72. Desert Side-Notched Points as a Time Marker in California

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Introduction

Chronological classification of archaeological resources is and must be based upon a foundation of minute typological distinctions, since we cannot know before the fact what properties of the material will ultimately prove to be of importance in chronological sorting.

One of the more valuable ways of dating archaeological remains is by means of the horizon marker. To be an effective horizon marker, an artifact type or style must have the two following properties: (1) it must be distinctive enough to be easily recognizable, and (2) it must have a position in the local chronology which is well established and which indicates that the type or style was in use for only a short time.

In Central California the most widely used horizon marker to date has been the clam shell disc bead, which is taken as the phase marker for Phase II of the Central California Late Horizon. This is a reliable marker for the Central Valley, but is less useful in other parts of the state because of its less frequent occurrence. Furthermore, it would be useful to have horizon or time markers of imperishable material because most archaeological sites are dated, tentatively at least, from surface collections, usually consisting exclusively of nonperishable items.

For the latter reason, and because of their relative abundance in California, projectile points obviously are desirable artifacts to serve as time markers. Projectile points have been commonly used, heretofore, as time markers by North American archaeologists. Such types, for example, as "Folsom," "Clovis," or "Pinto" points have not always been associated with otherwise well-defined cultural contexts, however, and, for the most part, the chronological position of these types is only imperfectly established.

The projectile point type proposed here as a time marker in California archaeology has long been recognized as distinctive. This projectile point type, sometimes called the Shoshone point, has recently been given the name "Desert Side-notched" by one of the present authors (Baumhoff, 1957, p. 10). The specimens to which this name applies are small projectile points, presumably arrow points, with triangular blades and side notches. The name

derives from the fact that these points are characteristic of late archaeological remains throughout the Desert West (Bennyhoff, 1958). The same type occurs also in the eastern United States but in its role as a California time marker a western name seems preferable for the type--for one thing, the present authors are not competent to deal with the type on a nation-wide basis, and in any case archaeologists in the eastern U. S. will probably prefer to use pottery types as time markers. The present effort is therefore mostly for the benefit of archaeologists in the western U. S., especially in the non-pottery areas of California and Nevada.

To establish the Desert Side-notched point as a significant type within California, we have catalogued all specimens of small, triangular, side-notched points to be found in the collections of the University of California Museum of Anthropology. Each specimen was recorded individually on a card containing data on dimensions (length, width, thickness, and weight), material, outline drawing, and provenience. The analysis of these data in the following pages proceeds through the following steps: (1) Spaulding's (1953) statistical test is applied to segregate possible subtypes. (2) Using this and other means, we are able to define subtypes of the Desert Side-notched point which we then organize according to site and stratigraphic provenience. (3) The final step is to plot geographic distribution and assign tentative dates to the subtypes.

Subtypes

A group of 606 specimens was catalogued from the collections of the U. C. Museum of Anthropology. The sample is not random, in the statistical sense, but is so large that we may assume it is representative. The lengths and weights were tabulated and a graph of each was drawn up (Fig. 1). Inspection of the graphs and specimens gave a breakdown into categories according to the following attributes: (a) material--obsidian and not of obsidian, lengths 0-22, 23-26, 27-32, over 33 mm.; (b) base--concave, V, and notched. (Weight was disregarded because of the great concentration in one area of the graph.) This gives 24 possible attribute combinations. Hence, the question to be answered is whether or not any of these combinations represent a subtype.

Counting the total number of specimens in each material category and calculating the percentage of the total for each, we have the following results:

	Number	Proportion
Obsidian	449	.7409
Not of obsidian	157	.2591

Next, the percentage of all specimens in each of the length categories is calculated:

Length category (mm.)	Number	Proportion
0-22	209	.3449
23-26	120	.1980
27-32	130	.2145
33+	147	.2426

Then the percentage of all specimens of the different base categories is calculated:

Base category	Number	Proportion
Concave	315	.5198
V	217	.3581
Notched	74	.1221

With this information we can arrive at an expected number of specimens that we should find in each category. This is done by multiplying the percentage of material by the percentage for each length category by the percentage for each base category. For instance, the first category given in Table 1 below is: Obsidian, 0-22 mm., Concave base. In this case, then, the calculation (P) would be: .7409 x .3449 x .5198 = .1328. This is converted into whole numbers by multiplying by the total number (606) of all the specimens examined, which gives an expected number (E) of 80.48.

Table 1

	P	E	O	d	d^2	pqk	$\frac{d^2}{pqk}$
Obsidian							
0-22 mm.							
Concave base	.1328	80.48	107	26.52	703.31	69.81	10.07
V base	.0915	55.45	44	-11.45	131.10	50.36	2.60
Notched base	.0312	18.90	32	13.10	171.61	18.30	9.38
23-26 mm.							
Concave base	.0763	46.24	47	.76	.58	42.72	.01
V Base	.0525	31.81	29	- 2.81	7.88	30.12	.26
Notched base	.0179	10.84	13	2.16	4.67	10.67	.44
27-32 mm.							
Concave base	.0826	50.05	44	- 6.05	36.60	45.93	.80
V Base	.0569	34.48	18	-16.48	271.59	32.54	8.35
Notched base	.0194	11.76	14	2.24	5.01	11.51	.44
33+ mm.							
Concave base	.0934	56.60	45	-11.60	134.56	51.33	2.62
V base	.0644	39.03	51	11.98	143.52	36.48	3.93
Notched base	.0219	13.27	5	- 8.27	68.39	12.97	5.27

Table 1 (continued)

	P	E	O	d	d^2	pqk	$\frac{d^2}{pqk}$
Not of obsidian							
0-22 mm.							
Concave base	.0465	28.18	16	-12.18	148.35	26.85	5.53
V base	.0319	19.33	5	-14.33	205.35	18.73	10.96
Notched base	.0109	6.61	5	- 1.61	2.59	6.54	.40
23-26 mm.							
Concave base	.0268	16.24	15	- 1.24	1.54	15.82	.10
V base	.0184	11.15	14	2.85	8.12	10.97	.74
Notched base	.0063	3.81	2	- 1.81	3.28	3.82	.86
27-32 mm.							
Concave base	.0288	17.45	27	9.55	91.20	16.97	5.37
V Base	.0199	12.06	25	12.94	167.44	11.82	14.17
Notched base	.0068	4.13	2	- 2.13	4.54	4.12	1.10
33+ mm.							
Concave base	.0326	19.79	14	- 5.79	33.52	19.09	1.76
V base	.0226	13.69	31	17.31	299.64	13.33	22.38
Notched base	.0078	4.73	1	- 3.73	13.91	4.67	2.98

The expected number is compared with the observed number (O) in the collection and the difference (d, which is O - E) noted. As can be seen, some of the numbers are negative. By squaring them all, the negative sign is removed and the differences between each class thus are accentuated.

In the sixth column of the table there is the combination pqk, in which p is the percentage (which we have in the first column: P), q is one (1) minus p (1 - p), or the percentage not expected to appear, and k is the total number of specimens, or 606. When multiplied together, they represent an estimate of the variance of the expanded binomial distribution. The standard deviation (σ) is computed as $\sqrt{pqk}$ and to convert this into units of standard deviation the formula $\frac{d^2}{pqk}$ is used (the last column in the table). $\frac{d^2}{pqk}$ is then approximately chi square with one degree of freedom, for which tables are readily obtainable. The use of these tables will tell the probability of the points in this category being made by chance alone. For example, in our first category we have a $\frac{d^2}{pqk}$ of 10.07. Entering the tables for one degree of freedom, we find a proba- of .001 or a chance of 1 in 1,000 of its being made by chance.

By using a probability of .01 or less (a $\frac{d^2}{pqk}$ of 6.635 or larger), six categories stand out, as follows:

Table 2

	$\frac{d^2}{pqk}$
Obsidian	
0-22 mm.	
Concave base	10.07
Notched base	9.38
27-32 mm.	
V base	8.35
Not of obsidian	
0-22 mm.	
V base	10.96
27-32 mm.	
V base	14.17
33+ mm.	
V base	22.38

Of the six categories of projectile points in Table 2, two have negative coefficients, indicating that in these cases the three qualities are not often found in the same specimen. The two negative categories are: (1) obsidian points with V-shaped bases from 27 to 32 mm. in length, and (2) points not of obsidian, with V-shaped bases, and less than 22 mm. in length.

The other four categories occur together more often than one would expect by chance alone. These categories are:

1. Obsidian points, 0-22 mm. long, with concave bases.
2. Obsidian points, 0-22 mm. long, with notched bases.
3. Points not of obsidian, 27-32 mm. long, with V-shaped bases.
4. Points not of obsidian, 33+ mm. long, with V-shaped bases.

We presume that these categories correspond, in some measure, to historically discrete subtypes of the Desert Side-notched point with areal and/or temporal distinctions. However, we do not choose to designate these categories themselves as subtypes. For one thing, to accept only these categories as subtypes would mean that there would exist certain specimens which could not be assigned a subtype. For example, an obsidian point with concave base,

24 mm. in length, would be included in none of the categories. For this reason, we have combined certain minor categories with the ones specified above to define the subtypes. In addition, categories 3 and 4 above have been combined to form a single subtype since these categories differ only in length, and also because the specimens found in the two categories completely overlap in geographical distribution.

