for Type 1 and 2 to be equal, the deviations about the respective sample means could then be combined. In other words, the variances were pooled into one single, best estimate of population variance using the formula

$$S_p = \sqrt{\frac{(X_i - \bar{X})^2 + (Y_i - \bar{Y})^2}{n_x + n_y - 2}}$$

Inserting the data for projectile point Types 1 and 2, we may calculate the pooled estimate of the standard deviation (S_p) as follows

$$S_p = \sqrt{\frac{8000 + 19077}{32 + 50 - 2}} = \sqrt{338.46} = \underline{18.397}$$

Having estimated total variability, the appropriate expression of the t-ratio test for a difference between two samples is

$$t = \frac{(\bar{X} - \bar{Y}) - \mu_{\bar{x} - \bar{y}}}{S_{\bar{x} - \bar{y}}}$$

with $df = n_x + n_y - 2$. In this expression,

$$S_{\bar{x} - \bar{y}} = \frac{S_p^2}{n_x} + \frac{S_p^2}{n_y}$$

We can thus statistically assess the difference between the two sample means. $S_{\bar{x} - \bar{y}}$ is found in the two types to be

$$S_{\bar{x}} = \sqrt{\frac{18.397}{32}} = \sqrt{0.5749} \qquad S_{\bar{y}} = \sqrt{\frac{18.397}{50}} = \sqrt{0.3679}$$

$$S_{\bar{x} - \bar{y}} = \sqrt{.5749 + .3679} = \sqrt{.9428}$$

The value of "t" in the comparison is thus

$$t = \frac{8.3 - 0}{.9709} = \underline{8.549}$$

with df = 32 + 50 - 2. The observed "t" is highly significant since $t_{0.01} = 2.641$ with 80 degrees of freedom. Hence, the test allows rejection of H_o which in this case was that the difference in sample means was the product of chance alone. It therefore appears that the attributes which define the two projectile point types have stratigraphic significance and we can thus assume must have temporal significance as well at this site.

Table 5: Metric and Provenience Data for Type 1 Projectile Points.

Specimen #	Length	Width	Thickness	Wt.	Provenience
Whole Specimens					
175-4 (2a)	1.71	1.78	0.25	0.4	Unit 1, 0-20
-35	1.78	1.55	0.28	0.7	Unit 1, 40-50
-124	1.90	1.34	0.20	0.5	Unit 3, 20-30
-144	1.60	1.38	0.29	0.5	Unit 3, 40-50
-153 (2c)	1.86	1.27	0.35	0.4	Unit 3, 50-60
-176 (2h)	3.20	1.93	0.32	1.4	Unit 5, 0-20
-177 (2e)	1.50	1.17	0.24	0.4	Unit 5, 0-20
-269 (2b)	1.74	1.36	0.25	0.4	Unit 7, 30-40
-277	1.55	1.80	0.28	0.3	Unit 7, 40-50
-309	1.60	1.60	0.26	0.6	Unit 8, 30-40
-361 (2f)	1.58	1.69	0.29	0.7	Unit 10,10-20
-372 (2g)	2.10	1.39	0.38	1.6	Unit 10,20-30
-411 (2d)	2.09	1.11	0.20	0.3	Unit 10,50-60
Stems Missing					
175-1	2.40	1.45	0.65	0.8	Unit 1, 0-20
-87	1.70	1.63	0.31	0.4	Unit 2, 30-40
-112	1.76	1.44	0.22	0.7	Unit 3, 0-20
-270	1.96	2.15	0.35	1.1	Unit 7, 30-40
-456	1.83	1.89	0.36	0.6	Unit 11,40-50
Tip and/or Tang Missing					
175-3	1.81	1.45	0.29	0.5	Unit 1, 0-20
-7	2.62	1.62	0.43	1.1	Unit 1, 0-20
-154	1.18	1.75	0.25	0.6	Unit 3, 50-60
-22	1.70	1.62	0.30	0.7	Unit 6, 30-40
-317	1.82	1.64	0.27	0.8	Unit 8, 40-50
-373	1.63	1.52	0.26	0.5	Unit 10,20-30
-500	1.60	1.50	0.34	0.6	Unit 4, 20-30
Broken Down Centerline, but Typable					
175-56	1.50	1.54	0.31	0.4	Unit 1, 60-70
-97	1.10	0.50	0.30	0.3	Unit 2, 20-30
-98	0.96	1.19	0.46	0.2	Unit 2, 20-30
-125	1.99	0.88	0.33	0.6	Unit 3, 20-30
-126	2.95	0.73	0.34	0.7	Unit 3, 20-30
-356	1.67	0.96	-.38	0.6	Unit 10, 0-20
-451	1.97	1.80	0.25	0.5	Unit 11,30-40

( )* denotes appropriate figure for illustrated specimen.

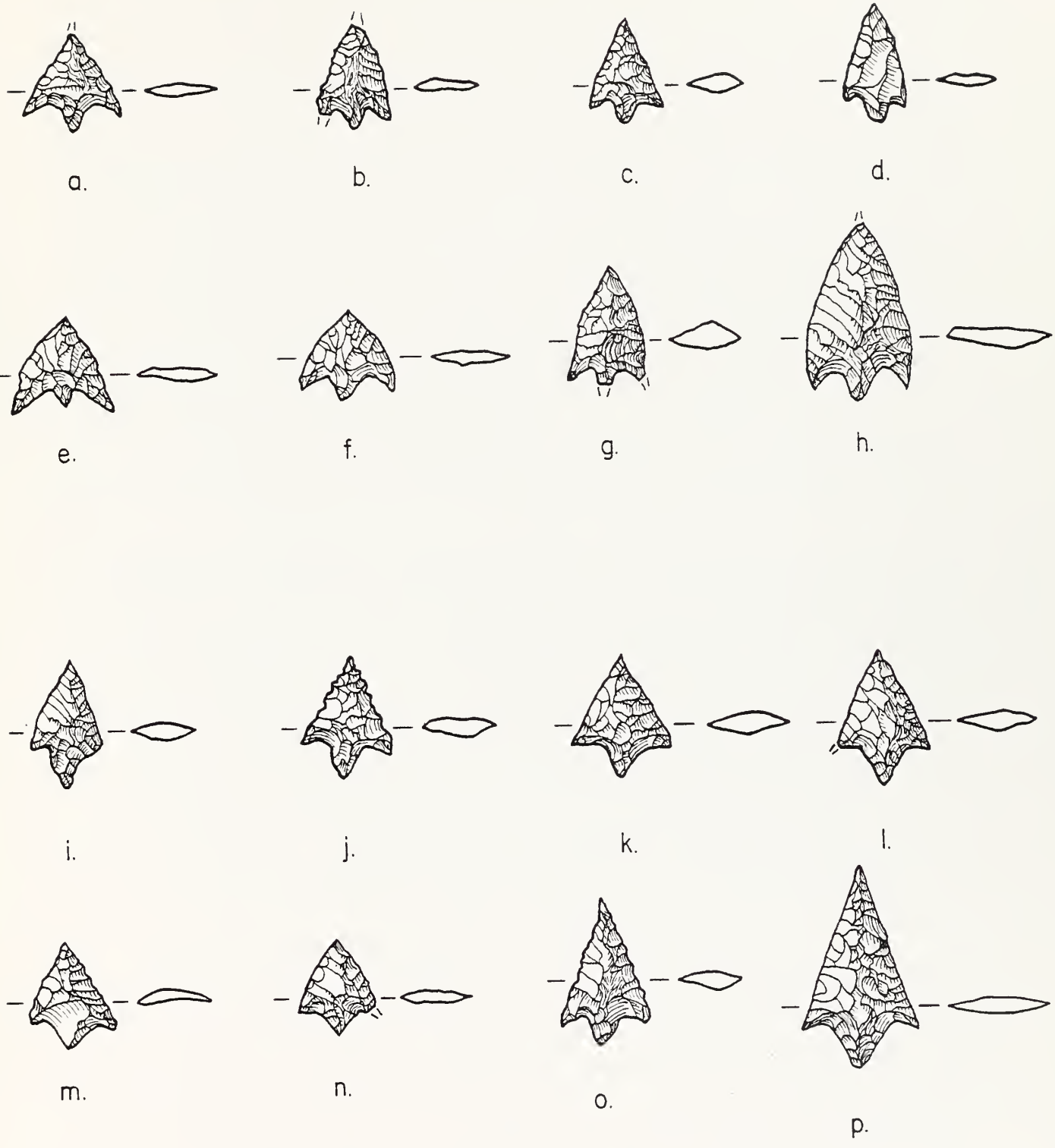
Table 6: Metric and Provenience Data for Type 2 Projectile Points.

Specimen #	Length	Width	Thickness	Wt.	Provenience
Whole Specimens					
175-2	2.30	1.00	0.30	0.6	Unit 1, 0-20
-5	1.60	1.10	0.18	0.3	Unit 1, 0-20
-6	2.00	1.50	0.33	0.7	Unit 1, 40-50
-44 (2i)	2.30	1.29	0.30	0.5	Unit 1, 50-60
-54 (2k)	2.21	1.73	0.36	0.7	Unit 1, 60-70
-68	2.21	1.67	0.35	0.7	Unit 1, 70-80
-85 (2o)	2.55	1.53	0.33	0.8	Unit 2, 0-20
-86	1.80	1.30	0.20	0.2	Unit 2, 0-20
-88 (2n)	1.67	1.70	0.25	0.3	Unit 2, 0-20
-111	2.00	1.59	0.46	0.3	Unit 2, 20-30
-113	1.96	1.39	0.40	0.8	Unit 3, 0-20
-164 (2p)	3.57	2.04	0.25	1.3	Unit 3, 60-70
-178	1.90	1.00	0.25	0.6	Unit 5, 0-20
-195	1.52	1.11	0.24	0.4	Unit 5, 40-50
-196	1.66	1.50	0.30	0.6	Unit 5, 40-50
-197	2.23	1.10	0.37	1.0	Unit 5, 40-50
-212	2.00	1.47	0.30	0.5	Unit 6, 20-30
-227	2.09	1.37	0.40	0.8	Unit 6, 40-50
-237	1.70	1.66	0.27	0.8	Unit 6, 50-60
-268	2.00	1.35	0.30	0.4	Unit 7, 30-40
-286 (2l)	2.40	1.70	0.34	0.9	Unit 7, 50-60
-344	2.07	1.08	0.33	0.6	Unit 9, 40-50
-353	1.55	1.40	0.35	0.6	Unit 10, 0-20
-374	1.77	1.03	0.30	0.4	Unit 10,20-30
-422 (2j)	2.19	1.65	0.38	0.8	Unit 10,60-70
-431	1.71	1.49	0.40	0.5	Unit 11, 0-20
-450	1.90	1.36	0.29	0.5	Unit 11,30-40
-457	1.50	1.33	0.22	0.3	Unit 11,40-50
-460	1.90	1.48	0.35	0.4	Unit 11,40-50
-464 (2m)	1.83	1.58	0.28	0.5	Unit 11,50-60
-465	2.19	1.45	0.26	0.5	Unit 11,50-60
-482	1.27	1.20	0.26	0.2	Unit 11,60-70
-491	1.62	1.81	0.41	0.6	Unit 4, 0-20
-510	1.83	1.65	0.31	0.4	Unit 4, 20-30
-541	1.72	1.67	0.58	1.2	Unit 4, 60-70
-546	1.89	1.52	0.31	1.0	Unit 4, 20-70
-549	2.04	1.14	0.33	0.7	Unit 4, 20-70

( )* denotes appropriate figure for illustrated specimen.

Tips and/or Stems Missing					
175-45	1.59	1.33	0.33	0.6	Unit 1, 50-60
-55	1.76	1.76	0.38	0.8	Unit 1, 60-70
-89	1.77	1.56	0.27	0.6	Unit 2, 30-40
-135	1.80	1.10	0.27	0.4	Unit 3, 30-40
-145	1.72	1.26	0.25	0.6	Unit 3, 40-50
-267	1.44	1.17	0.46	0.8	Unit 7, 30-40
-326	0.90	1.20	0.20	0.8	Unit 1, 80-90
-347	2.50	1.76	0.30	1.1	Unit 9, 40-50
-394	1.85	1.23	0.35	0.7	Unit 10,30-40
-396	1.27	1.10	0.23	0.8	Unit 10,30-40
-398	1.08	1.37	0.32	0.4	Unit 10,30-40
-410	2.11	1.36	0.36	0.7	Unit 10,50-60
-513	1.90	1.78	0.50	0.7	Unit 4, 30-40
-522	0.97	1.38	0.25	0.3	Unit 4, 30-40
-523	1.50	0.74	0.50	0.4	Unit 4, 40-50

FIGURE 2.



Type 3 Projectile Points. A total of 7 small, triangular corner-notched projectile points were classified as Type 3. The specimens were all produced from obsidian, all were characterized by straight to slightly concave lateral borders, and all possessed a straight stem with convex to straight base. However, the group of 7 specimens also exhibited some internal variation so that the decision was made to segregate the type into two sub-types, Types 3a and 3b. The essential difference between the two subtypes is exhibited in the angle formed between the stem and the shoulders or sides of the artifacts. In Type 3a specimens (Figure 3a-c), the angle so formed is approximately 90 degrees, while in Type 3b specimens (Figure 3d-g) the angle so formed is less than 90 degrees, the corner notches being quite deep and thus forming straight barbs or tangs similar to those characteristic of Type 2 projectile points. All metric and provenience data for these specimens is given in Table 7. Since the sample sizes were so small, no attempt was made to formally assess the significance of the difference in depth occurrence of the two sub-types, although it should be noted that the mean depth of Type 3a is 25 cm (calculated by excluding the one specimen recovered from the 20-70 cm level of Unit 4) while the mean depth of Type 3b is 40 cm.

Type 4 Projectile Points. A total of 3 corner-notched, contracting stem projectile points of obsidian were classified as Type 4. The basal treatment of these specimens was similar to that characteristic of Type 2 specimens in being characterized by contracting stems with moderately-developed tangs or barbs. However, Type 4 specimens are much longer in relation to their width than Type 2 specimens, and the two lateral borders of the blade are concave at the distal end but become convex toward the center of the blade, thus forming compound curves along each side of the artifact. Similar artifacts were recovered by Leonhardy at the Iron Gate site on the Klamath River in Trinity County (Leonhardy 1967: Figure 10: qq, rr, ss, tt, Types 3A,B,C,D). Metric and provenience data for the type are given within Table 7, and the three recovered specimens illustrated in Figure 3h-j.

