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REPORTS

The Age of the San Dieguito Artifact Assemblage at the C. W. Harris Site

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The age of some San Dieguito artifacts at the C. W. Harris Site is shown stratigraphically to be older than 9,030 (11,222 to 9,322) B.P. The artifacts associated with dates of 8,490 (10,561 to 8,540) B.P. may have been redeposited with the gravel and sand in which they were found, and may be older than 8,490 (10,561 to 8,540) B.P. The San Dieguito-bearing deposit, Stratum E, is divided into three Units: EI, EII, and EIII. EI contains undisturbed San Dieguito artifacts and features located in coarse and fine sands overlaying gravel and sand deposits. Unit EII is composed of the fill of Channel 1, which cuts through the undisturbed San Dieguito level in Unit EI. Channel I fill consists of gravel and sand strata containing redeposited San Dieguito artifacts. A radiocarbon date of 9,030 (11,222 to 9,322) B.P. was obtained from a stratum in coarse sands overlying the stream deposits of Channel 1. Unit EIII is Channel 2, cut into the edge of Channel 1 in Unit EII. The boundary between EII and EIII is an erosion surface which rises toward the east, just 20 cm. above the location where the date of 9,030 (11,222 to 9,322) B.P. was obtained. Channel 2 was cut to bedrock and filled with three gravel and sand strata containing San Dieguito artifacts. Two dates of 8,490 (10,561 to 8,540) B.P. were obtained on charcoal from the middle stratum. Warren and True (1961) believed a charcoal lens from this stratum was a hearth, evidence of human occupation at 8,490 (10,560 to 8,540) B.P., but this now seems unlikely. The San Dieguito occupation at the C. W. Harris Site began sometime prior to 9,030 (11,222 to 9,322) B.P. and may have persisted to ca. 8,540 (10,561 to 8,540) B.P.

The radiocarbon dates for the San Dieguito component of the C. W. Harris Site were originally published by C. Vance Haynes, Jr., Donald C. Grey, Paul E. Damon, and Richmond Bennett in 1967 (Table 1). In that report, the authors (Haynes et al. 1967:10) correctly described the 9,030 (11,222 to 9,322) B.P. sample as predating the San Dieguito artifacts. In 1967, excavations were extended much farther across the terrace than was described by Haynes and his colleagues (1967). These later excavations exposed stratigraphic relationships showing that San Dieguito tools and flakes predated the stratum from which the 9,030 (11,222 to 9,322) B.P. carbon sample was taken. The senior author has been remiss in not publishing the detailed results of his 1965–67 excavations (which seems to be a curse of the C. W. Harris Site—neither M. J. Rogers nor Paul Ezell reported their work in full). A review of Rodgers' notes reveals that his stratigraphic information could contribute significantly to a better understanding of the stratigraphy of the Harris Site (SDI-149) (Warren 1967; Warren and True 1961; Warren's unpublished notes on the 1965 and 1967 excavations).

Table 1

^{14}C DATES FROM THE C. W. HARRIS SITE (SDI-149): CALIBRATED AGE DETERMINATIONS USING OXCAL (INTCAL04)

Radiocarbon Dates	Calibrated Age Range at 1 Sigma		Calibrated Age Range at 2 Sigma	
(LJ-202) 6,300 ± 200	7,424 to 6,994 B.P.	5,474 to 5,044 B.C.	7,571 to 6,747 B.P.	5,621 to 4,797 B.C.
(A-723) 7,620 ± 360	8,974 to 8,048 B.P.	7,024 to 6,098 B.C.	9,404 to 7,792 B.P.	7,454 to 5,843 B.C.
(A-724) 8,490 ± 400	10,134 to 9,017 B.P.	8,184 to 7,067 B.C.	10,561 to 8,540 B.P.	8,611 to 6.590 B.C.
(A-725) 8,490 ± 400	10,134 to 9,017 B.P.	8,184 to 7,067 B.C.	10,561 to 8,540 B.P.	8,611 to 6,590 B.C.
(A-722A) 9,030 ± 350	10,585 to 9,627 B.P.	8,635 to 7,677 B.C.	11,222 to 9,322 B.P.	9,272 to 7,372 B.C.