One further subtype has been segregated. This is characterized by a bell-shaped base, by material nearly always of obsidian, and particularly by its "comma" shaped notches. The length of this subtype is quite variable. We had been aware of the possibility that such a subtype existed when the statistical analysis was made. It was thought then that the differentiating characteristic of this subtype was a concave blade, giving the point a long thin tip (Pl. 1w). In the initial statistical analysis, therefore, the specimens were classified according to whether their blades were convex or concave. This characteristic turned out to have no significant correlation with other characteristics, and it was therefore excluded in the final tabulation. Even though this subtype was obtained by intuition rather than by statistical method, we have every confidence in its reality as a distinct historical growth. Its small, well-defined distribution bears out our feeling on this matter.

By the foregoing methods, partly statistical and partly intuitive, we have obtained four subtypes of the Desert Side-notched point, described in the following paragraphs. That these categories have historical reality as subtypes is confirmed, it is felt, by their well-defined areal distribution and by their consistent chronological associations throughout the state. Each subtype had at least three defining characteristics. For a specimen to have been included in any subtype, we required that it have at least two of the three defining characteristics. Even with this requirement, it was found that there were some aberrant specimens in each category, for example, a "long" specimen would have to be placed in an otherwise short category (cf. Pl. 1f). Fortunately, there were only a few of these aberrations.

1. General subtype (Pl. 1a-f)*

Defining characteristics: Material, obsidian; length, 0-26 mm.; base, concave.

This is the most variable of all the subtypes and also the most widespread; hence its name. There may actually be several subtypes included here which we are unable to distinguish because of the sample.

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*Pl. 1 follows p. 40. (N.B.: Explanation of Pl. 1 is on p. 65.)

2. Sierra subtype (Pl. 1g-k)

Defining characteristics: material, obsidian; length, 0-26 mm.; base, notched.

This subtype is less variable than the preceding. It is called the Sierra subtype because it is characteristic of the High Sierra region of California. It is also common, however, in the Great Basin and in the Southwest.

3. Delta subtype (Pl. 1m-r)

Defining characteristics: material, not obsidian (usually of varicolored cherts and jaspers); length, 27+ mm.; base, V-shaped.

This subtype is so named because it is most commonly found in the delta region of the Sacramento-San Joaquin Rivers. The V-shaped bases of these specimens are usually isosceles triangles with base angles of 45 degrees or more.

4. Redding subtype (Pl. 1s-x)

Defining characteristics: material, obsidian; length, variable; base, bell-shaped; notches, comma-shaped.

The subtype is named from the fact that the city of Redding is near the center of its distribution. Although the Redding subtype is variable in length, it is the most easily recognized of the subtypes because of its bell-shaped base and especially because of the shape of its notches.

Two other categories of artifacts must be mentioned even though they are not included in the present study. One of these is a species of large blade found in the Delta region, the shape or form of which is obviously modeled on that of the Desert Side-notched point. The practice of making these large, presumably ceremonial blades was common in the Delta region throughout Phase II of the Late Horizon times. At least one of these objects is made of bone (Bennyhoff, 1957), indicating that its function is probably different from that of ordinary Desert Side-notched points. Since these objects are presumably not projectile points, they have not been formally included in the present study. Their presence, however, indicates a knowledge of Desert Side-notched points and they have therefore been referred to for dating purposes.

These large blades were included in our statistical analysis (accounting

for the long right-hand tails on the graphs shown in Fig. 1) but are excluded from the following distributional analysis. They could actually have been included as subtypes, but are excluded because they obviously did not function as projectile points.

Table 3 is a list of the sites from which these blades are derived.

Table 3

Site (by county)	No. of specimens
Lassen	
General	3
Sacramento	
6 (Johnson)	10
28 (Strawberry)	2
31 (Joe 1)	1
56 (Mosher)	2
95 (Allyn 2)	4
San Joaquin	
43 (Tracy Lake)	2
80 (Stockton Channel)	2
82 (Walker Slough)	2
86 (Pool)	3
91	1
105	1
Solano	
2 (Peterson 2)	1

The other category of artifact that must be mentioned is a type of projectile point that looks very much like the Desert Side-notched point, except that it is much larger. This kind of point is found in Great Basin sites at a much earlier time than the Desert Side-notched (Jennings, 1957, p. 121; Cressman, 1956, Fig. 45, type 7A). This large side-notched point is also found in northeastern California (at the Karlo site [Las-7], for example) but has been excluded from consideration in the present paper.

There is a possibility that this large side-notched point is the prototype of the Desert Side-notched point. We might imagine, for example, that some group of people were using these large side-notched points at a time when they first became aware of the idea of the bow and arrow. They

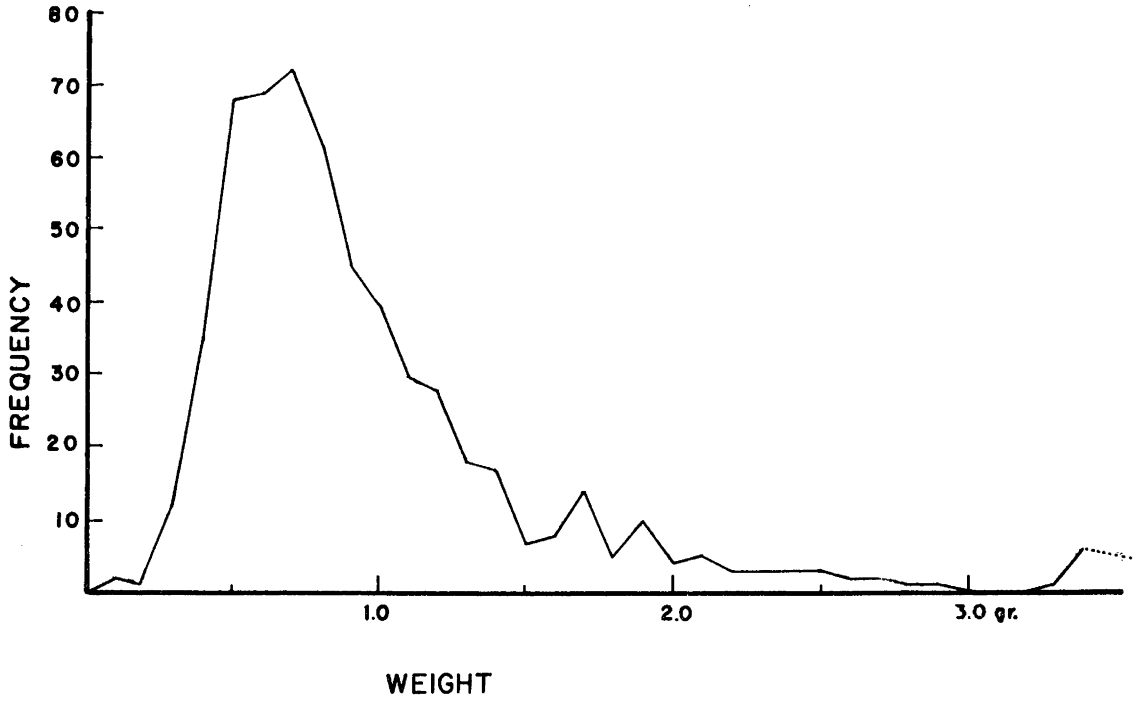
then began to make arrow points and in doing so used the form with which they were already familiar. We do not know that this is the case, however, but suggest it as a possible explanation of the similarity of form between the Desert Side-notched point and these larger, earlier, side-notched points.

Sites

The record of occurrence of each of the subtypes in various northern California archaeological sites, so far as it is shown by the present data, is given in Table 4. In the paragraphs that follow, the important sites are discussed individually in order to determine the temporal relationships of the subtypes.