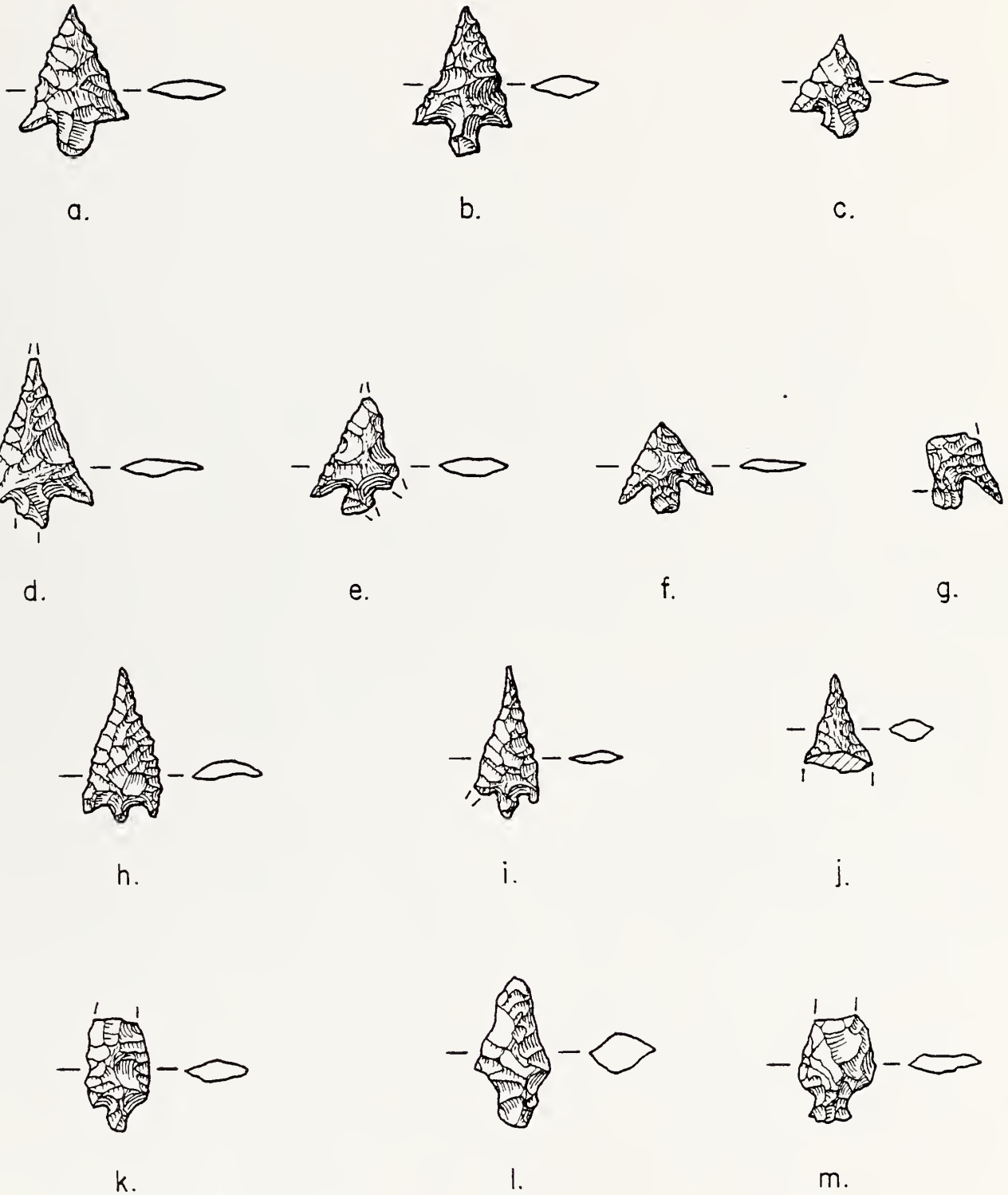
Type 5 Projectile Points. A total of 3 stemmed projectile points with rounded shoulders and straight to slightly expanding stems were classified as Type 5. All three specimens were produced from obsidian, although the three also exhibited variable treatment with regard to blade configuration and stem form. The sample size is so small that combining the three into a single type may not yield useful data. Nevertheless, all three were found below 30 centimeters, with the average depth occurrence being slightly more than 48 centimeters. Metric and provenience data for the specimens is given in Table 7, and all three are illustrated in Figure 3k-m.

Table 7: Metric and Provenience Data for Projectile Point Types 3-5.

Specimen #	Length	Width	Thickness	Wt.(g)	Provenience
Type 3a					
175-187 (3a)*	2.46	1.73	0.30	0.5	Unit 5, 20-30
-300 (3b)	2.48	1.47	0.35	1.2	Unit 8, 20-30
-551 (3c)	1.75	1.28	0.24	0.5	Unit 4, 20-70
Type 3b					
175-220 (3d)	2.10	1.10	0.30	0.8	Unit 6, 30-40
-393 (3f)	1.49	1.64	0.23	0.4	Unit 10, 30-40
-479 (3e)	1.90	1.50	0.30	0.5	Unit 11, 60-70
-501 (3g)	1.15	1.05	0.32	0.3	Unit 4, 20-30
Type 4					
175-213 (3j)	1.47	1.14	0.30	0.3	Unit 6, 20-30
-490 (3i)	2.47	1.10	0.27	0.3	Unit 4, 0-20
-548 (3h)	2.55	1.24	0.29	0.7	Unit 4, 20-30
Type 5					
175-229 (3m)	1.73	1.16	0.30	0.7	Unit 6, 40-50
-308 (3k)	1.81	1.20	0.39	0.9	Unit 8, 30-40
-478 (3l)	2.48	1.25	0.60	1.3	Unit 11, 60-70

( )* denotes appropriate figure for illustrated specimen.

FIGURE 3.



Type 6 Projectile Points. Two triangular-shaped, stemmed projectile points were recovered within the initial 20 centimeters of deposit and classified as Type 6. Both specimens were produced from obsidian, both exhibited slightly convex lateral borders, and both exhibited thick, expanding stems with straight bases. Metric and provenience data are given in Table 8, and the two specimens are illustrated in Figure 4a-b.

Type 7 Projectile Points. Two projectile points classified as Type 7 were recovered within the 30-40 cm level of Units 8 and 11. Both were triangular in shape, possessed well-defined corner notches and exhibited straight to slightly convex lateral borders. Metric and provenience data are given in Table 8, and the two artifacts are illustrated in Figure 4c-d.

Type 8 Projectile Points. A total of four unstemmed leaf-shaped projectile points of obsidian were recovered from the site and classified as Type 8. All four exhibited convex lateral borders, while three possessed rounded bases and one a pointed base. Metric and provenience data are given in Table 8, and the four specimens are illustrated in Figure 4e-h.

Untypable Projectile Point Tip Fragments. A total of 14 projectile point tip fragments, all of obsidian, were recovered from the site. The fragments could represent a number of the point types described above, so that no attempt was made to classify any of them as to "type." All appear to represent the distal 1/3 to 1/2 of the original artifact from which they were broken. Metric data for these fragments as well as provenience are summarized in Table 8.

Drills. A total of 5 artifacts of obsidian appear to have functioned as drills and/or punches. Since at least three of the five specimens appear to have been produced from stemmed projectile points from which the tip had been removed, the decision was made to discuss these artifacts in conjunction with the discussion of projectile points. The three specimens which appear to have been produced by modifying projectile points are illustrated in Figure 4k-m. The functional bit was produced by extending the depth of the corner notches followed by thinning and sharpening the stem itself, thereby producing a tool useful for perforating a material such as leather.

One of the four specimens classified as a "drill" (Figure 4j) was manufactured from a thin obsidian flake. The beak or projection on this tool measures nearly 1 cm in length, although the tip appears to have been broken. The final specimen classified as a drill (Figure 4i) consists of the bit only. This portion of the tool was a long, slender shaft of obsidian which had been carefully pressure-flaked along its entire length. Glazing and polish on the distal end of the artifact indicate that the specimen may have been hafted and used to perforate resistant material such as bone. None of the other four speci-

mens exhibited the polishing evident on Figure 4i, nor is there other evidence that any of the other four specimens was hafted.

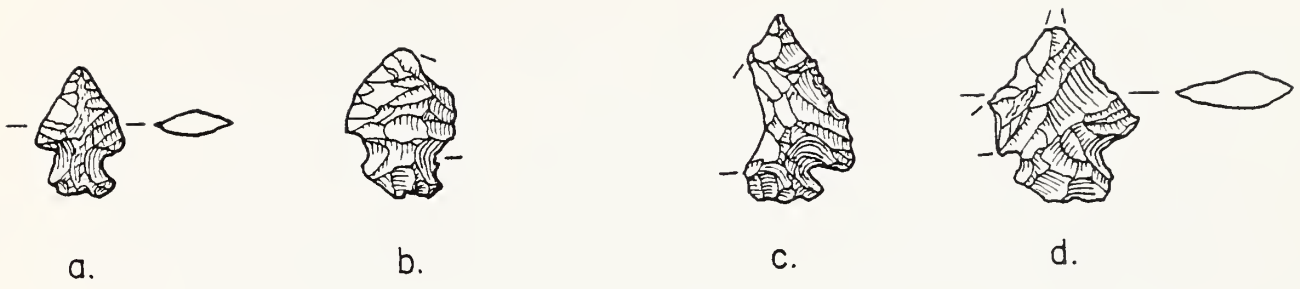
All metric and provenience data for the five artifacts classified as drills are given in Table 8.

Table 8: Metric and Provenience Data, Projectile Point Types 6-8, Unclassified Point Tips, and Drills.

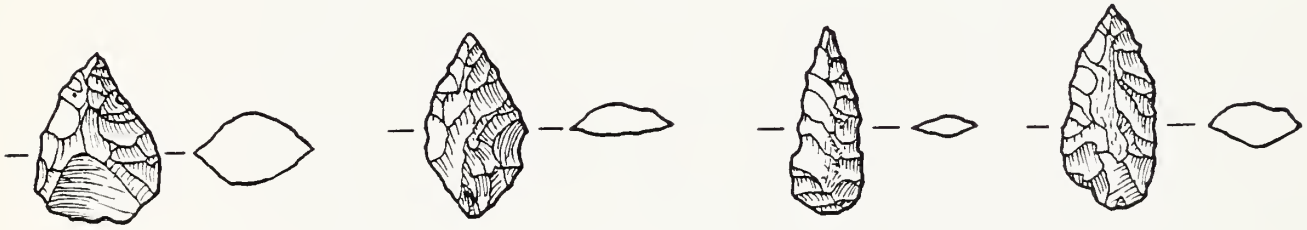
Specimen #	Length	Width	Thickness	Wt.(g)	Provenience
Type 6					
175-110 (4a)	1.60	1.10	0.31	0.5	Unit 3, 0-20
-363 (4b)	2.00	1.51	0.45	1.3	Unit 10, 0-20
Type 7					
175-307 (4d)	2.35	1.96	0.44	1.9	Unit 8, 30-40
-449 (4c)	2.47	1.50	0.29	0.6	Unit 11, 30-40
Type 8					
175-221 (4g)	2.50	1.05	0.27	0.7	Unit 6, 30-40
-228 (4h)	2.21	1.37	0.55	1.8	Unit 6, 40-50
-259 (4e)	1.60	1.67	0.88	3.0	Unit 7, 20-30
-363 (4f)	2.47	1.45	0.46	1.5	Unit 10, 0-20
Unclassified Point Tips					
175-80	1.40	0.98	0.24	0.2	Unit 1, 90-100
-114	2.05	1.80	0.30	0.8	Unit 3, 0-20
-127	1.10	0.84	0.25	0.4	Unit 3, 20-30
-238	1.40	1.58	0.30	0.8	Unit 6, 50-60
-261	0.70	0.43	0.18	0.2	Unit 7, 20-30
-301	2.20	1.13	0.57	1.4	Unit 8, 20-30
-339	2.08	1.36	0.43	1.1	Unit 9, 20-30
-395	1.28	1.27	0.26	0.4	Unit 10, 30-40
-397	1.80	1.26	0.24	0.5	Unit 10, 30-40
-480	1.52	1.25	0.26	0.2	Unit 11, 60-70
-481	1.48	1.13	0.26	0.2	Unit 11, 60-70
-511	0.95	0.55	0.17	0.1	Unit 4, 30-40
-514	3.05	2.13	0.52	2.6	Unit 4, 30-40
-524	0.96	0.60	0.29	0.1	Unit 4, 40-50
Drills					
175-188 (4m)	1.40	1.30	0.27	0.30	Unit 5, 20-30
-245 (4i)	3.00	0.96	0.40	0.90	Unit 6, 70-80
-365 (4j)	2.19	1.90	0.43	1.10	Unit 10, 30-40
-512 (4l)	1.43	1.40	0.25	0.30	Unit 4, 30-40
-550 (4k)	1.36	1.35	0.29	0.70	Unit 4, 20-70

( )* denotes appropriate figure for illustrated specimen.

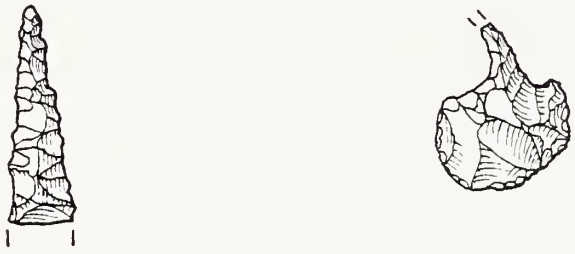
FIGURE 4.



a. b. c. d.

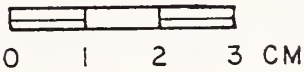


e. f. g. h.



i. j.

k. l. m.



Cores. Eleven cores, all of basalt, were recovered from Units 1, 3, 10 and 11 (see Table 9 for all metric and provenience data and Figure 5 for illustrations of two specimens). Most of the specimens tend to be circular in plan view, although they are too thin to be considered spherical in shape (see metric data in Table 9). All are characterized by the removal of flakes from between 50 to 75% of the surface area. At least four specimens (#'s 175-46, -60, -136, -470) represent large tabular flakes, the inner surface of which served as the striking platform for removal of small thin flakes which were presumably used as implements themselves or which may have been further modified into artifacts.

Scrapers. A total of five lithic specimens were classified as scrapers. All were produced from relatively thick basalt flakes similar to the tabular core illustrated in Figure 5 (Specimen #175-470). However, unlike the basalt cores, the implements classified as scrapers were not subjected to substantial flake removal, but rather appear to have functioned as completed tools themselves. All of these artifacts exhibited retouch as well as small use flakes having been removed from a portion of the perimeter of the artifact, thereby producing a working edge angle of between 30-60 degrees between the flat inner surface of the flake and the flake's retouched margin. One specimen (Figure 5, #175-565) may have functioned as a knife, although examination of the working edge of the implement did not reveal clear evidence of use striations paralleling the long axis of the artifact. Metric and provenience data for the five artifacts classified as scrapers is given within Table 9.

Hammerstones. A total of 7 lithic specimens exhibited evidence of battering resulting from use as hammerstones, most likely in conjunction with lithic manufacture. Four of the specimens were basalt, and the remaining three (#'s 175-276, -487, -528) were granite. The specimens varied in shape from nearly spherical stream cobbles to elongated, thick flakes struck from basalt cores. However, none of the specimens appear to have served any function other than having been used once of twice as hammerstones. Weights and provenience data for the seven specimens are given in Table 9.

Worked Flakes. A total of 12 obsidian flakes were classified as worked flakes, 10 of which were recovered from the levels within the eleven test pits, and 2 of which were recovered from Feature 3 (20-70 cm level of Unit 4). All of the specimens were small, with none weighing more than 5 grams. Although the specimens were represented by irregular shapes, all exhibited evidence of having been purposefully retouched along a portion of the artifact's perimeter in order to produce a useful cutting and/or scraping edge.

Provenience data for the 12 specimens is given in Tables 3 and 4.

Utilized Flakes. A total of 7 flakes of obsidian exhibited small use flakes having been removed from a portion of the periphery of the artifact. None exhibited purposeful pressure flaking in order to modify the working edge of the artifact or to shape the specimen. Although roughly equivalent in size, the shapes of the specimens was variable, indicating that the artifact was simply selected from available waste flakes of obsidian primarily on the basis of overall size, used once or twice for cutting or perhaps scraping, and then discarded. The largest of the specimens weighed 4.7 grams, the smallest 1.8 grams. Provenience data for the seven specimens is provided in Table 3.

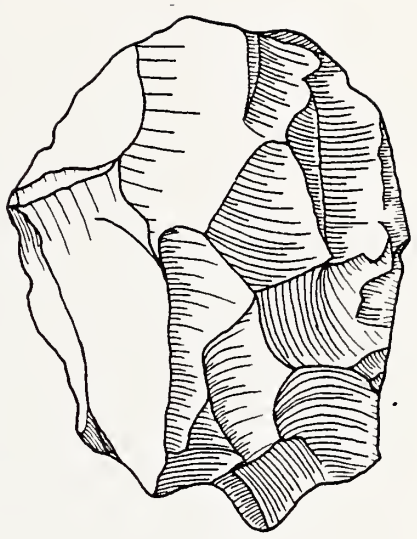
Table 9: Metric and Provenience Data for Cores, Scrapers and Hammerstones.

Specimen #	Length	Width	Thickness	Wt (g)	Provenience
Cores					
175-46 (5)	7.20	7.04	3.20	169.2	Unit 1, 50-60
-58	8.83	7.74	4.21	340.0	Unit 1, 60-70
-59	8.12	5.00	3.56	141.0	Unit 1, 60-70
-60	5.00	4.41	2.94	66.0	Unit 1, 60-70
-61	7.00	5.72	2.67	125.0	Unit 1, 60-70
-73	5.83	4.90	3.20	68.2	Unit 1, 70-80
-74	4.35	2.14	1.22	20.0	Unit 1, 70-80
-136	3.40	1.50	2.30	50.3	Unit 3, 30-40
-391	5.63	5.03	1.89	75.0	Unit 10, 30-40
-470 (5)	10.13	8.67	4.79	416.4	Unit 11, 50-60
-475	7.29	6.00	2.70	110.4	Unit 11, 50-60
Scrapers					
175-71 (5)	10.12	7.37	1.30	107.4	Unit 1, 70-80
-72	4.07	2.64	0.82	11.1	Unit 1, 70-80
-476	6.80	4.20	1.57	36.1	Unit 11, 50-60
-545	7.88	4.63	2.50	122.3	Unit 4, 20-70
-565(5)	11.90	4.37	1.74	105.8	Unit 4, 20-70
Hammerstones					
175-276	-	-	-	425.30	Unit 7, 30-40
-319	-	-	-	149.60	Unit 8, 40-50
-337	-	-	-	160.50	Unit 9, 0-20
-443	-	-	-	170.00	Unit 11, 20-30
-469	-	-	-	160.90	Unit 11, 50-60
-487	-	-	-	144.70	Unit 11, 60-70
-528	-	-	-	118.40	Unit 4, 40-50

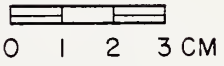
( )* denotes appropriate figure for illustrated specimen

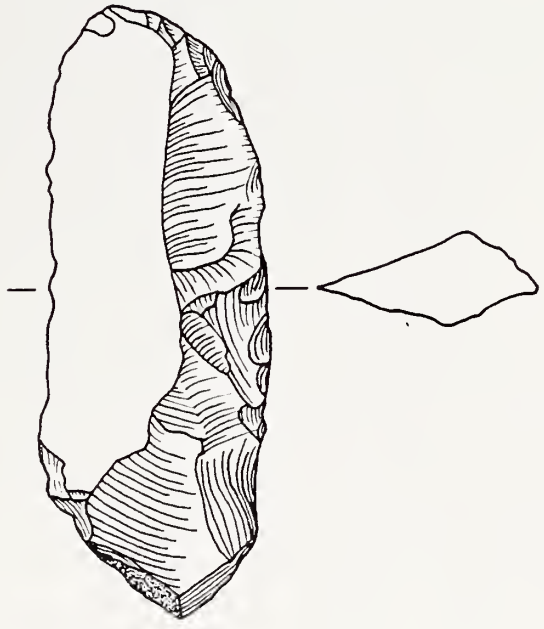
FIGURE 5.

175-46



175-470





175-565

175-71

Waste Flakes. The Kett Site produced a total of 5473 waste flakes, including 4024 flakes of obsidian (73.5% of the total of waste flakes), 1209 flakes of basalt (22.1%), 109 of chert (2.0%), and 131 of quartz (2.4%). The frequency of occurrence of the waste flakes parallels the depth distribution of other items within the site deposit. That is, the percentage of cultural material occurring at a given depth and the cumulative percentage of cultural material with increasing depth is closely approximated by the percentage occurrence for obsidian, basalt, chert and quartz flakes, although the latter present the most divergence for the first three levels of deposit (see Table 10).

Table 10: Comparison of the Depth Distribution of Waste Flakes with the Totality of Cultural Material from the Site.

	0-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
All Cultural Material from Site									
% per level	18.9	15.7	21.0	17.0	12.7	10.1	2.8	1.5	0.3
Cumulative %	18.9	34.6	55.6	72.6	85.3	95.4	98.2	99.7	100.0
Obsidian Waste									
% per level	18.5	15.8	21.1	17.3	12.5	10.5	2.7	1.4	0.2
Cumulative %	18.5	34.3	55.4	72.7	85.2	95.7	98.4	99.8	100.0
Basalt Waste									
% per level	17.9	14.9	20.4	15.9	13.8	10.7	3.4	2.2	0.8
Cumulative	17.9	32.8	53.2	69.1	82.9	93.6	97.0	99.2	100.0
Chert Waste									
% per level	24.0	8.7	10.6	19.2	16.3	14.4	5.8	1.0	0.0
Cumulative	24.0	32.7	43.3	62.5	78.8	93.2	99.0	100.0	0.0
Quartz									
% per level	2.7	16.4	41.8	3.6	13.6	8.2	3.6	5.5	4.6
Cumulative	2.7	19.1	60.9	64.5	78.1	86.3	89.9	95.4	100.0

Ground Stone Artifacts. Ground stone artifacts are represented by manos, pestles and a single millingstone/mortar. Excluding aboriginal waste flakes, historic items and organic materials, ground stone implements represent 11.17% of the aboriginal artifacts recovered from the site.

Pestles are represented by 6 specimens, and although the six were fragmentary, they all appear to represent the hopper pestle type with circular to ovoid cross-sections and flat grinding surfaces. Three of the specimens are illustrated in Figure 6, and metric and provenience data for all six specimens are given in Table 11.

Manos are represented by 18 fragments. The two illustrated specimens (Figure 6, #'s 175-375 and -444) were the most complete of the 18 specimens recovered, and as can be seen in the illustration, specimen #175-444 includes slightly more than half of the original artifact while #175-375 includes roughly 1/4 of the original specimen. Most of the fragments appear to have resulted from heat-fracturing, with such fracturing also being visible on the two illustrated examples. Although quite fragmentary, all of the specimens recovered appear to have been ovoid in shape when whole and to have been utilized only lightly on one surface only. Metric and provenience data for the 18 artifacts are given in Table 11.

Millingstones/mortars were represented by a single example recovered from the 40-50 cm level of Unit 5. The artifact was produced from a dense meta-volcanic rock, and exhibits shallow, ovoid concavity within the central portion of the artifact as well as a more developed mortar-like circular depression within this larger area, thus indicating that the artifact most likely functioned as a hopper mortar (Figure 7). The specimen was recovered within a concentration of unmodified rocks and associated with uncharred pine tree limbs. Because of these associations, the entire concentration of rocks, including the pine limbs and the millingstone/mortar, was recorded as Feature 2 during excavation. However, upon completion of excavation of the Unit and examination of the configuration of the entire complex of rocks, limbs and artifact, it was determined that the most likely explanation for the association was as the product of historic road grading, an activity which resulted in a casual association of the artifact with the other materials along the lower lip of the dirt road which currently cuts through this portion of the site (see Map 2, Site Map, for the relationship of Unit 5 and the dirt road noted).

In any case, this artifact is a late type in northern California prehistory, and lends support to the other datable artifacts recovered from the site which together suggest a relatively late period of prehistoric occupation, an hypotheses which is more clearly outlined in the concluding section of this report.

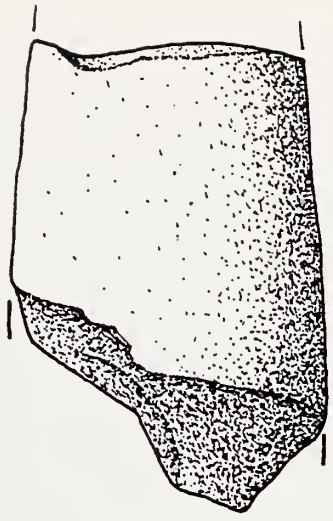
Table 11: Metric and Provenience Data for Pestles and Manos.

Specimen #	Length	Width	Thickness	Wt (g)	Provenience
Pestles and Pestle Fragments					
175-27	-	4.40	3.53	248.50	Unit 1, 30-40
-57 (6)	-	7.51	6.30	716.50	Unit 1, 60-70
-189	-	6.10	5.54	500.35	Unit 5, 20-30
-201 (6)	-	5.00	5.01	541.40	Unit 5, 50-60
-230	-	5.12	3.17	375.70	Unit 6, 40-50
-430 (6)	-	5.80	5.30	516.60	Unit 10, 60-70
Manos and Mano Fragments					
175-105	-	8.34	4.93	230.3	Unit 3, 0-20
-115	-	-	3.60	169.3	Unit 3, 0-20
-132	-	-	-	115.0	Unit 3, 20-30
-137	-	-	4.59	204.2	Unit 3, 30-40
-147	-	-	3.47	172.6	Unit 3, 40-50
-148	-	9.66	3.60	188.4	Unit 3, 40-50
-165	-	9.50	4.57	303.6	Unit 3, 60-70
-246	-	-	3.06	53.3	Unit 6, 70-80
-304	-	-	-	140.0	Unit 8, 20-30
-375 (6)	-	-	5.19	356.5	Unit 10, 20-30
-392	-	-	-	162.1	Unit 10, 30-40
-401	-	-	-	100.3	Unit 10, 40-50
-402	-	-	-	194.2	Unit 10, 40-50
-421	-	-	-	214.8	Unit 10, 50-60
-444 (6)	-	8.98	5.98	579.3	Unit 11, 20-30
-455	-	9.20	5.01	351.0	Unit 11, 30-40
-468	-	-	-	159.1	Unit 11, 50-60
-489	-	-	-	84.8	Unit 11, 60-70

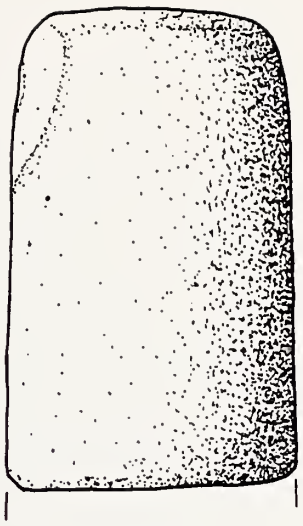
- = incomplete dimension, hence no measurement taken

( )* denotes appropriate figure for illustrated specimen

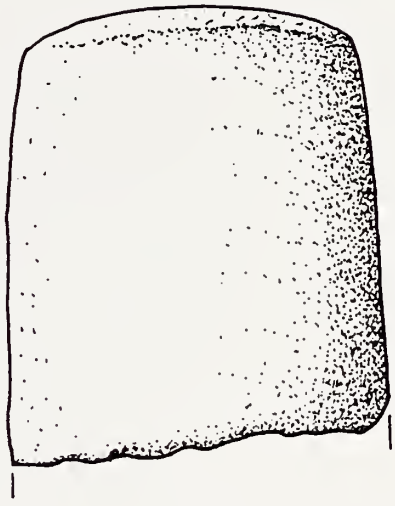
FIGURE 6.