Table 4

Site (by county)	Subtype			
	General	Sierra	Delta	Redding
Calaveras				
114 (Hospital)	3	-	8	-
141	1	-	-	-
142 (Poore)	2	-	-	-
143	-	-	1	-
Colusa				
2 (Howells Point)	1	-	-	-
Contra Costa				
138 (Hotchkiss)	3	-	3	-
El Dorado				
24 (Cathedral Rock)	4	2	1	-
Fresno				
7	1	-	-	-
27 (Pine Flat)	2	-	-	-
115 (Vermilion Valley)	6	5	-	-
118 (Badger Flats)	-	1	-	-
123 (Sly)	5	1	-	-
133	1	1	-	-
137 (Rattlesnake Creek)	1	-	-	-
140	1	-	-	-
141	-	1	-	-
142	1	-	-	-
152 (Round Meadow)	-	1	-	-



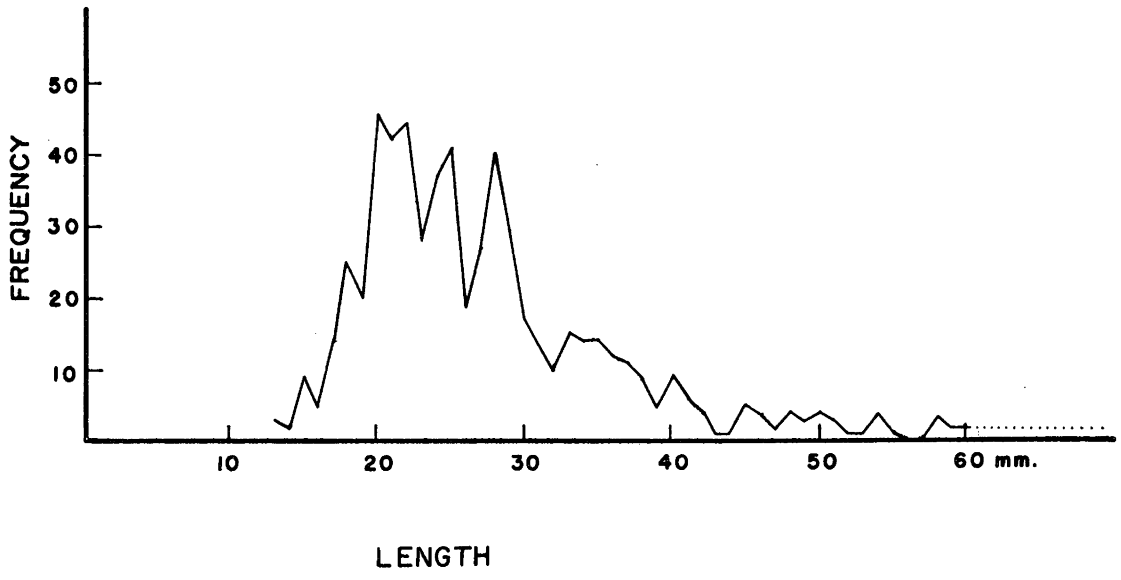
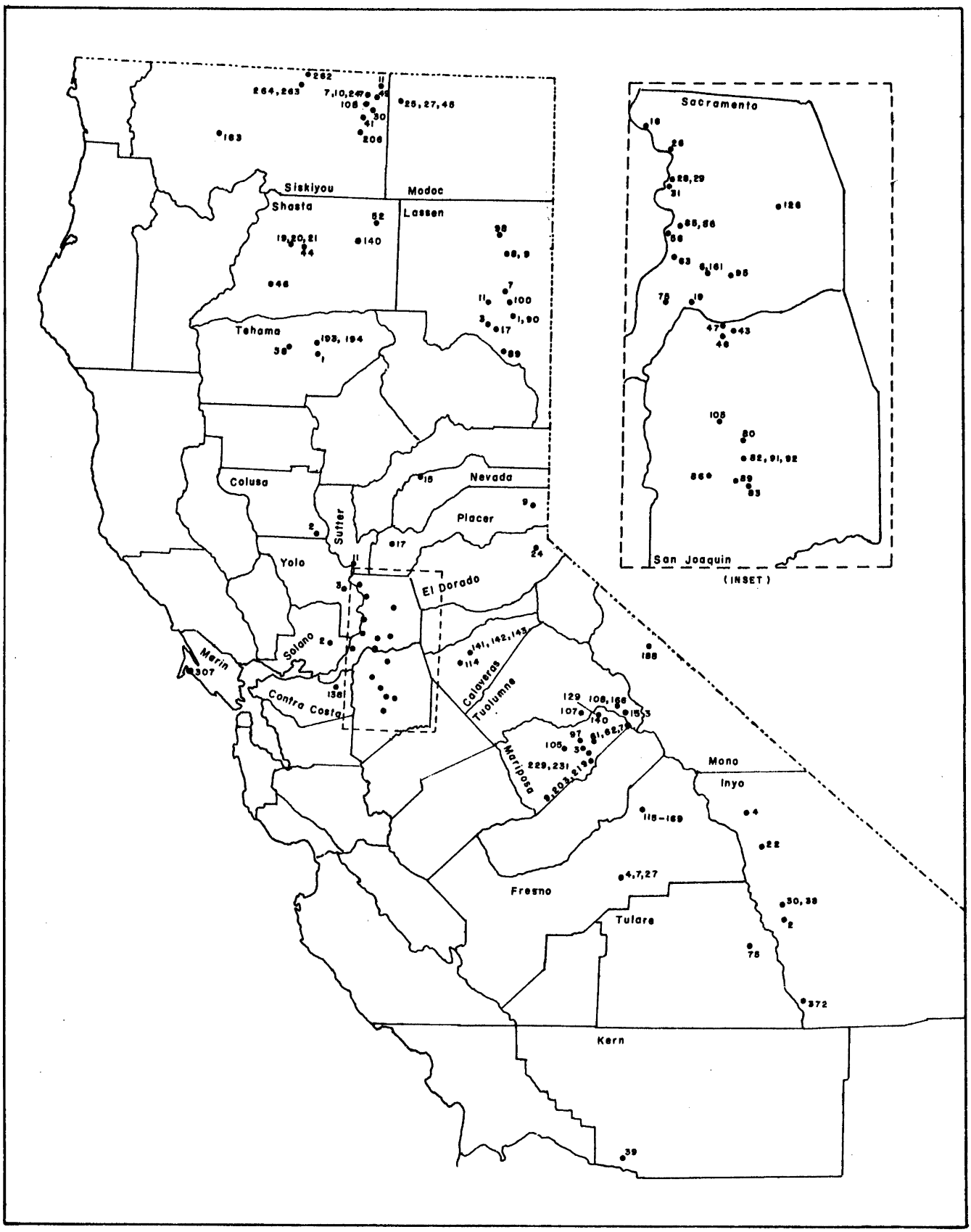
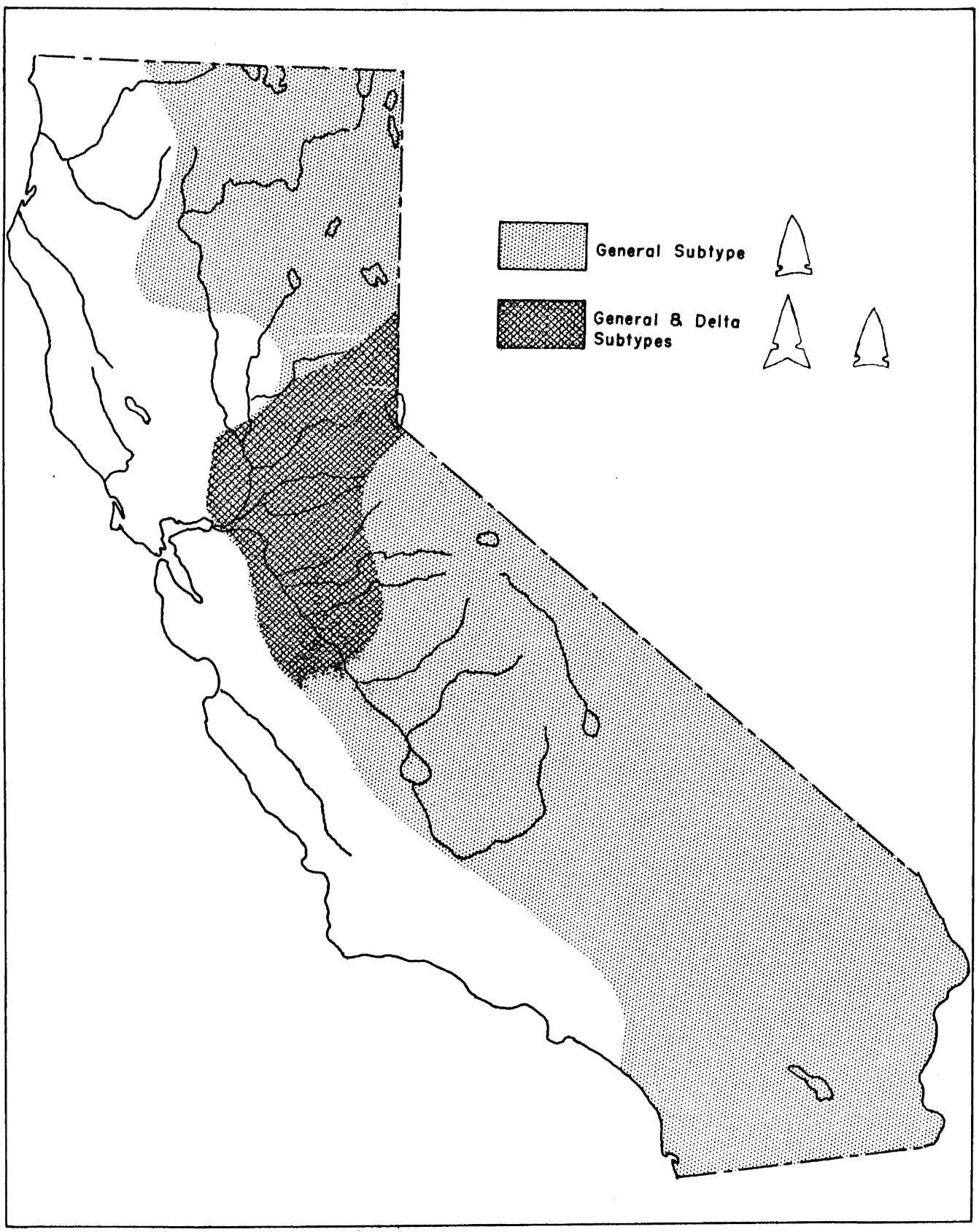