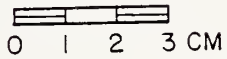
175-201

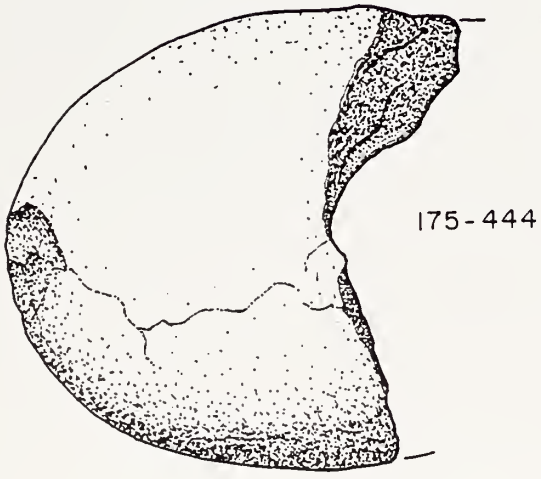


175-430

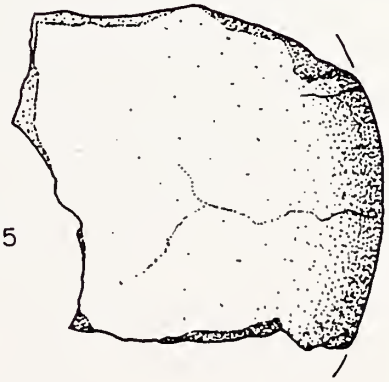


175-57



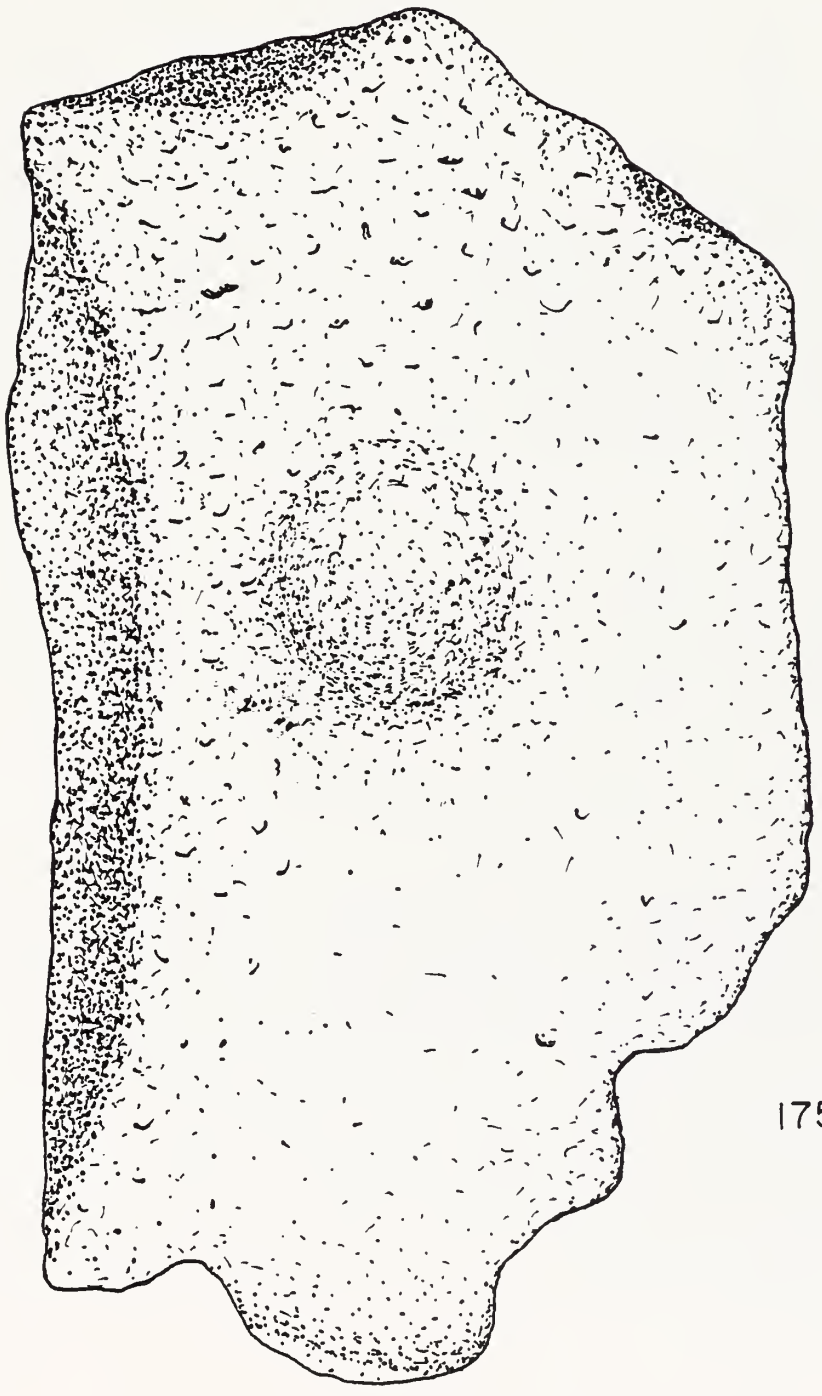


175-444

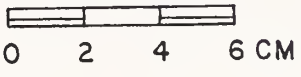


175-375

FIGURE 7.



175-529



Beads. A total of 23 glass trade beads were recovered from the site (see Tables 3 and 4). All of the specimens were of the same type of small, cylindrical glass beads which were introduced historically into this part of California. None of the specimens appeared oxidized or otherwise burned, although two were red to orange in color while the remaining 21 specimens were white. Eleven of the beads were recovered from the 20-70 centimeter level of Unit 4 (the suspected burial pit, recorded as Feature 3), while ten of the remaining eleven specimens were recovered from Unit 10. As it turned out, both Units 4 and 10 were situated adjacent to the heavily disturbed area near the center of the site at which Hullinger removed a number of burials, all associated with historic items including glass beads identical to those recovered during the present project. It seems reasonable to suggest,therefore, that these beads are not generally distributed within the midden at the site, but rather are most likely associated with the burials which, as will be argued below, represent a separate and later re-use of the site by descendants of the site's original occupants. Specimen #175-558 is illustrated below.

5:1

175-558

Ochre. In addition to the beads, quantities of red mineral ochre were found throughout the deposit. Some of this material occurs naturally within this area, although it is clear that much of the substance was associated exclusively with the cultural deposit and hence must have been brought in by the aboriginal occupants in prehistoric times. Since the material was found in most of the test pits, and not localized, as were the beads, within excavation units situated adjacent to the burial area, the conclusion is that the material may have been imported by the original occupants at the site rather than having been used exclusively by those who subsequently used the site as a cemetery. Provenience data for the total of 199.2 grams of ochre recovered is provided in Tables 3 and 4.

Historic Artifacts

A total of 48 items which date to the historic period were recovered from the site. Unidentifyable pieces of glass and corroded metal total 41 specimens, or approximately 85% of the total historic items recovered. The remaining items include one contemporary bottle cap recovered from the 0-20 cm level, two .22 calibre brass shell casings also recovered from the initial 20 cm of deposit, and three white porcelain buttons recovered from Feature 3 (20-70 cm of Unit 4).

Prior to fieldwork for the present project, it had been hypothesized that the site may well contain a significant historic component (see Research Objectives section, above). This hypothesis was based primarily on the results of the earlier excavations by Hullinger during which a number of historic items had been recovered in association with aboriginal burials. However, the results of the project undertaken here suggest a different situation, as follows.

The single bottle cap and the two .22 calibre shell casings clearly represent quite recent deposition and appear to be totally unrelated to any aboriginal occupation of the site. The three buttons, on the other hand, are apparently associated with the historic beads recovered from Feature 3, a suspected burial pit which, incidentally, didn't possess a clearly defined burial. This leaves a total of 41 miscellaneous fragments of iron and glass fragments. Of this total of 41 items, however, 22 (24%) were recovered from the initial 20 centimeters of deposit, while 27 (66%) were recovered from the initial 30 centimeters. Moreover, 34 (82%) of the total of 41 fragments of iron and glass were recovered from shallow depths within Units 3, 4, 5, 8 and 9. One thing which these five Units have in common is close proximity to heavily disturbed areas, particularly the dirt roads which pass through the site area; consequently, these locales represent likely spots for the accumulation of contemporary historic rubble deposited by casual passers-by and others who have visited the site in recent years. There is, in other words, virtually no evidence to support the notion that the midden at the Kett Site contains an historic component, and in fact the conclusion offered here is that the midden was deposited entirely during prehistoric times.

How, then, do we reconcile the occurrence of a number of historic artifacts (porcelain buttons and glass beads) associated with aboriginal burials with the hypothesis that the midden was deposited entirely in prehistoric times? The suggestion offered here is that all of the burials represent a re-use of the site as a cemetery by local Wintu Indians who knew of the site's existence from ascendants who had either occupied the site themselves in earlier times and/or whose own ascendants had occupied or knew of the site's existence. This conclusion con-

forms with information provided by Al Thomas who attended his own grandmother's funeral ceremony at this site sometime around 1920, although neither Al Thomas nor apparently did his grandmother live at or otherwise occupy the Kett SIte. This conclusion also conforms with ethnographic information available for the Wintu Indians generally, in which it is stressed that cemeteries were seldom if ever located at occupation sites but rather were usually located at least 100 yards distance from such locales.

Charcoal. Charcoal samples sufficient for C-14 assays were collected from a number of different levels of the site, although only a single sample was submitted for analysis due to cost and other considerations. Tables 3 and 4 identify the grams of charcoal collected from the various levels within the deposit, while Figure 8 (Feature 1) identifies the locale of the one sample submitted for analysis, the results of which are not yet available as of this writing.

Shell. Small quantities of freshwater mussel shell (most likely M. margaratifera) were encountered to a depth of 50 centimeters, as indicated within Table 3.

Nuts/Shells. Acorns and pine nut seeds, less than 5% of which were carbonized, were collected from all levels of the deposit to a maximum of 80 centimeters depth. However, most of these specimens appear to have been deposited by rodents currently inhabiting the site deposit.

Unidentified Bone Fragments. Small splinters of bone were collected from most levels of the deposit, although none of the specimens were large enough or possessed diagnostic articulatory surfaces which would allow accurate species identification. Some of this material undoubtedly represents aboriginal deposition, although it is also likely that some may have been deposited through the actions of domestic dogs and perhaps coyotes as well as owls and other predatory birds.

Human Bone. A total of four small fragments of human skull were recovered during the course of the project. All four pieces appear to represent a mature as opposed to juvenile individual, although little more can be said about the individual or individuals represented on the basis of the existing data. Two of the skull fragments were recovered from the 0-20 cm level of Unit 7, and together weigh 4.6 grams. These pieces most likely represent remains discarded to this area during the course of earlier excavations at the site by Hullinger and/or others. The remaining two specimens were found in the 30-40 cm level of Unit 11, and together weigh a total of 2.6 grams. The occurrence of these latter two specimens at this depth in an excavation unit located some distance from the main area

of burial concentration is somewhat more difficult to explain. However, small fragments of human bone and human teeth are not an uncommon occurrence within many aboriginal California sites, and we should also not discount the activities of rodents in transporting items within cultural deposits. In any case, Unit 11 was excavated to a maximum depth of 70 cm without encountering additional evidence of human burials or human remains.

Features

Three features were recorded during the course of the project. Feature 1 represents the largest of the house pit depressions at the site and about 25% of the pit was excavated by joining four separate 1m X 2m excavation units. Feature 2 has already been discussed above in relation to the occurrence of the hopper mortar recovered from Unit 5. It was originally thought that the hopper mortar, a small concentration of rocks and some uncharred digger pine limbs might represent an aboriginal feature of some sort. However, following completion of the project and analysis of the items recovered from the test pit as well as examination of the drawings and photographs made during fieldwork, it was concluded that the association was not aboriginal but rather a product of much more recent road grading activities along the lip of the dirt road which currently cuts through the site area. Lastly, Feature 3 is the suspected burial pit encountered between 20 and 70 centimeters depth within a portion of Unit 4. Features 1 (Figure 8) and 3 (Figure 9) will be discussed below.

Feature 1. As noted, Feature 1 represents a portion of the largest house pit depression recorded for the site (House Pit A on Map 2, Site Map, end jacket). As can be seen from Figure 8, somewhat less than 25% of the original pit was examined through the excavation of Units 2,7,8 and 9. Nevertheless, the Units were placed in such a way as to expose a cross-section from the outer rim or lip through to the center or deepest portion of the depression.

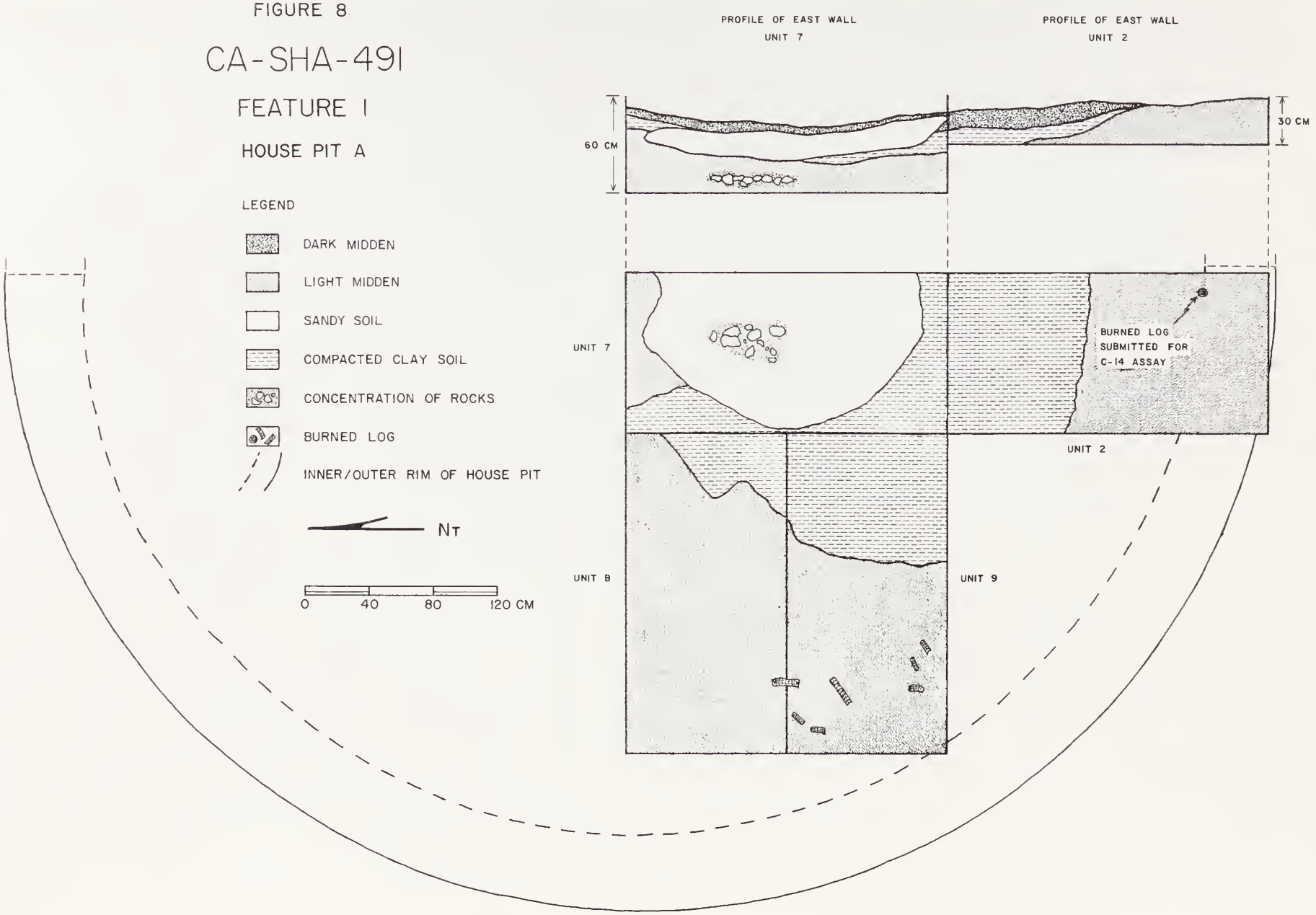
Excavation revealed a stratigraphy markedly different than that encountered within the other excavation units. The black aboriginal midden within the depression averaged only about 10 centimeters thick rather than the 70 centimeters average thickness encountered within the other excavation units. Toward the outer rim of the pit this dark black midden capped a sandy soil, lighter in color than the midden but which nevertheless contained some aboriginal artifacts. Between the rim of the pit and the pit's center, the black midden capped a compacted clay soil containing few aboriginal items, and it has been assumed that this compacted clay area represents the

FIGURE 8

CA-SHA-491

FEATURE 1

HOUSE PIT A



living floor of the original house pit. Lastly, at the center of the pit the black midden covers another sandy layer which averages about 12 centimeters in thickness; this sandy layer in turn was found to intergrade with the light midden at about 40 centimeters depth and to contain a concentration of unmodified but fire-fractured rocks which has been interpreted as representing the fire hearth or fire pit associated with the habitation structure (see Figure 8).

Small quantities of charcoal were observed within the light midden soil around the perimeter of the depression, and within the southeast quadrant of Unit 2 was encountered charred pine limbs, one of which was of substantial diameter and was situated vertically with respect to the ground surface. A 17-centimeter-long section of this charred limb was carefully removed, a portion wrapped in foil for later C-14 assay and the remaining section preserved for examination as to species as well as possible dating through dendrochronological techniques. The results of the C-14 assay are not yet in, but the dendrochronological study has been completed, suggesting a date of 1840 for the last year of the limb's life (see Appendix A).

It is possible that this house pit was constructed subsequent to the accumulation of most of the midden at the site. This inference is based on the fact that a reappearance of the black midden was encountered beneath the compacted clay floor in Units 8 and 9, with artifact frequency for these two units increasing between about 40 and 50 centimeters depth. Moreover, if the dendrochronological dating of the charred pine limb from Unit 2 is accurate, and if in fact this limb represents a part of the original pit house structure, then the sequence of occupation and deposition at this site becomes more complex than previously thought, a situation which will be discussed in detail in the concluding section of this report.

Feature 3. Feature 3 represents a bark-lined, rock covered pit which is nearly circular in plan view and averages 75 centimeters in diameter. The feature was encountered at 20 centimeters depth within Unit 4 and terminated in sterile soil at 78 centimeters depth. The pit was nearly centered within Unit 4 so that excavation of that unit resulted in complete excavation of the feature. According to Al Thomas, the pit size, rock covering and bark lining all suggested a probable burial, a conclusion also supported by available ethnographic data as well as by the results which had earlier been obtained by Hullinger during the course of burial excavation at the site.

Figure 9 provides a detailed cross-sectional and plan view of the feature, including the location and juxtaposition of the rock cairn or covering as well as the pine and cedar bark slabs

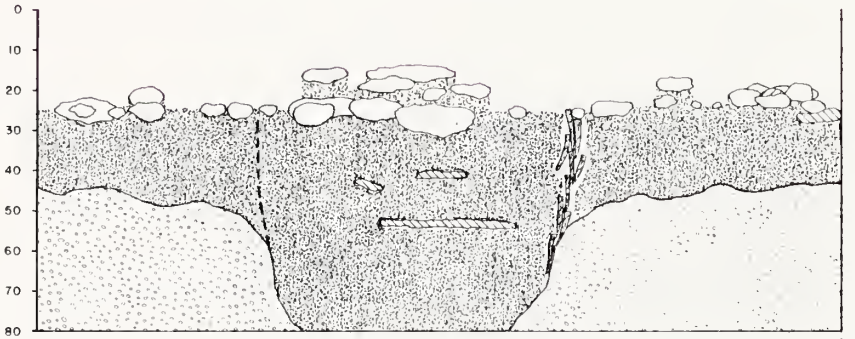
which lined a portion of the perimeter of the pit. Table 4 lists the total number of aboriginal and historic artifacts and other items recovered from the feature. As can be seen from Table 4, a total of eleven glass trade beads were recovered from the feature, or nearly 50% of the total number of such beads recovered from the site during the course of the present project. In addition, two very small fragments of bone were recovered within Unit 4 within the initial 20 centimeters of deposit but outside of the area of the feature. Together, the beads and the occurrence of bone also suggested the possibility that the pit would contain a burial. Feature 3 also yielded a number of other artifacts, waste flakes, historic items and organic materials (see Table 4), although these items were represented within the pit in nearly identical proportion to their occurrence within the other excavated units.

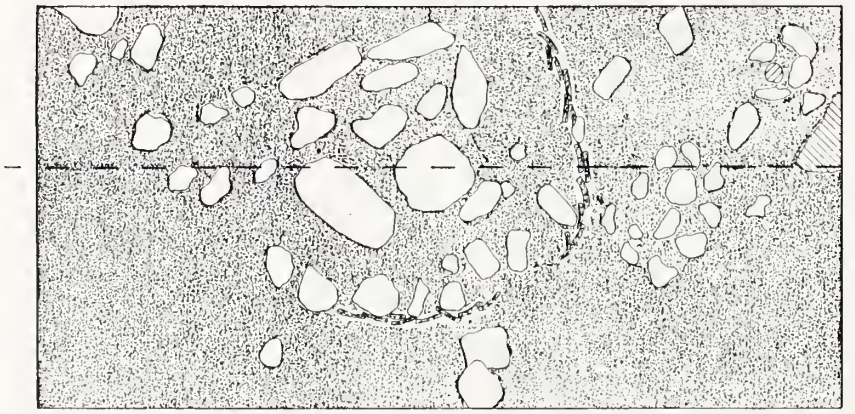
Excavation of the feature proceeded by using trowels and passing all excavated material through 1/8" mesh screen. The excavated material was black midden indistinguishable from that removed from other excavation units except that the material from the feature was contained by thin slabs of pine and cedar bark set vertically into the ground. Beads and other artifacts were encountered throughout the entire 50 centimeter depth of the feature, but no burial or other evidence of human interment was encountered. At 78-80 centimeters depth, the black soil gave way abruptly to the yellowish granules of the sterile decomposing granite substratum. No burial was encountered.

It is possible that at one time the pit contained a burial which had been excavated and removed prior to the present project. Hullinger's field notes and feature drawings were examined carefully to determine if he had excavated and removed a burial from this particular locale, although no definite conclusion could be reached on the matter. In any case, there is no question about our having uncovered a previously excavated pit nor about the association of the bark slabs with the pit. If a burial had been removed by Hullinger or someone else, the resultant pit could easily have been filled in with midden and cultural debris removed from adjacent areas during the course of additional excavations at the site. The rock cairn or covering which we encountered could thus represent nothing more than a fortuitous concentration of stones piled at this locale while excavating adjacent areas. Lastly, the bark slabs which we encountered could represent the original lining of the original burial pit, and the fact that only a portion of the perimeter of the well-defined pit was so lined could be explained in terms of the earlier disturbance and excavation within the feature.

CROSS SECTION

UNIT 4





PLAN VIEW, UNIT 4, 20-30 CM

FIGURE 9.

CA-SHA-491

FEATURE 3

LEGEND

- DARK MIDDEN
- LIGHT MIDDEN, ROCKY
- ROCKS
- CHARRED WOOD
- PINE BARK SLABS
- HUMAN BONE FRAGMENT
- EDGE OF PIT

IV

PROJECT SUMMARY, CULTURAL SIGNIFICANCE AND RECOMMENDATIONS

As noted in the research design section of this report, the primary objective of the present project was to assess the scientific/research potential and cultural/historical values of the Kett Site. The project was not designed to maximize the recovery of scientific data, and therefore this final section of the report will necessarily be brief and conclusions offered should be considered tentative. Nevertheless, the data retrieved are clearly adequate for assessing the significance of the resource, for dealing in a preliminary way with the research questions which were addressed at the beginning of the report, and for offering a number of useful hypotheses and conclusions concerning the prehistoric occupants and their activities.

Dating the Site. Dating has been accomplished through the identification of a number of different components at the site. These components may be described, and tentative dates have been suggested, as follows.

Component I. The earliest period of prehistoric occupation at the Kett Site resulted in the deposition of the black midden which eventually accumulated to a depth of approximately 70 centimeters. The midden contained a variety of lithic artifacts, lithic waste, quantities of organic material as well as charcoal. However, the excavations produced no evidence that any of this material was deposited in historic or Protohistoric times (i.e., after about 1850), since there was a complete lack of Euroamerican trade goods and other historic items except for those which could be associated with the burials. Additionally, although the Kett Site produced an abundance of projectile points, no Desert Side-notched forms were recovered. Therefore, a more precise estimate of the latest date for Component I is A.D. 1550, since, as Baumhoff and Byrne (1959:56-57) note, the Redding subtype of the Desert Side-notched point was introduced in the area "not more than two hundred years ago..." while the General subtype preceded the Redding subtype by another two hundred years. Since neither of these forms is present in the general midden (but both were recovered in association with the burials), the midden appears to have been deposited sometime prior to about 400 years ago, or before about A.D. 1550. Lastly, Projectile Point Types 1 and 2 (see artifact description, above) represent diagnostic forms of the Shasta Complex, a complex which dates to the period between about A.D. 1200-1800 in the Redding area.

We thus arrive at the following age estimate for Component I: deposition probably began sometime after about A.D. 1200 and had reached approximately 70 centimeters thickness by about

A.D. 1550.

Component II. The second period of aboriginal occupation at the Kett Site resulted in construction of several habitation structures (see Site Map, Map 2). The suggestion that these structures were built subsequent to the accumulation of most of the midden deposit is based on two primary considerations. First, as noted in the discussion of Feature 1, House Pit A was discovered to be excavated into an existing midden accumulation which reappeared beneath the compact clay floor of the structure. Second, all of the extant house pits occur some distance to the northwest of the main midden accumulation, a situation which contrasts with the situation which has been recorded for the Cottonwood area (see Jensen 1978) and elsewhere. That is, at several other Redding-area sites, the house pit depressions have most often been recorded as centrally located within the site and with respect to the deepest midden area. In any case, if the house pit depressions were excavated after the primary accumulation of midden (i.e., after about A.D. 1550), they had apparently been abandoned before the beginning of the historic era (ca. 1850), as no historic items were clearly associated with the single house pit excavated during the present project.

Moreover, we also have the dendrochronological estimate of A.D. 1840 for the last year of life of a pine limb which appears to have been associated with House Pit A. If this date identifies the year of construction of this and perhaps some of the other house pits at the site, then it is possible that Component II may represent little more than about 10 years of aboriginal occupation (from about 1840 to 1850). This seems to be confirmed by the fact that the midden which is associated with the house pits represents little more than a thin veneer (ca. 10-20 centimeters in thickness) when compared to the midden which was accumulated within that portion of the site where the burials were eventually placed.

It should be emphasized, however, that the above conclusions concerning the separateness of Components I and II and the suggested dating for the latter are only hypotheses based on a limited quantity of data. Nevertheless, they appear compatible with inferences which could be drawn from other data classes, although they should certainly be formally tested if a more comprehensive research program is undertaken at this site.

Component III. The third period of aboriginal use at the Kett Site occurred totally during the historic period -- that is, after 1850. The component consists of the aboriginal burials which were located near the center of the site and adjacent to the dirt road which cuts through the site area. All of the burials represented aboriginal individuals who were buried in flexed positions with both aboriginal as well as historic artifacts.

Although no burials were recovered during the present project, Hullinger (n.d.) had removed a total of 9 burials during the course of excavations conducted between 1960 and 1962. Hullinger's report does not provide especially detailed information on the burials, although by combining the information from his field notes (which Hullinger made available) with the data in the report it is possible to identify most of the items associated with each interment. Some of the associations clearly represent items which filtered into the burials from the midden deposit, or were mixed with the burials at the time of burial excavation, including fire-fractured rock, scrapers, waste flakes, etc. However, in each of the 9 burials is a clear association of Late Period aboriginal artifact types as well as historic items. The Late Period aboriginal artifacts include Desert Side-notched and Gunther barbed projectile point forms, Olivella and clam shell beads, Haliotis pendants, and granite charmstones. Historic items included ironstone dishes, glass trade beads, Chinese coins, rifle butts and receiver parts, percussion cap boxes, and other items. Interesting also is the fact that of the total of 107 Gunther barbed projectile points recovered by Hullinger, 14, or approximately 13%, were produced from glass; and of the total of 35 Desert Side-notched forms recovered, 11, or about 35%, were produced from glass. Thus, while both types of projectile points were produced into the historic period, Hullinger's findings tend to confirm previous studies which suggest that a greater percentage of the Desert Side-notched forms were produced during the historic period than was the case for the Gunther series. None of the projectile points which we recovered during the present project were produced from glass, a fact which constitutes one of the reasons for suggesting that the midden and the burials represent significantly different time periods of occupation.

Lastly, although we do not know precisely when the Kett Site began to be used as a cemetery by local Wintu Indians, we do know that one of the last burials at the site occurred sometime during the present century. Mr. Al Thomas attended the burial of his own grandmother at the Kett Site sometime between 1910 and 1920. The fact that only burials and no habitation has occurred at the Kett Site between about 1870 and the present has been confirmed by Roger Bicking who, in 1962, was 80 years old. Mr. Bicking's parents built their home near the Kett Site in 1870 and there were no Indians living at the site at that time nor, according to Bicking, have Indians occupied the site since that date (information cited by Hullinger n.d.:13).

Component IV. The final component at the Kett Site consists of a light surface scatter of recent historic debris dating from the late 1800's to the present. Some of this material has been deposited by excavators and others who visited the site in recent years simply for the purpose of looting the

deposit and graves. The broken bottles and other debris have occasionally found their way down into the midden through the actions of rodents and other natural forces. However, for the most part this historic material is found lightly scattered over the surface of the site area.

Refinement of Regional Artifact Taxonomies. The Kett Site produced a rather restricted range of artifact types, thus restricting the number and kinds of useful comparisons which could be made with other sites in the region. For the most part, artifact classes utilized during the present study were based on those which had been established in previous studies, some of which have proven to be useful chronistic indicators for this area of northern California. However, there was one exception which, significantly, involved the most sensitive artifact class recovered from the site (projectile points) as well as the most abundant form representative of this class. The exception involved the "Gunther barbed projectile point," a designation which we discovered to be too broad and to encompass more than a single, temporally significant artifact type.

In many previous studies of northern California prehistory, the Gunther barbed designation has been applied to virtually all small, triangular points of obsidian with deep corner notches. However, the present project resulted in the recovery of a large number of these small triangular specimens which, upon close examination, exhibited slight though consistent morphological differences. It was observed that those specimens which possessed well-developed tangs also possessed excurvate lateral blade borders, while those specimens which possessed tangs which were shorter than the stem possessed straight lateral blade borders.