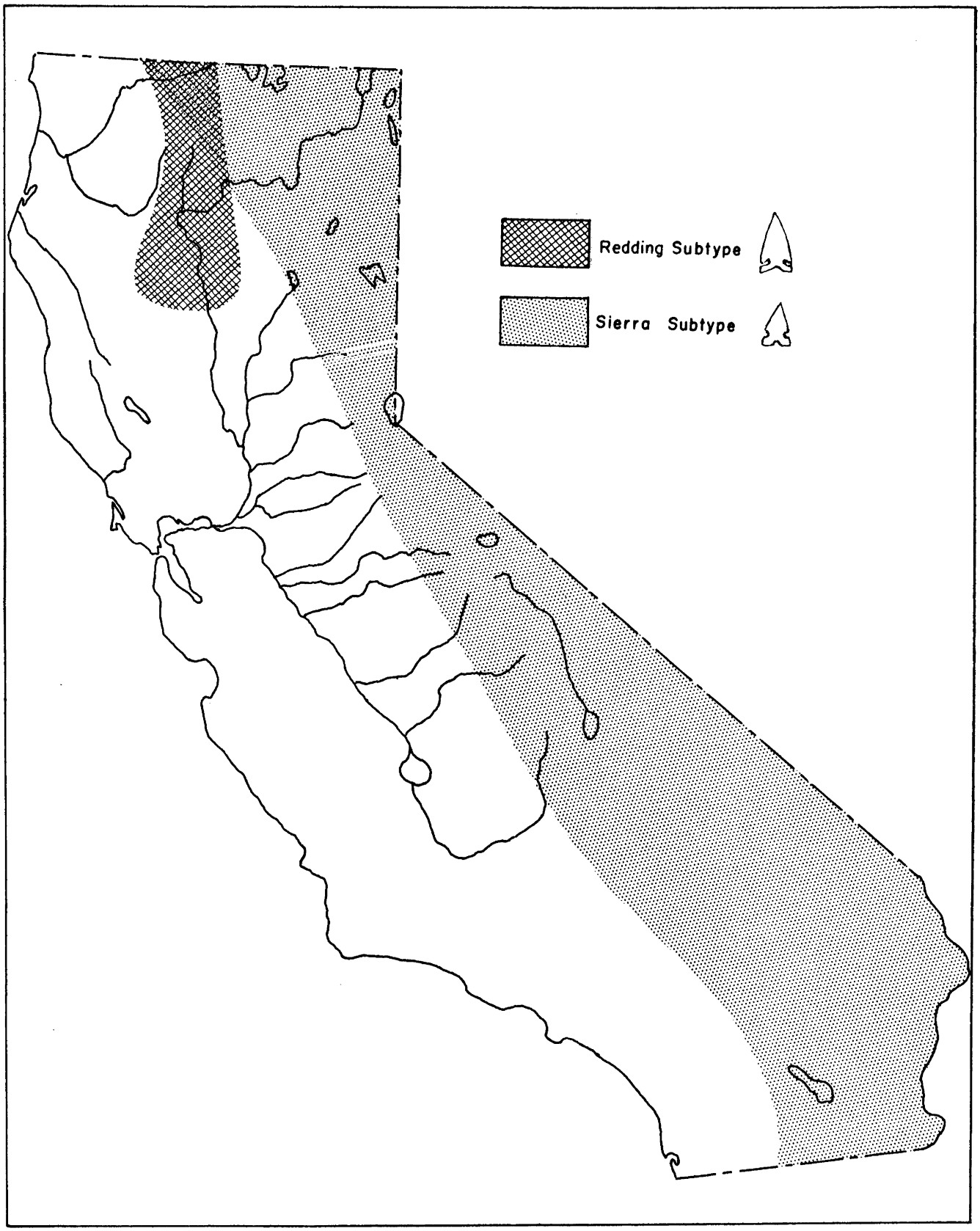
Figure 1. Frequency Distribution of Weights and Lengths of Desert Side-Notched Projectile Points



Map I. Archaeological Sites Producing Desert Side-notched Points



Map 2. Distribution of Desert Side-notched Points, General & Delta Subtypes.



Map 3. Distribution of Desert Side-notched Points, Sierra & Redding Subtypes.

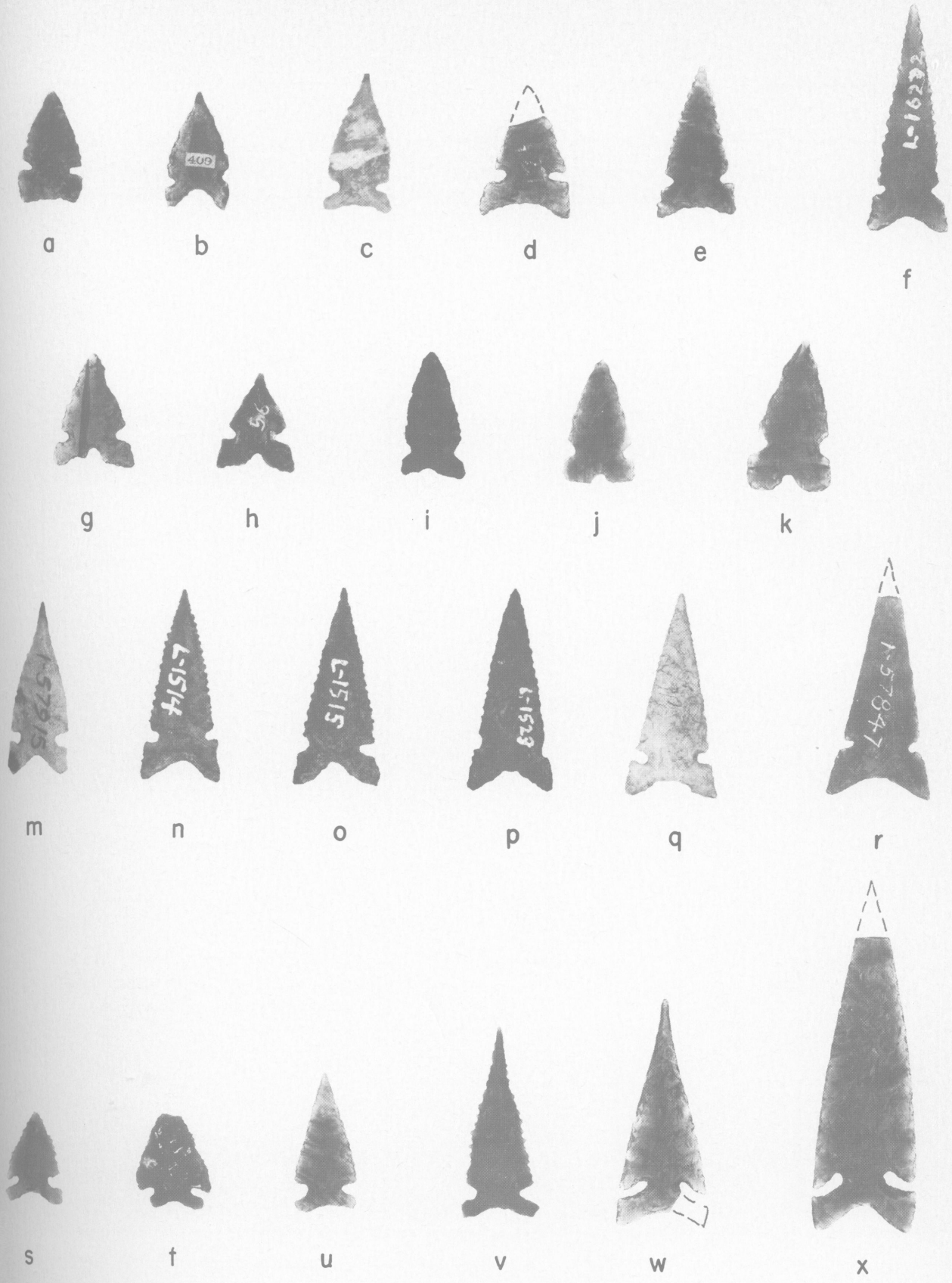


Plate I

Table 4 (continued)

Site (by county)	Subtype			
	General	Sierra	Delta	Redding
Fresno				
161	3	1	-	-
169	-	1	-	-
Inyo				
2	15	5	-	-
4	1	-	-	-
22	1	-	-	-
30	-	1	-	-
38	1	-	-	-
372 (Rose Springs)	5	3	-	-
Kern				
39 (Buena Vista Lake)	X*	-	X*	-
Lassen				
General	38	21	2	-
1 (Tommy Tucker Cave)	-	-	1	-
3	1	-	-	-
7 (Karlo)	7	2	-	-
8	-	1	-	-
9	-	1	-	-
11	-	2	1	-
17	1	-	-	-
89	1	-	-	-
90 (Amedee Cave)	3	3	-	-
98	-	1	-	-
100	1	-	-	-
Marin				
307	1	-	-	-
Mariposa				
3 (Big Meadows)	2	-	-	-
9	4	2	-	-
61	5	3	-	-
62	2	1	-	-
79	-	1	-	-
97	1	-	-	-
105	9	4	-	-
129	1	-	-	-

* Present but not counted.