When the distinction just noted was applied to the entire sample of small triangular points, two groups emerged which were characterized by different depth occurrence within the deposit. It was decided to examine the significance of the difference in mean depth by use of a t-test comparison of the two sample means. The results of that test (see above, Artifact Description, Projectile Points, Types 1 and 2) indicated that the two forms were indeed differentially distributed with respect to depth, and hence probably represent slightly different time periods, at least at the Kett Site.

On the basis of the information acquired from the site, it is suggested that the designation "Gunther barbed" be restricted in its application to only those obsidian, corner-notched specimens with tangs which are equal to or longer than stem length. Subsequent studies at the Kett Site and elsewhere will have to attempt to correlate the occurrence and distribution of these two point types with absolute dates.

Socioeconomic activities and the role of the site in regional settlement patterns.

As noted above, the Kett Site produced a rather restricted range of artifact types, thus restricting the number of inferences which could be drawn regarding socioeconomic activities undertaken at the site. Nevertheless, the primary economic activities appear reflected in the artifact classes recovered from Component I when these classes are expressed as a percentage of the total of aboriginal artifacts recovered from the site. The table below makes such a comparison, although the calculation excludes aboriginal waste flakes as well as the ornamental objects (beads) which, it is believed, represent a later period of aboriginal use of the site.

Artifact Types	#	% of Artifacts
Projectile Points	118	61.78
Cores, Worked Flakes, Utilized Flakes	31	16.23
Drills	5	2.62
Scrapers	5	2.62
Hammerstones	7	3.66
Ground Stone Artifacts	25	13.09
	191	100.00

With projectile points and point fragments totaling nearly 62% of the entire artifact collection, while all other artifact classes combined total slightly more than 38%, it would appear that hunting was the predominant economic pursuit during the course of occupation of this site. Moreover, most of the other artifact classes may also have been directly or indirectly related to this activity, such as hammerstones, cores, worked flakes, scrapers, and drills.

The only other economic activity clearly represented by the artifact inventory from Component I is plant food processing, undoubtedly involving pine nuts, acorns, manzanita berries, and perhaps other seasonally available species as well.

No identifiable bone fragments were recovered, so that it is impossible to determine the types and quantities of animals which were hunted and perhaps snared and trapped. Moreover, the only extant vegetal remains were those deposited within the site by rodents currently inhabiting the site area.

The level of attrition characterizing the osseous and plant remains must also have destroyed a number of artifacts of wood, bone and perhaps shell, so that our artifact inventory is

somewhat skewed. Nevertheless, given the inventory which is represented, and in consideration of the location of the site within the foothills at some distance from major streams, it appears that primary site activities included hunting large mammals and plant food collecting during the early fall months.

Later use of the site by individuals who excavated more-or-less permanent structures suggests a more intensive and perhaps year-round occupation of the site. However, no information concerning artifact classes deposited during this period was obtained since that portion of the site containing the structural remains was not excavated during the present project.

Trade/Commerce Between Site Occupants and Old Shasta. It was originally postulated (see Research Design section, above) that the site may have been occupied solely during the historic period. Indeed, it had even been suggested that the site was occupied because of its proximity to Old Shasta. Had this been accurate, the site presumably would have produced the data needed to infer some of the adjustments in economy and socio-political life which the Indians had to make in order to survive the onslaught of Euroamericans into the area. However, our original hypothesis appears to have been inaccurate. We secured no evidence that any of the original midden was accumulated during historic times, and hence the question of Indian-White trade and commerce is a moot point for this time period.

Historic use of the site by Indians appears to have been confined exclusively to the period during which the site was used as a cemetery. As noted above, however, Component II (that period during which the house pits were excavated) may represent occupation between about 1840 and 1860. Again, however, that portion of the deposit containing the structural remains was not examined during the course of the present project (except for the single large housepit designated Feature 1).

Summary. We may conclude this summary of Research Results by offering the following scenario of the occupational history of the site. It should be emphasized that the discussion below constitutes a series of hypotheses about what may have occurred at the Kett Site during the past 600 years. While plausible, this narrative is not intended as the final word on the subject.

Sometime between about A.D. 1200-1300, local Wintu Indians, themselves perhaps recent arrivals to the area (cf. Whistler 1977), established a camp on the south face of a small knoll overlooking a year-round spring and an intermittent stream. It is not clear what, if any, types of structures were built at the site during their visits here, although it appears that hunting with bows and arrows was the single most important economic activity. In

addition, however, acorns and pine nuts were undoubtedly collected from the abundant trees within the area, suggesting that the site was perhaps occupied most intensively in early fall when the nuts were available, but before the major spring salmon runs had begun.

Sometime prior to the introduction of the Desert Side-notched projectile points, estimated at about A.D. 1550, the Indians ceased returning to the Kett Site. Perhaps as local Wintu populations increased, larger settlements were established along the rivers, a situation which may have been a response not only to the larger populations in the area but also to some concomitant economic changes which were occurring. Such economic changes may have involved an increasing reliance upon the seasonally available fish resources along the Sacramento River and the ability to support more densely clustered populations within this narrow band of land.

In 1832-33, the Wintu and other populations within northern California witnessed the arrival of fur trappers from the Hudson's Bay Company. This event proved to be a devastating one for most of the native populations within the Sacramento Valley as a number of Old World diseases were introduced against which the Indians had developed no natural immunities. It has been estimated that perhaps 70% of the native population within the Sacramento Valley succumbed to a variety of infectious diseases between 1832 and 1835. One of the consequences of this massive population loss was that traditional social systems collapsed and large lineages were forced to splinter into smaller groups in order to survive. The Kett Site's second episode of occupation may have occurred at this time, as a small group of survivors from some nearby devastated village moved a short distance away from the river and established a new settlement near the spring which had supported their ancestors several centuries before. Apparently 8 small house pits were excavated at this time. The year was 1840.

However, this second occupation of the Kett Site was short lived. As noted above, local Euroamerican residents within the area adjacent to the Kett Site report no Indians living at the site in 1870, and this second occupation may actually have lasted no more than 10 or 20 years -- from 1840 to sometime between 1850-60. By 1855 the Euroamericans had arrived in large numbers, had disrupted native food supplies by polluting streams and driving off other animals upon which the Indians had depended, and it is doubtful that aboriginal groups could easily have survived much beyond 1855 utilizing traditional means. Thus, it is likely that most or all of the Indians had left the site by 1860, seeking work at mining and lumbering camps within the general area.

While the Indians may have been forced once again to split into smaller family units and to leave the Kett Site, they didn't

forget about their old home. As members and relatives of the original group reached old age and began to die, they requested to return to their original home. This resulted in the third and final episode of aboriginal use of the Kett Site, this time as a cemetery. By this time, perhaps 1860 or slightly later, the Indians had acquired a number of Euroamerican material items, many of which were buried with the deceased. Even the Indian tools buried with many of the individuals showed the influence of white culture, as projectile points (including Desert Side-notched forms) were fashioned of glass and native shell beads were augmented with European varieties, also made from glass. The beginning of the 20th Century still saw use of the Kett Site as an Indian cemetery, with the last burial having occurred as late as about 1920.

Significance and Recommendations

The Kett Site represents a cultural resource of demonstrated research potential and cultural historical values. Not only is the site deposit highly productive of temporally diagnostic artifacts such as projectile points, but the limited sample of such artifacts recovered during the present project has already led to the postulation of new and significant hypotheses concerning internal differentiation within the Late Period Shasta Complex of northern California. While time and funds prevented adequate testing of that portion of the site area which contains the majority of structural remains, some preliminary information regarding structures was obtained during partial excavation of House Pit A, the results of which suggest the possibility of a Protohistoric and perhaps historic date for construction of these features. This fact adds to the importance of the site, again through documentation of important cultural changes which occurred during and at the close of the California Late Period.

It seems clear, therefore, that site CA-SHA-491 has already yielded data important to our understanding of both regional and local prehistory, and for this reason qualifies under Title 36 CFR 800.10 for nomination to the National Register of Historic Places. Moreover, as is the case with all archaeological locales, the site is a non-renewable resource, yet forms part of the data base for the study of California's prehistoric cultural heritage. As such, the site provides archaeologists and other scientists with a laboratory by means of which to test a variety of research problems and hypotheses including, but not limited to those already outlined above in the preceding section of this Chapter.

Beyond contributing to our understanding of Late Period California prehistory, the present project confirmed the fact that the site has been used as an Indian cemetery for perhaps

the past 100 years, and that local Wintu Indians maintain close religious and ceremonial bonds with the burial area of the site. Use of the site as a cemetery was confirmed by a re-examination of the original Hullinger report, a comparison of Hullinger's notes with the findings obtained during the present project, and by information provided by Al Thomas and other local Wintu Indians. However, that the burials are intrusive to the original midden accumulation and do not involve the entire site area was established during the present project through excavation of the eleven test pits.

In light of the demonstrated scientific/research potential and cultural/historical values of the site, preservation of the resource is clearly warranted. The options by means of which preservation might be achieved may be outlined as follows:

1) The cemetery area of the site should be set aside and recognized as such and preservation ensured by fencing the area and posting it as a cemetery. In this way, access to the area could be physically restricted, while trespassers who elect to ignore the fence and posting of the area could legally be prosecuted for violation of California statutes relating to such areas.

2) The remainder of the site area does not include burials and ideally should be preserved through an avoidance strategy as well. Realistically, however, it is unlikely that avoidance can be ensured in view of the level of development within the area. In fact, as development proceeds adjacent to the site area, access to the site by ever larger numbers of persons will be inevitable, and the looting which has destroyed portions of the site in the past will likely increase in magnitude. This is particularly true in light of the high artifact yield for which the Kett Site is widely known.

Therefore, it is recommended that the information potential of the site be salvaged through a mitigative data recovery program. Minimally, such a program should include the following:

1) Excavation of at least three of the remaining seven house pits which remain unexcavated and which are located within the northwest quadrant of the site area. Not only will this provide information on aboriginal structures and associated artifacts, but it will allow testing of the hypothesis offered in this report that (1) the occupation represented by the house pits began sometime around A.D. 1840 and terminated by about A.D. 1855, and (2) that this occupation was not directly connected with that represented by the main midden area of the site.

2) Excavation of at least 5, 1m X 2m units within that portion of the midden containing the house pit depressions. Again, the purpose of collecting a sample of artifacts and information from this portion of the midden is to secure data for testing the hypothesis regarding separateness of the main midden area from that area of the site containing the structural remains.

3) Excavation of at least 5, 1m X 2m units within undisturbed portions of the main midden area. The additional sample from this area is necessary in order to

a) provide a more representative sample of the site's projectile point sequence which was tentatively established during the present project;

b) secure charcoal samples sufficient to provide absolute dates for that sequence of projectile point types;

c) provide additional materials for comparison with the data to be recovered from that portion of the site containing structural remains.

It is suggested that the proposed program would constitute mitigation of the adverse impacts to the site which have and will continue to derive from unauthorized artifact collecting and vandalism. The proposed number of excavation units has been determined on the basis of a consideration of the proportion of the site area which remains undisturbed and from which it can be expected that formal archaeological data recovery methods could secure data adequate for addressing the research questions posed in the preceding section of this Chapter. The burial area of the site will not be impacted by the proposed data recovery program, and will have to remain under strict government supervision and should be continually protected, as outlined above.

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EXPLANATION OF PLATES

Plate 1, A: West view of the Kett Site as seen from the Kett Lumber Company yard.

B: Northwest view of the site as seen from disturbed area west of lumber yard.

C: Bureau of Land Management Cadastral Survey Crew

D: North view of Feature 1 (House Pit depression)

Plate 2, A: Public notice sign posted at the site to encourage compliance with 1906 Antiquities Act

B: CSU-Chico archaeologist J. Zancanella, foreground left, mapping Feature 1; Jensen and Redding-area reporter in background

C: Volunteer assistant drawing Feature 2 in Unit 4

D: Volunteers working in Unit 4

Plate 3, A: Al Thomas (Indian Consultant) and James Dotta share mutual interest in Wintu heritage

B: Clark Brott (in shorts) explaining aspects of the project to Mrs. George Grant and daughter (Native American Observers)

C: Northwest view of CSU-Chico excavators G. Runyan and Paul Bowman

D: Volunteer assistants initiating excavation of Unit 5

Plate 4, A: CSU-Chico archaeologist Will Shapiro initiating excavation of Unit 3

B: CSU-Chico archaeologist P. Bowman checking depth of initial 20 cm of Unit 1

C: Unit 1 at 20 cm depth

D: Unit 2 at 20 cm depth

Plate 5, A: Profile 1 (for location, see Site Map)

B: Southwest view of Feature 1 (House Pit), Units 2, 7, 8, & 9

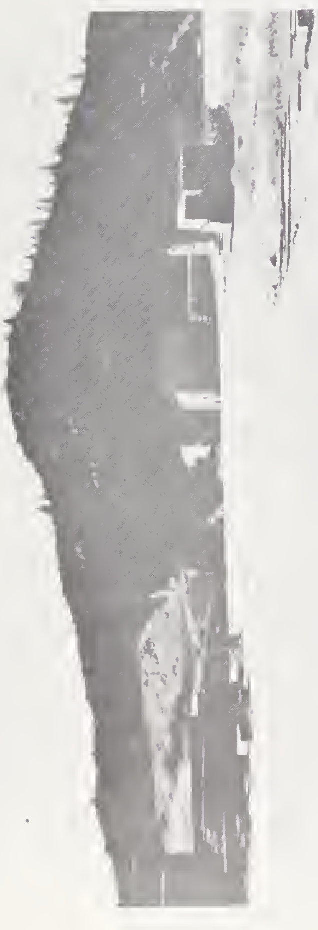
C: CSU-Chico archaeologists G. Runyan and P. Bowman excavating Unit 7, center of house pit depression

D: CSU-Chico archaeologist J. Zancanella exposing charred limb in Feature 1, Unit 2

Plate 6, A, B, C: Cleaning, preliminary sorting and counting of cultural material prior to writing excavation unit summaries

D: Field counts were transcribed onto unit summaries and the results of preliminary artifact sorting were transcribed onto a data sheet

Plate 1



a

b

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Plate 2

a

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Plate 3

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Plate 4

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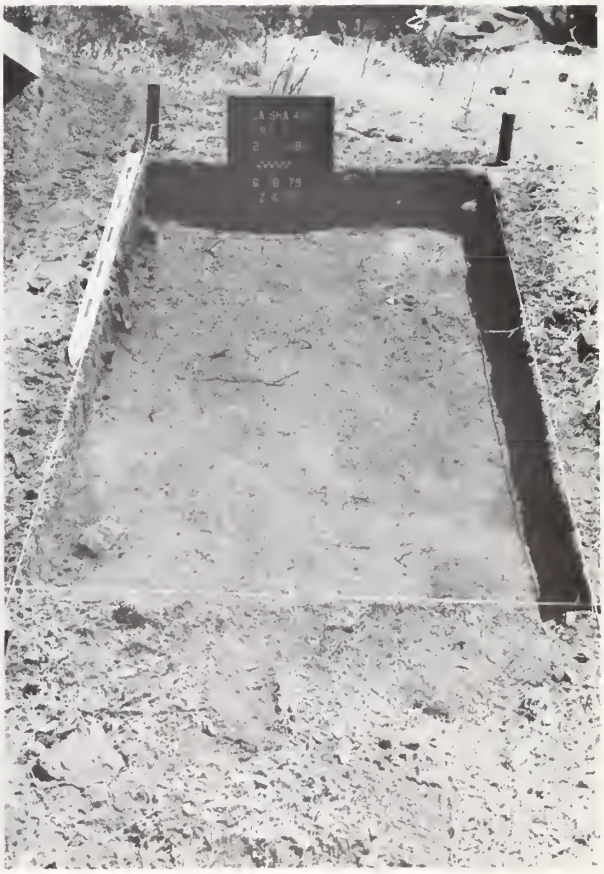

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Plate 5

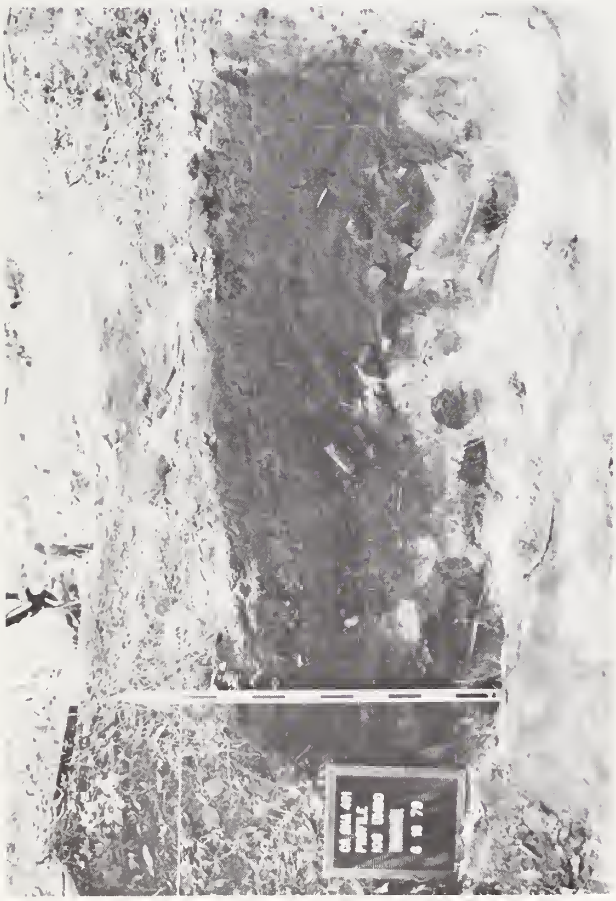

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Plate 6

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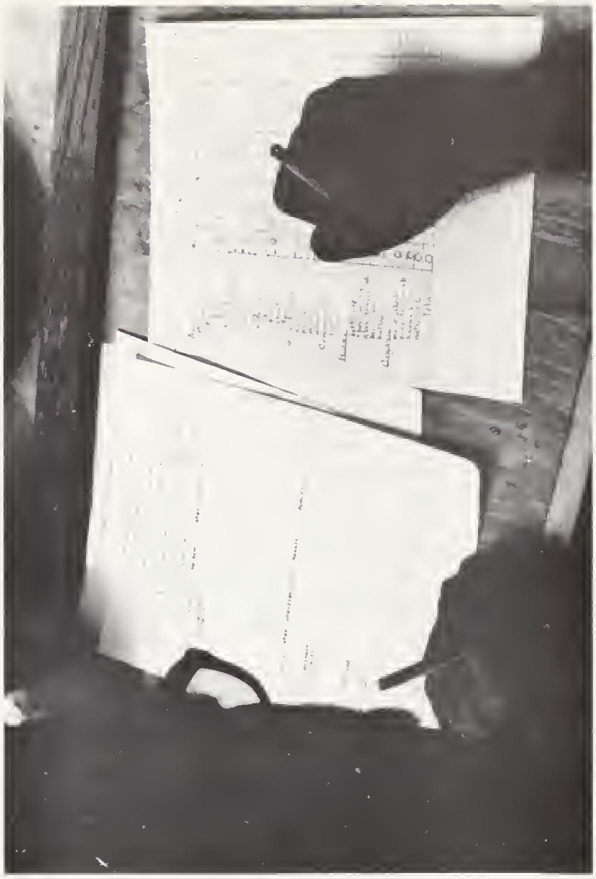

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APPENDIX A

CLASSIFICATION AND ANALYSIS OF WOOD AND ASSOCIATED PLANT COMPONENT SPECIMENS RECOVERED DURING THE 1979 ARCHAEOLOGICAL EXCAVATIONS AT THE KETT SITE - CA SHA 491

by

Les White
December, 1979

Dr. Peter M. Jensen
Principal Investigator

I - INTRODUCTION

The Kett Site (CA SHA 491) is the location of a permanent village said to have been occupied during the proto-historic era by people of the Wintu Group of California Indians. It is situated approximately 4 miles west of the present-day city of Redding, Shasta County, California, at an elevation of 800 feet above sea level. The site is on Public Lands administered by the Bureau of Land Management, U.S. Department of Interior.

Archaeological investigation of the site was initiated by the Bureau of Land Management in consultation with representatives of interested Native Americans. It was deemed necessary because the site was being destroyed by vandalism. The investigations were conducted under the auspices of the University Foundation, California State University, Chico. Dr. Peter M. Jensen is the Principal Investigator for the project.

In the course of subsurface exploration fragmented specimens of partially decayed wood, and wood which had been altered by fire, were recovered. This latter material included stem fragments reduced to charcoal and the partially burned terminal section of a conifer branchlet with portions of the leaves still attached. This recovery was made in Unit No. 2, which also surrendered evidence interpreted as housepit (dwelling) remains.

This report describes the methods of investigation and interpretations of findings of an analysis of the recovered material. It finds that all are of the specie Pinus sabiniana (Digger Pine) - a tree native to the site. The efforts to age-date the decayed wood specimen through application of dendrochronological techniques was not absolutely conclusive; however, based on the evidence, the date of 1840 A.D. is suggested to be the last year in the wood's lifetime.

II - BACKGROUND OF ANALYSIS

1. Objectives

Study and analysis of plant remains are common practices of archaeology in both its prehistoric and historic fields. Analysis may provide information useful to explaining past environments, food consumption and processing practices, the technological achievement level of site occupants and numerous questions of a related nature.

This analysis seeks to accomplish the following:

(1) Determine the plant specie of the individual specimens.
(2) Determine if there is any evidence of shaping or modification of form which may be assignable to man's activities or uses of the specimens.
(3) By application of the techniques common to dendrochronology determine if time-specific information concerning the growth years of the plant is present and extrapable.

2. Specie Classification

Woody plants are classified botanically into one of two separate groups. These are flowering plants (Class Angiospermae) and non-flowering plants (Class Gymnospermae). The oaks, laurels, willows, and most shrubs, are in the first category and the gymnosperms include the pines, firs, redwoods, cedars and most (but not all) evergreens. The angiosperms are overwhelmingly more numerous and diversified worldwide than are the gymnosperms.

In living plants the task of identification is enhanced by the opportunity to observe bark, leaf, flower and fruit, all of which may be specie or sub-specie specific in one or more characteristic including color, form, taste and odor. The classification of non-living specimens (when the above components are not present) must rely upon the comparisons of the visible characteristics of intra-stem tissue with samples of wood whose specie is known.

By far the majority of cellular growth tissue in woody plants is directionally oriented consistent with the upward extension of the stem (trunk) and in the case of branches, their outward growth. Because of this condition the patterns of cellular growth viewed in the transverse plane are generally specie-specific differentiated and thus diagnostic in classification. In terms applied to common quarter-sawn lumber the transverse plane is analogous to "end grain." Other diagnostic features reside in the plant tissue viewable in the longitudinal plane but, with the exception of closely related specie or sub-specie, successful identification generally does not hinge upon their explication, particularly in the case of the gymnosperms. Angiosperms, by virtue of their greater numbers of family and specie, pose more difficulties.

3. Dendrochronological Analysis

Most are aware that by counting the total number of

"annual" rings in a tree stump, or log, one can estimate the age of the tree when its life ended. The theory of dendrochronology is founded on this simple premise - but, pursues the goal of establishing the precise year represented by each growth ring. Although cellular growth, in temporate climates, is more or less consistent with seasonal climatic variation it has been shown that growth irregularities do occur resulting in such anomalies (for example) as two rings in one year or none at all. In areas of climatic extreme, such as the arctic, long periods without growth may occur. In tropical latitudes growth may be so continuous that seasonality is not discernible (U.S.D.A. Bulletin 72:202). Natural events, such as fire and disease, as well as man-caused occurrences may inflict traumatic injury upon a tree and effect growth. Fritts (1976:55-117) points out numerous individual and combined factors which effect plant physiology and hence cell growth.

To establish the precise growth year of a ring, dendrochronologists use a system of "cross-dating" as part of their technique. It requires that previously dated specimens match those of the one in question (as verification) before assignation of a date to the latter (Fritts 1976:2). Successful application of the technique is usually dependent upon the specimen undergoing analysis containing approximately twenty-five (25) consecutive growth rings which are discernible and measurable, unless unusually strong and easily recognizable ring groupings are present. Branches of trees are often difficult to date, as rings tend to be absent or false rings occur (Michels 1973:119). The specimen must retain its original structure and form to the extent measurements reflect the true growth characteristics of the rings.

III - METHOD AND TECHNIQUE

The requirements for preparation of woody stem specimens for both specie identification and dendrochronological analysis are essentially the same. Preparation consists of smoothing the surface of the transverse (cross-sectional) plane of the specimen so that details of the cellular structure are revealed when viewed under low to moderate magnification. Importantly, an attempt should be made to extract the viewing transverse sections from those parts of the specimen containing: (1) the least decayed wood and (2) the greatest number of intact annual rings. Accordingly, a 40 mm thick section (or round) was selected for removal from a locality approximately 10 cm from that end of the specimen representing the basipetal

direction when live. The section was stabilized by wrapping the exterior with several layers of masking tape and removed by means of a fine-toothed hand saw. The exposed transverse surface was prepared for viewing by machine sanding with a series of successively finer textured sandpapers until the best surface achievable was gained. This method is consistent with that described by Ferguson (1970:187) and was (with the exception that due to their small size the sectioning was eliminated) used to prepare the carbonized specimens. The diagnostic attributes of the needle and branchlet specimen are found on their exteriors and, therefore, did not require preparation prior to examination.

After preparation the specimens were visually examined under magnification and subjected to comparative analysis to determine their specie.

Magnification in the range of 10-20X power is considered satisfactory for most dendrochronological purposes (Fritts 1976:72) and likewise by Pansin and de Zeeuw (1970:425, 507), for all but the more difficult species, in identification. In this analysis a 12X comparator, 6X hand lens, and 50X microscope were used. The latter was found useful in the examination of the decayed wood and charred stem fragments.

IV - DESCRIPTIONS OF SPECIMENS

1. Decayed Wood

The specimen is in an advanced stage of decay. When in-situ the fragmented portions of the wood were held in position by soil pressure facilitated by intertwined plant roots which had penetrated the numerous cracks. The condition of decay made it impossible to retain the total original form during its extraction from the soil (Zancanella 1979). Measurement of the partially reconstructed form of the specimen indicate it was approximately 28 cm in length, roughly cylindrical and about 6-8 cm in diameter - tapering slightly toward its smaller end. Decay had caused the specimen to halve longitudinally along (or near) the pith, as well as part transversely, at a point about one-third its length from the large end. The longitudinal halving had been accompanied by essentially total decay of one of the segments of the small diameter above the transverse break, leaving only one semi-diameter (segment) intact for viewing. The larger end, which represents the basipetal direction in the living plant, has (except for the crack at the pith) its complete circumference intact.

The reddish-brown hue of the specimen and other characteristics of the decay process observed are manifestations of the deterioration caused by the soft-rot fungi (Ascomycets and Fungi Imperfecti) as described by Pansin and de Zeeuw (1970:347-349). Soft-rot fungi is commonly found in wood which has undergone alternating periods of dampness and drying. This condition is met by the below-surface position of the specimen when recovered. Soft-rot hyphae generally first attack the less lignified components of the wood structure in conifers. The condition of the wood structure of this specimen typifies this effect and only a skeletal framework (in the micro sense) remains. This framework, viewed in the transverse plane, consists mainly of radially oriented wood-rays and longitudinal resin ducts with occasional primary tangential cell walls intact. The remainder of the wood is hyphae-digested cellulose and undifferentiable. Despite the advanced stage of decay the changes in latewood and earlywood growth can be distinguished and are thus suitable for ring-width measurement (dendrochronological analysis) and likewise, when observed in conjunction with other phenomena present, useful in specie identification.

The exterior of the specimen is devoid of bark and is of a rough non-uniform texture caused by rotted tissue dis-attaching from the main body of the limb. There are local areas of 1-2 sq. cm which display attributes common to cambial zone tissue. There are two locations, one near each end, where formerly branchlets existed - now represented by stem cavities. These branchlets appear to have been about 3 cm in diameter.

There are insect galleries present in the specimen both in the interior portions and the near-bark. This probably represents the activities of both beetles and grubs as indicated by the differences in size and shape of the galleries. Members of each family attack both living and dead tissue and, thus, essentially are nondiagnostic to this study.

The number of yearly growth rings present in the specimen was determined by measurement and count along four separate radials located in approximately opposing quadrants of the limb cross-section. The total number of rings in each radial were found to be: R1-17, R2-19, R3-15 and R4-19. The radials containing 19 rings each were, at their exterior termini, in localities adjacent to the previously noted cambial zone tissue.

Examination of the rings reveal a condition of eccentricity of growth in the specimen - or to state it otherwise, the rate of growth is not uniform around the pith during a given year or series of years. Eccentric growth is a manifestation of the tree's response to stress and is characteristic to limbwood reacting to length changes due to new outward growth (Pansin and de Zeeuw 1970:288-290). It is not uncommon for Digger pine limbs of this size to grow to lengths of 2-3 meters and their sinuous shapes to contain a number of local areas of growth eccentricity.

2. Carbonized Materials

The recovered material includes a number of fragmented carbonized segments of a branchlet stem, numerous small unidentifiable bits of wood charcoal - including minute sections of conifer needle and the easily recognizable and well preserved terminal section (meristem) of a conifer branchlet.