Table 4 (continued)

Site (by county)	Subtype			
	General	Sierra	Delta	Redding
Mariposa				
140	1	-	-	-
203	1	-	-	-
219	1	-	-	-
229	-	1	-	-
231	1	-	-	-
Modoc				
25	-	1	-	-
27	10	4	-	-
45	1	-	-	-
Mono				
188	-	1	-	-
Nevada				
15 (North San Juan)	5	-	1	-
Placer				
Lincoln site	5	-	31	-
9 (Kings Beach)	1	-	3	-
17	1	-	3	-
Sacramento				
6 (Johnson)	46	-	75	-
16 (Bennett)	3	-	4	-
19 (Old Crump)	-	-	2	-
28 (Strawberry)	1	-	6	-
29 (King Brown 1)	-	-	4	-
31 (Joe 1)	2	-	3	-
56 (Mosher)	-	-	2	-
63 (Bloom)	1	2	-	-
75 (Locke)	1	-	-	-
85 (Nicolaus 2)	-	-	2	-
86 (Nicolaus 4)	1	-	1	-
95 (Allyn 2)	-	-	1	-
127 (Augustine)	-	-	1	-
161 (Little Johnson)	1	-	-	-
San Joaquin				
43 (Tracy Lake)	5	-	6	-
46 (Smith)	1	-	-	-
47 (McCauley)	1	-	3	-

Table 4 (continued)

Site (by county)	Subtype			
	General	Sierra	Delta	Redding
San Joaquin				
80 (Stockton Channel)	12	-	14	-
82 (Walker Slough)	6	-	7	-
83 (Ott)	4	-	5	-
86 (Pool)	-	-	2	-
89 (Brants Ferry)	-	-	2	-
91	1	-	4	-
92	1	-	-	-
105	-	-	3	-
Roberts Island (?)	1	-	2	-
Shasta				
19 (McCloud 19)	-	-	-	1
20 (McCloud 20)	21	-	-	23
21 (McCloud 21)	1	-	-	-
44	3	-	-	1
46	X*	-	-	X*
52 (Callison)	6	7	-	-
140	-	-	-	1
Siskiyou				
7 (Canby's Crossing)	15	7	-	-
10 (Fleming Island)	21	10	-	-
11 (Oklahoma Landing)	18	3	-	-
30	1	-	-	-
41 (Upper Ice Cave)	-	1	-	-
49	-	1	-	-
108	1	-	-	-
163	1	-	-	-
206	1	-	-	-
247	-	1	-	-
262 (Foster)	5	-	-	1
263	1	-	-	-
264	2	-	-	1
Solano				
2 (Peterson 2)	-	-	1	-
Sutter				
11 (Vernon)	1	-	5	-

* Present but not counted.

Table 4 (continued)

Site (by county)	Subtype			
	General	Sierra	Delta	Redding
Tehama				
1 (Kingsley Cave)	6	1	-	1
58 (Redbank)	14	1	-	27
193 (Payne Cave)	3	-	-	9
194	-	-	-	1
Tulare				
75	5	2	-	-
Tuolumne				
General	10	9	-	-
107	-	1	-	-
108	-	2	-	-
153	1	-	-	-
166	7	1	-	-

Calaveras County

The four sites in Calaveras County represented in the collections are all in the foothill region at altitudes of 2000 to 3000 feet. It is apparently feasible to work out a sequence of subtypes here. The late end of the sequence is evident at the Hospital Site (Cal-114), where the projectile points nearly all come from a single late cemetery. The same cemetery produced a quantity of shell artifacts, including numerous clam shell disc beads as well as abalone ornaments which evidently derive from the protohistoric period, not more than a hundred years before white contact (J. A. Bennyhoff, personal communication). The projectile points, predominantly of the Delta subtype, therefore represent the latest part of the sequence.

The two specimens from the Poore Site (Cal-142), both of the General subtype, are from the top six inches of a midden which produced, at all levels, projectile points typical of Late Horizon, Phase I in the Central Valley. Since no artifacts from the site, aside from the two Desert Side-notched points, are characteristic of Phase II, we may conclude that the two points represent terminal Phase I or beginning Phase II times.

The evidence from these two Calaveras sites, then, suggests that the General subtype was introduced into Calaveras County about 1500 A.D., or

slightly earlier, and the Delta subtype came into the region, probably from the Central Valley, around 1700 or 1800 A.D.

It is perhaps worthwhile to note that the Sierra subtype did not occur at these sites, indicating that this subtype did not go west of the High Sierra in the latitude of Calaveras County.

Colusa County

Desert Side-notched points are found at but one site in Colusa County, Howells Point Site (Col-2). It is surprising that only one specimen was recovered from the site, in spite of the fact that it represents a full Phase II settlement, with an abundance of clam shell disc beads (cf. Lillard, Heizer and Fenenga, 1939, p. 69). Many projectile points have been recovered from the site besides that of the Desert Side-notched type, indicating that southern Colusa County is about the northern limit of the spread of this projectile point type from the Delta region. Col-2 yields the firmest evidence of a gap in the distribution of the type within the Sacramento Valley, since there are no further occurrences to the north between Howells Point and Red Bluff, which is the southernmost extension of the known distribution of another subtype of Desert Side-notched point, the Redding subtype.

Contra Costa County

The only specimens of Desert Side-notched points from Contra Costa County are from the Hotchkiss Site (CCo-138). All specimens with known provenience come from Phase II burials or from what is evidently Phase II midden, and thus from the period since 1500 A.D. The specimens found at CCo-138 represent the westernmost occurrence of the type in Central California, except for a single example from Marin County. Thus the Desert Side-notched point is essentially limited to the Delta province of Central California Late Horizon, the Hotchkiss Site being the westernmost site of this province.

El Dorado County

The single site representing this county is Cathedral Rock Site (Eld-24), a pure representative of the Kings Beach Complex (Heizer and Elsasser, 1953). The occurrence of a point of the Delta subtype at the site suggests that this subtype extends over the Sierra Nevada at this latitude into the territory of the Washo.

Fresno County

Fresno County specimens have been obtained from two distinct regions,

the foothills and the high mountains. Sites Fre-7 and 27, for example, are in the foothills at an elevation of about 2000 to 2500 feet, while the other sites are at elevations greater than 5000 feet.

That the three specimens from the foothills are of the General subtype, while the Sierra subtype is confined to the high elevations, is consistent with the distribution of the Sierra subtype farther north in the Sierra Nevada, where it likewise seems never to occur below about 5000 feet. Fre-27, a site in the territory of the ethnographic Yokuts, has been excavated and considerable pottery was obtained there, so that the relationship of Desert Side-notched points with respect to Yokuts ceramics may be indicated.

Table 5

Potsherds and Desert Side-notched Points at Fre-27

Level (in.)	Potsherds	Desert Side-notched Points
0-12	173	1
12-24	7	-
24-36	1	-
36-48	-	1

It will be observed that while the pottery is essentially confined to the topmost one foot of the deposit, one of the two Desert Side-notched points was obtained from a considerable depth (42 in.) This suggests that these points may pre-date the use of pottery at the site.

Taking the sites at higher elevations (Fre-115 through 169) as a group, the ratio of points of General subtype to points of Sierra subtype is 3:2. At the Vermilion Valley Site (Fre-115), however, the ratio is 6:5. Since this site represents the full historic period (Lathrap and Shutler, 1955), while some of the other sites presumably represent prehistoric times, the inference is, as it is elsewhere in the Sierra Nevada, that the Sierra subtype is slightly later than the General subtype.

Inyo County

Two of the Inyo County sites producing Desert Side-notched points have been excavated; the other specimens have come from surface collections.

One excavated site is Iny-2 (H. S. Riddell, 1951), which produced the following data:

Table 6

Potsherds and Desert Side-notched Points at Iny-2

Level (in.)	Potsherds	Desert Side-notched	
		General	Sierra
Surface	ca. 750	12	5
0-6	189	1	-
6-12	23	1	-
12-18	2	1	-

This stratigraphy also suggests that the General subtype is slightly older than the Sierra subtype. Since the quantity of pottery drops off very rapidly below a depth of six inches, the evidence suggests, in addition, that the General subtype predates the introduction of pottery by a short time.

The general ideas derived from Iny-2 are supported by the stratigraphic details of the Rose Springs Site (Iny-372) excavated by F. A. Riddell (1958, p. 42).