The part-circle branchlet stem fragments, when graphically projected, indicate that the diameter of the branchlet(s) from which each originated were in the range of 30-35 mm. Some of the stem fragments contain insect galleries near their exterior tissue. The small (pinhole) size of the openings suggest they were formed by ambrosia bettles which attack recently killed (green) wood (Pansin and de Zeeuw 1970:366). Growth rings are distinguishable in the stem fragments and exhibit the small yearly increment growth typical of conifer branchlets. Minute cell features have been obliterated by the effects of fire and specific attributes in earlywood and latewood tissue diagnostic to specie identification are in part obscured. Radially oriented wood-rays are distinguishable.

The branchlet terminal section specimen measures about 1 cm in diameter at the point it fractured from the parent stem, is 5 cm in length and lacks an undetermined amount of its tip which has broken off. The diameter increases toward the central part of the specimen to accommodate the needle cluster. Although only short lengths (1-3 cm) of needles remain intact, their sheaths and bases are still attached along part of the length. The needles are fascicled and are in bundles of three. The exterior surface of the stem, and the attached needle components, have been charred but are not carbonized. The broken stem end is charred to a greater extent than the surface. The recently broken tip section shows no direct effect of burning on the interior of the specimen, which displays the reddish-brown hue of

decaying wood. This lesser degree of charring was also noted on the interior surfaces of the carbonized branchlet segments.

V - IDENTIFICATION

Each of the specimens is identified to be of the specie Pinus sabiniana - Digger Pine. This tree is indigenous (and a major over-story component) of the broad-sclerophyll woodland and chaparall biome in which CA-SHA-491 is situated. These findings are based upon an analysis of observed phenomena resident in the specimens and comparisons with samples of known species. This process was supplemented by use of the Pansin and de Zeeuw (Textbook of Wood Technology, 1970) illustrated identification keys.

Sufficient feature detail is observable in the decayed wood specimen to assure a positive identification; but, in the case of the carbonized branchlet segments, some diagnostic attributes are not present because of both the nature of the specimen and the effects of fire. This condition places some weight on the similarities it shares in provenience, size class, plant component relationship and degree effected by fire, with the positively identified branchlet terminal section.

The rough, scaly bark platelets, robustness of needle and sheath with the latter's characteristic accentuated threadlike binding of the three needle bundle are unmistakably diagnostic of the Digger pine. Other native pines which produce three needle bundles are Knobcone (Pinus contorta), Ponderosa (Pinus ponderosa) and Jeffrey (Pinus jeffreyi); however, they lack the distinctive size and robustness of the Digger Pine.

VI - AGE DATING OF DECAYED WOOD

The major constraints limiting success of dendrochronological analysis and age-dating this specimen are the skewed ring width measurements due to eccentric growth and the characteristic near-cease of radial growth in the last few years of its life. It is primarily a matter of unreliability in both cases. In the first, the problem lies with the growth being regulated by intra plant systemic responses to a greater degree than environmental factors, resulting in a "smothering" of the latter's effect. This effect is less pronounced on side exhibiting the more narrow ring widths. This phenomena may be observed on the plots of Radius 1 and Radius 4 (opposing radii) shown on "Exhibit A." The condition of limited latter year growth cannot be dealt with effectively because inter-ring

differences are so minor that perceived variations may be due to physical changes through decay and, therefore, are unreliable.

Plots of ring width measurements of climate sensitive conifer specimens in Central Northern California demonstrate an irregular pattern through time of distinctly recognizable rings of very low growth. Through replicative sampling and measurement these low growth rings have been shown to be year-specific and have resulted in establishment of a 300 (ca.) year mean cross-dated chronology for the area (White n.d.). Narrow rings for the years 1924, 1873, 1859, 1829, 1802 and 1734 (for example) are commonly displayed by specimens from this region.

The ring-width plots for the decayed wood were standardized, to remove the variation caused by its declining growth trend, prior to direct comparison with the indices (mean chronology) of the age dated samples. This was accomplished by graphically approximating a growth curve on the plot and dividing the yearly growth value by the curve value at that point.

The resulting standardized (indices) plots were then compared directly with the mean chronology and the "best fit" for the specimen was found to be for the years 1821 to 1840. These years are represented in the chronological record as a period of generally low and declining growth. The tree-ring record is particularly persistent for the mid-period of these decades and 1829 is distinctive of it. A plot of a portion of the mean cross-dated chronology for the interval years 1811-1850 A.D. is also depicted on "Exhibit A." An examination of the plots will reveal that some discrepancies between them exists, such as the amount of positive or negative growth variation in a given year. This is due, in part, to the mean chronology being composed in the main of long-lived trees which are less likely to show excessive growth anomalies than are younger trees. Additionally, the mean chronology, because its average includes a number of specimens, tends to absorb individual tree-specific demonstrations of high growth. A direct ring width plot of a portion of 310 year old specimen W01-16a is shown on "Exhibit A" to illustrate these phenomena.

VII - INTERPRETATION & CONCLUSIONS

Based upon examination and analysis of the specimen materials, as described, the following interpretations and conclusions are offered:

1. All of the plant materials examined are of the specie Pinus sabiniana - Digger Pine.

2. There is no observable extant evidence ascribable to modification or tool use by man - although he was likely the agent of the affecting fire.

3. The decayed wood and the charred material are probably the products of separate events with the latter materials likely to be of recent origin. This conclusion is reached after comparing their stages of decay. The presence of the undecayed, substantially intact, needles and the general appearance of the carbonized material as previously described all support relative contemporanity of this material. Conversely, the advanced stage of decay of the limb wood suggests interment for a lengthy period of time.

   It is noted that Zancanella (1979) found the carbonized branchlet and leaf materials in close association with the decayed wood. Although the former were encountered first..."a few centimeters above the wood"...he perceived them as..."all together;" however, this examination finds no evidence that fire has affected the decayed wood as would be expected were their origins in a single event. This is regarded as further support for the postulation of their separation in time.

4. When found, the decayed limb was situated in a near-vertical orientation between 30 and 50 cm below ground surface with its larger end at the lower elevation (Zancanella 1979). This large end has been identified in this examination as the part nearest the point where the limb emerged from the trunk. It is a common occurrence for large trees, when falling, to drive one or more of their branch ends into the soil by force of weight. Landslides, flooding and other natural events may also bring about burial. It is difficult to account for the reverse orientation of this specimen by such natural forces, given the environmental factors of the site. It is suggested the most likely agent was human manipulation.

5. 1840 A.D. is offered as a suggested date for the last year of the limb's life. This suggested date rests solely on the similarities displayed by a ring series of limited length. It is recognized that causal factors, other than those generated by climatic variation and thus similarly affecting the majority of trees in a region, may have contributed to the correlation. Ferguson (1970) states..."Correlation coefficients (of separate indices) exhibit a normal random fluctuation within narrow limits aroung "zero" except at the

match point, where a highly significant positive correlation may be obtainable." The correlation coefficient between the Radius 1 and mean chronology indices is 0.3829 reflecting a 90% certainty of the matche's validity.

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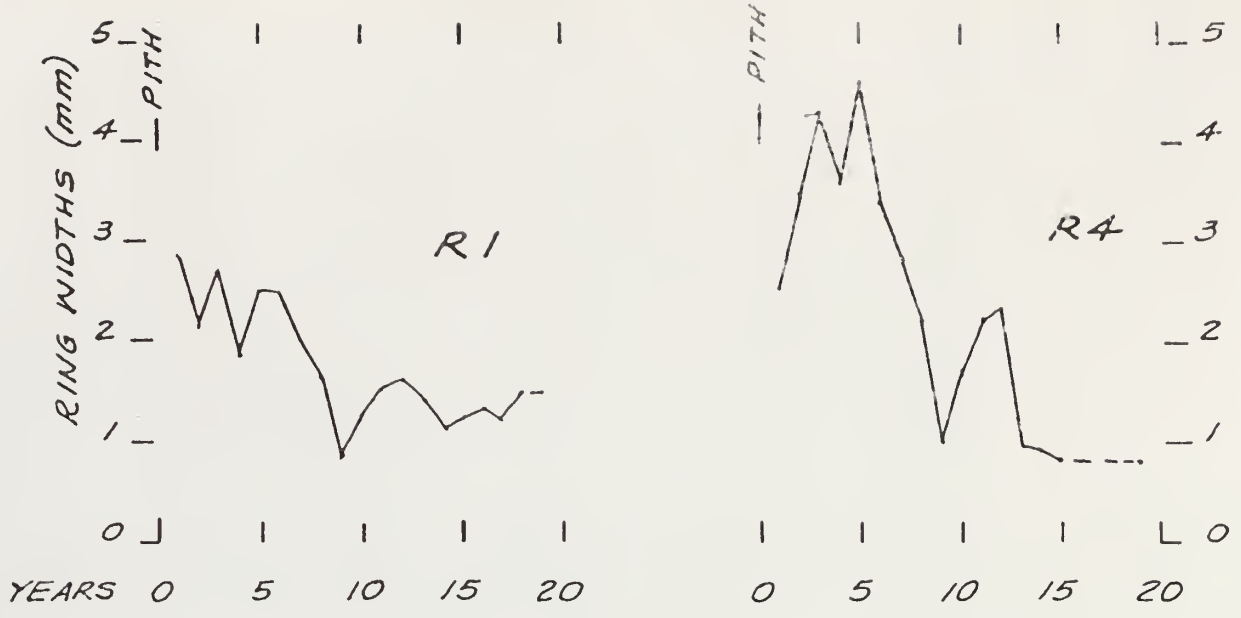
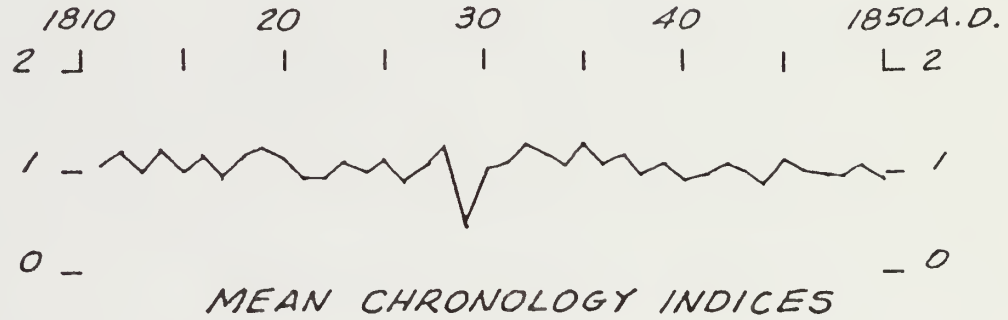
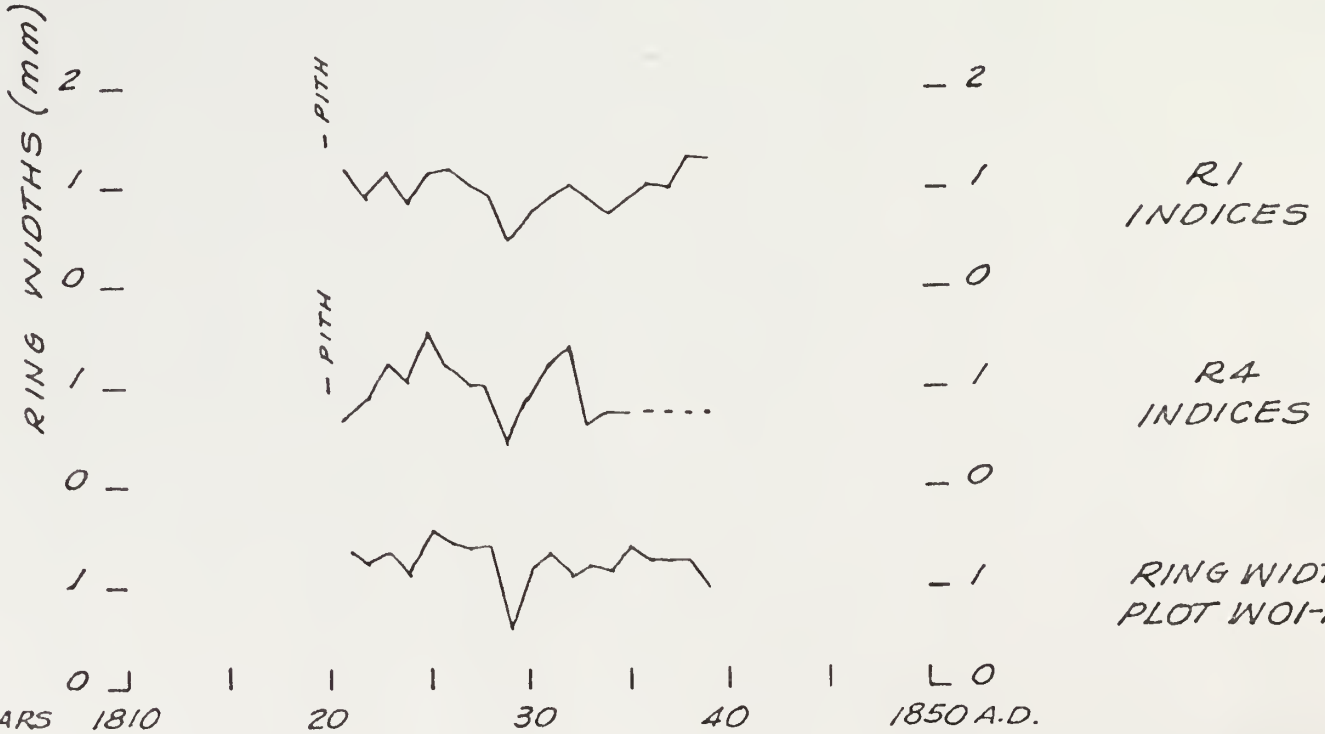


RING WIDTH PLOTS OF APPOSING RADII



MEAN CHRONOLOGY INDICES



"EXHIBIT-A"

12/79

CA·Sha·491: The Kett Site

"Nö'sai"— a prehistoric Keswick Wintu habitation locale

10 5 0 10 20 30 meters

BUREAU OF LAND MANAGEMENT

CONTOUR INTERVAL=ONE METER

- K — survey datum
- 12 — excavation unit
- profile
- 10 meter grid
- trail
- 4WD track
- 240 — meters AMSL
- intermittent stream
- H — house depression
- bulldozed
- vandalized

MAP TWO
october
1979

cadastral survey by hatfield / sifers site map by lukes / miller

to h_2o tank

council rocks

anvil rock

os/bos rock

cairn hill

section line

T32N/R5W/SEC30/MDM

1/16th corner

BLM

private

magnetic declination 19°

north·true

b u l l d o z e d

aph 7910.02