Table 7

Potsherds and Desert Side-Notched Points at Iny-372

Level (in.)	Potsherds	Desert Side-notched	
		General	Sierra
0-12	74	2	2
12-24	11	3	1
24-36	1	-	-

Again the General subtype seems to be slightly older than the Sierra subtype, and again we see that, although the quantity of pottery drops off below the twelve inch level, the number of Desert Side-notched points is just as great in the 12-24 inch level as it is in the 0-12 inch level.

Kern County

The only Desert Side-notched points from Kern County are reported from the Buena Vista Lake excavations (Wedel, 1941). At one of the sites excavated, eighteen of these points were recovered (out of a total of about three hundred and fifty points). From Wedel's illustrations it would appear that both the General and Delta subtypes are present in the collections, but it is not known how many of each. Only about 6 percent of the total collection of points from this site are of obsidian, while 44 percent of the Desert Side-notched points are of that material. These proportions suggest that the Desert Side-notched points found at the site were due either to trade or to influence from the east (perhaps from Inyo County) where obsidian is found more commonly.

The Desert Side-notched points were confined to the top four feet of the deposit at Ker-39 (Wedel's Site 1; cf. Wedel, 1941, Table 8. The type is Wedel's NBb1), while glass beads and iron fragments were found in the upper three feet of the deposit. This stratigraphy indicates that Desert Side-notched points were probably present only during about the last hundred years of the prehistoric period.

Lassen County

The collections from Lassen County contain many specimens with specific site provenience, in addition to a great number in one group known to be from Lassen County but which probably come from different sites (from the collection of Mr. Otto Hansen of Susanville, Calif.). The general collection, and the specific site collections as well, have been tabulated to show the relatively high proportion of Sierra subtype specimens that are found in this county. This subtype approaches 50 percent of all Desert Side-notched points from Lassen County, the highest percentage for any county.

Several of the individual site collections are of interest from the dating standpoint. Tommy Tucker Cave (Las-1) produced a single Desert Side-notched specimen, hafted to a juniper foreshaft, which was inserted into a heavy cane arrow (Fenenga and Riddell, 1949, Fig. 58s). The arrow, with Desert Side-notched point attached, was found in Room 1 at a depth of 20-40 inches. In the same room were found shell beads of types (3d, 3b1, 3a2) which in Central California indicate Late Horizon times (Bennyhoff and Heizer, 1958, pp. 67, 85). Whether the Desert Side-notched point is to be attributed to the earlier or later part of the Late Horizon cannot be settled on the basis of the single specimen.

The Karlo Site (Las-7) has produced nine Desert Side-notched points out

of a total of several hundred projectile points recovered there. Although this site produced materials almost certainly of considerable antiquity (Riddell, 1956, Fig. 14), it is felt that the Desert Side-notched points represent the protohistoric Northern Paiute and thus are only a few hundred years old at most (ibid, p. 68).

Elsewhere in Lassen County, the Desert Side-notched point is known to occur only with the latest culture. Six of these points were recovered at Amedee Cave (Las-90) which Riddell (op. cit., Fig. 14) dates as post-1000 A.D. Again, a specimen from Las-3 was found with several pieces of pottery, indicating that it must be very late in time.

The burden of evidence, then, is that the Desert Side-notched point is late in Lassen County as it is elsewhere in California, probably beginning after 1200 A.D. In Lassen County, however, none of the excavated collections reveal the stratigraphic relationships of the subtypes of Desert Side-notched points.

Marin County

Only one Desert Side-notched specimen has been found to date in Marin County, that from Mrn-307. This site produced iron spikes which are thought to derive from the wreck of Cermeño's ship, the San Augustin, in 1595 (Meighan and Heizer, 1952, p. 104). From the same site, but occurring at a greater average depth than the iron spikes, come fragments of stoneware which may be derived from the visit of Sir Francis Drake to the California coast in 1579. The Desert Side-notched point was recovered at a depth of 21 inches (the average depth of the stoneware is 21 in.). The point may therefore be dated to the middle of the sixteenth century.

Mariposa and Tuolomne Counties

These two counties are considered together because all occurrences of Desert Side-notched points from the two counties are from Yosemite National Park and are reported by Bennyhoff (1956). The proportions of subtypes in the Yosemite area seem to be typical for the Central Sierra Nevada. There are sixty-two specimens of the General subtype and forty-four specimens of the Sierra subtype. There is also some evidence of the temporal relationships of the subtypes here since stratigraphic excavations were carried out at several sites. The table following indicates the stratigraphic relationships between the subtypes. These relationships suggest that the General subtype precedes the Sierra subtype in the Yosemite region.

Table 8

Desert Side-notched Points at Mrp-9 and Mrp-105

Level (in.)	Mrp-9		Mrp-105	
	General	Sierra	General	Sierra
Surface	1	2	-	1
0-6	1	-	4	1
6-12	2	-	3	2
12-18	-	-	-	-
. . . . .	. . . .	. . . . .	. . . . .	. .
36-42	-	-	1	-

Bennyhoff uses the Desert Side-notched point as a marker for his Mariposa Complex, the latest cultural complex found in the Yosemite region. His suggested beginning date for this complex is 1200 A.D.

Modoc County

The specimens of Desert Side-notched points from Modoc County all come from the survey and excavation performed there by R. J. Squier and Gordon Grosscup (Squier, 1956). The major excavated site in the area is Mod-27. According to Squier (personal communication), the cultural remains at this site are to be attributed entirely to his Tule Lake Phase which he dates at post-1500 A.D. In the surface collections and excavations from here and from neighboring parts of Siskiyou County, no Desert Side-notched points are known to be associated with Squier's earlier Gillem Bluff or Indian Bank phases.

Mono County

Only one Desert Side-notched point is recorded as having come from Mono County, in spite of the fact that Meighan (1955) has carried out a rather extensive survey in the area. Two pottery-producing sites were investigated by Meighan but no projectile points were found (ibid., p. 12). It must be concluded that the majority of the sites visited represented something other than the latest local culture. Desert Side-notched points are the most abundant projectile points of the latest cultures in Inyo County to the south and in the high Sierra to the west. It is hardly conceivable that they were not present in Mono County, and additional investigation should be made to settle this point.

Nevada County

The only specimens from Nevada County come from site Nev-15, excavated by R. F. Heizer. The site is shallow and probably the midden soil is badly mixed. The major part of the collection from the site shows affinities to the Martis Complex, but a few specimens, including the Desert Side-notched points, show a similarity to Heizer and Elsasser's later Kings Beach complex.

It is noteworthy that one of the points recovered at Nev-15 was of the Delta subtype, indicating the influence of this subtype well up into the mountains at this latitude.

Placer County

The Desert Side-notched specimens from Placer County are partly from the Central Valley (Lincoln Mound and Pla-17) and partly from the high Sierra (Pla-9). Specimens from the Lincoln Mound (part of the Lillard collection; the site has never been relocated and so remains unnumbered) and from Pla-17 (also near the town of Lincoln) bear a marked resemblance to specimens from the Delta sites farther south in the Sacramento Valley. This is, in fact, the most northerly extension of the area of the Delta subtype, which is most common in the Sacramento-Stockton region.

Site Pla-9 is on the northern shore of Lake Tahoe and is typical of the Kings Beach Complex (Heizer and Elsasser, op. cit.). The fact that the Delta subtype also occurs at this site indicates that the subtype extends eastward over the mountains at the latitude of Lake Tahoe (note that the Delta subtype also occurs at Nev-15). The points made by the historic Washo are of the Delta subtype (ibid., Fig. 1r-v), indicating a continuous distribution from the Washo, through the Maidu, Plains Miwok, and into Yokuts territory.

Sacramento and San Joaquin Counties

These two counties have produced more Desert Side-notched specimens than any other area of comparable size in the state. The sites from these counties which are susceptible to placement in the cultural sequence of the Delta region are listed below. We are indebted to J. A. Bennyhoff for most of this information.

Table 9

Desert Side-notched Points in Delta Region, Central California

	Subtype		Cultural Placement (Phase I and Phase II refer only to Late Horizon)
	General	Delta	
Sac-6	46	75	Phase II and Phase I (see below for stratigraphic details).
Sac-16	3	4	Middle Horizon through Phase II of Late Horizon.
Sac-28	1	6	Site is Phase I and Phase II. Four points of Delta subtype are from Phase II burials.
Sac-29	-	4	Three specimens from historic burial, one specimen from a definite Phase I burial (deeper than other Phase I burials and associated with Phase I serrated points.
Sac-31	2	3	Dominantly historic but may also have earlier components.
Sac-56	-	2	Site nearly all Phase II or historic.
Sac-95	-	1	Phase II.
Sac-127	-	1	Site was occupied from Middle Horizon to historic times.
Sac-161	1	-	Terminal Phase I and Phase II are represented at the site.
SJo-43	5	6	Dominantly Phase II with some late Phase I.
SJo-47	1	3	Phase II, Phase I, and Middle components.
SJo-80	12	14	Very late Phase II, and probably historic.
SJo-82	6	7	Historic, Phase II, and rare Phase I material.
SJo-83	4	-	Dominantly Phase II, but with some Phase I-Phase II transitional material also present.
SJo-86	-	2	Both specimens found with late Phase II or historic burials.
SJo-91	1	4	Late Phase I and beginning Phase II. The specimens of General subtype were found with clam shell disc beads.

We add here the stratigraphic details of the specimens from the Johnson Mound (Sac-6). Six specimens came from burials or features, as follows:

Burial 43 (Phase II) - 1 specimen, General subtype.
Burial 52 (Phase II) - 1 specimen, Delta subtype.
Burial 66 - 1 specimen, General subtype. The burial is definitely Phase I, but the association of the projectile point is questionable.
Feature 5 - 3 specimens, Delta subtype, found at a depth of 5 inches and therefore presumably from historic or Phase II times.

The record of occurrence of the specimens found unassociated in the midden of the Johnson Mound is given in the following table and, for comparative purposes, the occurrences of clam shell disc beads found in the midden is also given. For stratigraphic purposes the site has been divided into north and south sections. The clam shell disc beads, and therefore the Phase II occupation, have a much greater average depth in the northern portion of the site. The single deep occurrences of clam shell disc beads are from a pit in the southeast corner of the site (pit T-7). None of the Desert Side-notched points are from this pit.

Table 10

Depths of Desert Side-notched Points and Clam Shell Disc Beads in Midden Deposit of Johnson Mound (Sac-6)

Level (in.)	South Section			North Section		
	Clam Shell Disc Beads	Desert Side-notched points		Clam Shell Disc Beads	Desert Side-notched points	
		General	Delta		General	Delta
0-12	16	1	1	19	2	4
12-24	10	1	1	14	2	5
24-36	1	1	2	14	1	-
36-48	-	-	1	1	-	1
48-60	-	-	-	2	-	-
60-72	-	-	-	-	-	1
72-84	-	-	-	-	-	-
84-96	2	-	-	-	-	-

The burden of evidence from Sacramento and San Joaquin Counties is that the Desert Side-notched point is predominantly associated with the Late Horizon, Phase II culture. No clear decision is possible as to whether these

points are also to be attributed to Phase I components. At site Sac-29 we have the only specimen to be associated definitely with a Phase I burial. At the Johnson Mound (Sac-6), the specimens found unassociated in the midden were slightly deeper than clam shell disc beads in the southern section of the site, but in the northern section were not quite so deep.

Only one other bit of evidence argues for Phase I dating of Desert Side-notched points. From the Johnson Mound comes a large antler point, described by Bennyhoff (1957), the form of which seems obviously to have been influenced by the form of Desert Side-notched points. The specimen was found unassociated in the midden at a depth of 40 inches in the eastern section of the site. Clam shell disc beads were found only in the topmost 12 inches of the trench from which the specimen was recovered, suggesting that the antler point was manufactured during Phase I times.

Summarizing, it seems that there are only two unequivocal Phase I occurrences of Desert Side-notched points in the Delta region. We are therefore justified in concluding that the inception of the type in this region was in the terminal Phase I period or beginning Phase II period. Any site component which produces this kind of projectile point in quantity must be considered, on these grounds alone, to represent Phase II of the Late Horizon.

The relationship of the Delta subtype and the General subtype in Sacramento and San Joaquin Counties poses a difficult question. The stratigraphic evidence from the Johnson Mound suggests that the Delta subtype is slightly earlier than the General subtype. On the other hand, the General subtype is known to have originated east of California while the Delta subtype is presumably a Californian specialization and is therefore later. Weighing all the evidence, we are inclined to deemphasize at present the stratigraphic occurrences at the Johnson Mound, and to conclude that the Delta subtype was developed soon after the peoples of the region acquired knowledge of the General subtype.

One other problem of the specimens from Sacramento and San Joaquin Counties is presented by the materials of which the Desert Side-notched points are made. A majority of the specimens are of vari-colored cherts, although a sizable minority is of obsidian. The chert used for these specimens seems never to be of the Franciscan variety which is found in the coast ranges to the west. Since no chert occurs in the Delta region itself, it must be concluded that either the material or the points themselves were traded in from the east. If the material was acquired from the east and points were made locally, we would expect to find chipping debris in the sites in the form of small flakes of chert. Cook and Treganza (1950, Table 3) found no such debris when they performed physical analysis of certain of

the middens from which Desert Side-notched points have been recovered, such as the Johnson Mound (Sac-6). Obsidian chippage was found to be present in small but perceptible quantities while chert chippage was completely absent. The obsidian in these sites, the common material for projectile points other than Desert Side-notched points, is derived from the Napa and Lake Counties obsidian quarries to the west.

What we have, then, is a definite indication that obsidian was traded in from the west with local manufacture of the products, while the chert points, already made, were traded in from the east. We do not yet know the source of the chert points to the east, but the distribution of the Delta subtype, Desert Side-notched point, indicates that it may have been at about the latitude of Lake Tahoe (Map 2).

Shasta County

The Desert Side-notched points from Shasta County come from one of two areas: the Shasta Dam-Redding area (sites Sha-19, 20, 21, 44, 46) and the Fall River-Hat Creek area (sites Sha-52, 140).

The one large excavated site in the Shasta Dam area is Sha-20 (Smith and Weymouth, 1952). The provenience of the Desert Side-notched points from that site is presented herewith.

Table 11

Desert Side-notched Points from Sha-20

Surface	General Subtype			Redding Subtype		
	8			3		
	Tr. I	Tr. II	Other	Tr. I	Tr. II	Other
0-12 in.	1	2	1	1	5	-
12-24 in.	1	1	-	-	-	-
24-36 in.	-	-	-	-	-	-
36-48 in.	1	-	-	3	-	-
48-60 in.	2	-	-	5	-	-
60-72 in.	1	1	-	2	-	-
72-84 in.	-	-	-	-	-	-
84-96 in.	-	-	-	1	-	-

Burial 5 (late, with pinenut beads): one General subtype.
Burial 6 (Historic): one General, two Redding subtypes.
One Redding subtype specimen is without location data.

It will be observed that, with one exception, all occurrences deeper than 24 inches, of both Redding and General subtypes, are in Trench I. It was in this trench that all but one of the burials occurred, including some very deep historic burials (Bur. 6, for example, at 61 in.). The graves in the historic period were evidently dug from near the 1940 surface of the site. The deep occurrences of Desert Side-notched points in this trench are, therefore, either themselves attributable to historic burials or, at any rate, to the disturbance caused by the historic burials. This would also explain the scarcity of Desert Side-notched points in the 12-36 inch levels.

If we have a case of reverse stratigraphy in Trench I, it is evident that the Redding subtype is more common in later times than the General subtype, for it is the Redding subtype that is deepest in Trench I and shallowest elsewhere.

The other site of significance in Shasta County is the Callison Site (Sha-52) on Fall River. We find none of the Redding subtype here, indicating that this subtype did not reach so far east, at least in numerical strength. The stratigraphic details of the Callison Site are given below:

Table 12

Desert Side-notched Points at Sha-52

Level (in.)	Subtype	
	General	Sierra
0-6	1	1
6-12	1	-
12-18	2	-
18-24	1	-

Burial 2 (had no other associations): one Sierra subtype.
Burial 7 (a very late burial with preserved textiles): one General, 5 Sierra subtypes.

The evidence here suggests that the Sierra subtype came into the area not more than one to two hundred years ago, and that the General subtype preceded it by two hundred years or more.

Siskiyou County

Siskiyou County collections of Desert Side-notched points are derived from two separate localities. One group of sites, including Sis-7, 10, 11, 30, 41, 49, 108, 206, 247, is in the northeast corner of the county, in the Klamath Lake region. Other sites (Sis-163, 262, 263, 264) are in the western part of the county in Scott Valley and on the Klamath River. Sites Sis-7, 10 and 11 were investigated by J. D. Howard and may include several occupation areas. The catalog entries for these sites read as follows:

Sis-7: "Probably Canby's Cross, Canby Bay, south end of Tule Lake, Siskiyou County."

Sis-10: "Oklahoma Landing and Fleming Island, Lower Klamath Lake, Siskiyou County."

Sis-11: "Probably Siskiyou County, Lower Klamath Lake, NW 1/4, sec. 19, T48N, R3E, MDBM."

Other specimens from the Tule Lake region were collected by R. J. Squier and Gordon Grosscup. Squier (personal communication) informs us that Desert Side-notched points are associated definitely only with the latest or Tule Lake Phase (post 1500 A.D.) in the region. It will be recalled that this same association apparently also holds for sites in Modoc County.

For the sites in western Siskiyou County, we have no information as to period except that Sis-262 is known to be historic.

Solano County

Only one Desert Side-notched point from a single site is recorded from Solano County. The site is Peterson 2 (Sol-2), which has components of Phases I and II of the Late Horizon and also a Middle Horizon component. The Desert Side-notched specimen is to be attributed to the Late Horizon, Phase II component.

Sutter County

The single site from Sutter County producing Desert Side-notched specimens is the Vernon Site (Sut-11). This site has yielded materials from both Phase I and Phase II of the Late Horizon.

Tehama County

Desert Side-notched points from Tehama County come from two separate regions: the Red Bluff area (Teh-58) and the foothill region east of Red Bluff (Teh-1, 193, 194). The Redbank Site (Teh-58), near Red Bluff, may be characterized as the center of a highly developed protohistoric culture without notable dependence on the lower Sacramento Valley, and, in fact, with more pronounced affinities toward the west (Treganza, 1954). It is at this site that we find the most marked development of the Redding subtype of the Desert Side-notched point. It is probably in this region that this subtype originated. The site seems to be entirely protohistoric and historic and presents little chance of obtaining stratigraphic evidence regarding historical priority of the subtypes.

In the region to the east of Red Bluff, Desert Side-notched points have been recovered from two excavated sites: Kingsley Cave (Teh-1) and Payne Cave (Teh-193). Since Kingsley Cave is for the most part older than Payne Cave (Baumhoff, 1955, 1957), the prevalence of the Redding subtype at Payne Cave and paucity of this subtype at Kingsley Cave must indicate that the Redding subtype is later in the region.

This contention is borne out by the association of these projectile points at Kingsley Cave. The single point of the Redding subtype was associated with Burial 5 which also had ninety-nine clam shell disc beads associated with it, indicating that it was from the protohistoric or historic period. Points of the General subtype came from all levels of the site (0-55 in.) and therefore may date from as much as three hundred years ago. The single point of Sierra subtype occurred at a depth of 21 inches, and may therefore be of an intermediate age.

Tulare County

The single Tulare County site which has produced Desert Side-notched points also produces potsherds; hence it may be considered to date from a very recent period.

Tuolumne County

See Mariposa County.

Temporal and Geographical Relationships

The areal distribution of the Desert Side-notched points is shown on Maps 2 and 3. Some special comment is required for greater clarity. It will be observed that the Desert Side-notched points did not diffuse to the Pacific Coast north of San Diego County (it is also only in San Diego County and south that pottery manufacturing reached the Pacific). North of here occasional specimens are found on the coast (note Marin County specimen mentioned above), especially in historic times, when there was probably some mixture of inland and coastal peoples (Pilling, 1955, p. 80, discusses such points occurring at historic sites). The distribution shown on Maps 2 and 3 illustrates aboriginal conditions of about 1750 and ignores some isolated occurrences outside the main area of distribution.

The distribution in California south of the Tehachapis is not derived from observations on individual site collections, of which there are very few in the U. C. Museum of Anthropology, but is taken from a study by Eberhart (n.d.) from published sources. Eberhart is intimately acquainted with Southern California archaeology and his view on this matter can be relied upon.

For the distribution of the subtypes, we may indicate the main points of uncertainty. For the General subtype we have shown a gap in the distribution within the Central Valley from Sutter County to about the southern boundary of Tehama County. The existence of such a gap rests on weak ground, since only the smallest collections are available from the area. There are two reasons for assuming that there actually is such a gap: (1) the Howells Point Site (Col-2) revealed only one Desert Side-notched point even though it was a full Phase II site with many projectile points of other types, and (2) the Redding subtype with its northern distribution indicates a separate development in relative isolation from the Delta area.

Elsewhere the distributions of the General subtype seem relatively firm. We may add that although the subtype is present in the southern San Joaquin Valley, it is definitely of minor importance.

For the Sierra and Redding subtypes the distribution seems to be on firm ground, except that the southern limit of the Redding subtype is uncertain. Elsewhere, there is an adequate sample of sites along the limits of the distribution.

The distribution of the Delta subtype presents a more complex problem. The southern limits of the subtype are not well established because of the

lack of adequate collecting in the San Joaquin Valley. The extension of this subtype into the Sierra seems well established and, in fact, there are occurrences of this subtype as far east as Stillwater in the Carson Sink of Nevada. It has been suggested earlier (cf. discussion under Sacramento and San Joaquin Counties) that the presence of the Desert Side-notched points in the Delta are to be accounted for, at least in part, by trade from the east. As yet the source of the points has not been discovered. Presumably, it is not in central or northern Nevada or the Delta subtype would be more common than it is in the Carson and Washoe Valleys. Evidently, then, it is in the foothill or Sierra region in California. One may suggest Placer or Nevada Counties as being the most likely source.

The following table gives our best estimate of the dates of introduction of the subtypes.

Table 13

Suggested Dates of Introduction of Desert Side-notched Points to Various Localities in California

	Subtypes			
	General	Sierra	Delta	Redding
Delta Region	1450	-	1500	-
N. Sacramento Valley	1600	-	-	1700
S. San Joaquin Valley	1650	-	-	-
S. Sierra	1350	1450	-	-
Central Sierra	1350	1450	-	-
N. Sierra	1400	1500	1500	-
N.E. California	1500	1600	-	-
Owens Valley	1300	1400	-	-

The dates given depend heavily on interpretations of the Central California cultural sequence. It is the present opinion of J. A. Bennyhoff (personal communication), based on intimate knowledge of the Late Horizon and on several radiocarbon dates, that the beginning of Phase II of the Late Horizon in Central California is to be dated at 1500 A.D. Since our evidence indicates the presence of Desert Side-notched points in terminal Phase I times, we have subtracted 50 years from the beginning Phase II date, thus estimating 1450 A.D. as the likely date for the introduction of the speci-

mens (General subtype) into the Delta region. If subsequent investigations indicate that the beginning Phase II is incorrect, the dates for Desert Side-notched points should be shifted accordingly.

The dates given for the Sierra and for Owens Valley depend upon the Central Valley dates. Since the Desert Side-notched point is earlier in the Southwest region than in California, the diffusion of the type must have been from east to west and from south to north. This being so, we presume that the dates for its introduction into the southern and central Sierra Nevada are earlier than the dates for the Central Valley and still earlier for the Owens Valley region.

The dates given for the northern part of the state are, to some extent, independent of the Central Valley sequence. In the northern Sacramento Valley these projectile points occur in contexts that give every appearance of being barely prehistoric. We are supported in this by R. J. Squier's guess date for his Tule Lake Phase in Modoc and Siskiyou Counties at 1500 A.D., since this is the only culture producing Desert Side-notched points in the region. We may point out a large discrepancy between the present dating and that of L. S. Cressman in southern Oregon. Cressman (op. cit., chart 3, fig. 45) found Desert Side-notched points in Level I of his Kawumkan Springs Midden. He indicates that Level I represents an occupation between 250 B.C. and 150 A.D. Since the Kawumkan Springs Midden is only a few miles into Oregon from California, it is clear that his and our datings for the Desert Side-notched points should mesh, rather than show a difference of more than 1500 years. Again, additional investigation is needed to clarify the issue. We will not attempt here to reconcile the discrepancy.

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Explanation of Figure
[Following page 40]

Figure 1: Frequency Distribution of Weights and Lengths of Desert Side-Notched Projectile Points.

Explanation of Maps
[Following page 40]

Map 1: California Archaeological Sites Producing Desert Side-Notched Points.

Map 2: Distribution of Desert Side-Notched Points, General and Delta Subtypes.

Map 3: Distribution of Desert Side-Notched Points, Sierra and Redding Subtypes.

Explanation of Plate 1*

(All specimens stored in University of California Museum of Anthropology [UCMA]. Numbers with "1-" prefix are Museum numbers proper; "L-" prefix, Lillard Collection; "B-" prefix, Barr Collection.)

a-f: General subtype
- a. 1-40365, Lower Klamath Lake, Siskiyou County.
- b. B-409 (provenience unknown).
- c. 1-57913, site Sac-6 (Johnson Mound, Sacramento County).
- d. 1-63034, site Sha-20 (McCloud River, Shasta County).
- e. B-807 (provenience unknown).
- f. L-16232 (provenience unknown).

g-k: Sierra subtype
- g. 1-40731, Siskiyou County.
- h. 1-134698, site Mrp-105 (Mariposa County).
- i. 1-40368, site Sis-11 (Lower Klamath Lake, Siskiyou County).
- j. 1-40371, site Sis-11 (Lower Klamath Lake, Siskiyou County).
- k. 1-40297, site Sis-11 (Lower Klamath Lake, Siskiyou County).

m-r: Delta subtype
- m. L-7915 (provenience unknown).
- n. L-1514, Lincoln Mound, Placer County.
- o. L-1515, Lincoln Mound, Placer County.
- p. L-1529, Lincoln Mound, Placer County.
- q. L-1516, Lincoln Mound, Placer County.
- r. 1-57847, site Sac-6 (Johnson Mound, Sacramento County).

s-x: Redding subtype
- s. 1-133254, site Teh-1 (Kingsley Cave, Tehama County).
- t. 1-152107, site Teh-58 (Redbank Site, Tehama County).
- u. 1-151843, site Teh-58 (Redbank Site, Tehama County).
- v. 1-151847, site Teh-58 (Redbank Site, Tehama County).
- w. 1-65134, Humboldt Lakebed, Churchill County, Nevada.
- x. 1-151795, site Teh-58 (Redbank Site, Tehama County).

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*Plate 1 follows p. 40.