Originally, the plan was to publish a final report in which all the data available on the Harris Site would appear in a single publication. However, there has been a great deal of misunderstanding and misrepresentation regarding the dates from the San Dieguito component of the Harris Site. That confusion has derived in part from some questionable interpretations found in earlier publications on the site, and the inadequate reporting of the dates has contributed significantly to the problem. This paper summarizes that portion of the stratigraphic data which demonstrates that some San Dieguito artifacts are older than 9,030 (11,222 to 9,322) B.P. However, it is still not a full report on the stratigraphy or the distribution of the San Dieguito artifacts and features at the C. W. Harris Site; that project remains to be completed.

A BRIEF HISTORY OF THE DATING OF THE C. W. HARRIS SITE

When Malcolm Rogers (1929) first identified the San Dieguito pattern (his "Scraper Makers") in 1929, he dated it later than the La Jolla pattern in a relative sequence of three cultural units. By 1938, Rogers (1938, 1938–39, 1939) had changed his mind and assigned San Dieguito to the earliest position in the sequence, with an age of 4,000 years. Rogers based this determination on his interpretations of the geology of the sites in the California desert, and on the stratigraphic record of the Harris Site. Assigning a correct age to the San Dieguito pattern in western San Diego County has been a problem ever since. In 1959, based on radiocarbon dates of over 7,000 years from La Jolla sites, Carl Leavitt Hubbs (personal communication, 1959) argued that La Jolla was older than San Dieguito. Rogers (1938–1939) had discovered stratigraphic proof that San Dieguito was earlier than La Jolla in his 1938 excavations at the Harris Site, but that evidence had still not been published when Rogers died in 1960.

As the year 1959 began, the San Dieguito pattern at the Harris Site had not yet been described, there was confusion regarding the differentiation of San Dieguito from La Jolla assemblages, and La Jolla sites were dated by radiocarbon at over 7,000 years. Furthermore, these early California assemblages shared no characteristics with the early fluted point tradition of the high plains east of the Rocky Mountains.

Claude N. Warren and D. L. True (1961) sought to address these problems in their 1959 excavations at the Harris Site. This work produced, for the first time, a description of the San Dieguito artifact assemblage from the C. W. Harris Site. Warren and True argued, as Rogers had, that the San Dieguito artifact assemblage was significantly different from that of the La Jolla and other Milling Stone Horizon sites, and that the San Dieguito pattern was older than the La Jolla. Warren and True's dating of the site was widely though not universally accepted by the archaeological establishment during the 1960s and 1970s (Heizer 1964; Jennings 1964; Krieger 1964; Meighan 1965; Willey 1966). Radiocarbon dates for the San Dieguito assemblage became available in 1966 (Haynes et al. 1967), when four carbon samples from the lower strata of the Harris Site, obtained during the excavations of 1965, were assayed. This paper presents the first correlation of the stratigraphy of M. J. Rogers' 1938 excavations (1966) with those of Warren and True's (1961) and Warren's 1965 and 1967 excavations, places the four radiocarbon dates in their stratigraphic context, and demonstrates an age of greater than 9,030 (11,222 to 9,322) years B.P. for at least a part of the San Dieguito component.

In recent decades there has been much speculation and a great deal written about the relationship between the San Dieguito and La Jolla cultural traditions (Bull 1983; Ezell 1983; Hanna 1983; Gallegos and Kyle 1998; but see Warren 1985). Some archaeologists have merged the San Dieguito and La Jolla assemblages into a single tradition. Others believe the San Dieguito assemblage represents a specialized activity of the La Jolla people.

The relationship between the San Dieguito and La Jolla cultural patterns, if any, requires clarification. A proper reporting of the age of the San Dieguito assemblages is necessary to evaluate such a relationship. We demonstrate here that (1) the San Dieguito assemblage at the C. W. Harris Site is older than most, if not all, dated La Jolla sites; and (2) that San Dieguito therefore does not represent a specialized activity of the La Jolla people. We maintain that the suggestion that San Dieguito and La Jolla represent a single cultural tradition has not been demonstrated, and is in fact unlikely, given the differences in lithic reduction technology and the differences in the forms and

functions of the tools (Crabtree, Warren, and True 1963; Flenniken, Eighmey, and McDonald 2008; Vaughan 1982; Warren 1967; Warren and True 1961). These problems demonstrate clearly how important it is that archaeologists identify criteria by which culture change due to evolutionary developments can be distinguished from change due to culture contact and replacement.

GEOLOGY AND STRATIGRAPHY OF THE C. W. HARRIS SITE

The Harris Site is located in the terrace deposits on the left or southeast bank of the San Dieguito River, in San Diego County, California, about seven miles from the coast (Fig. 1). The site is just downstream from where the river exits a steep, narrow canyon through the Coast

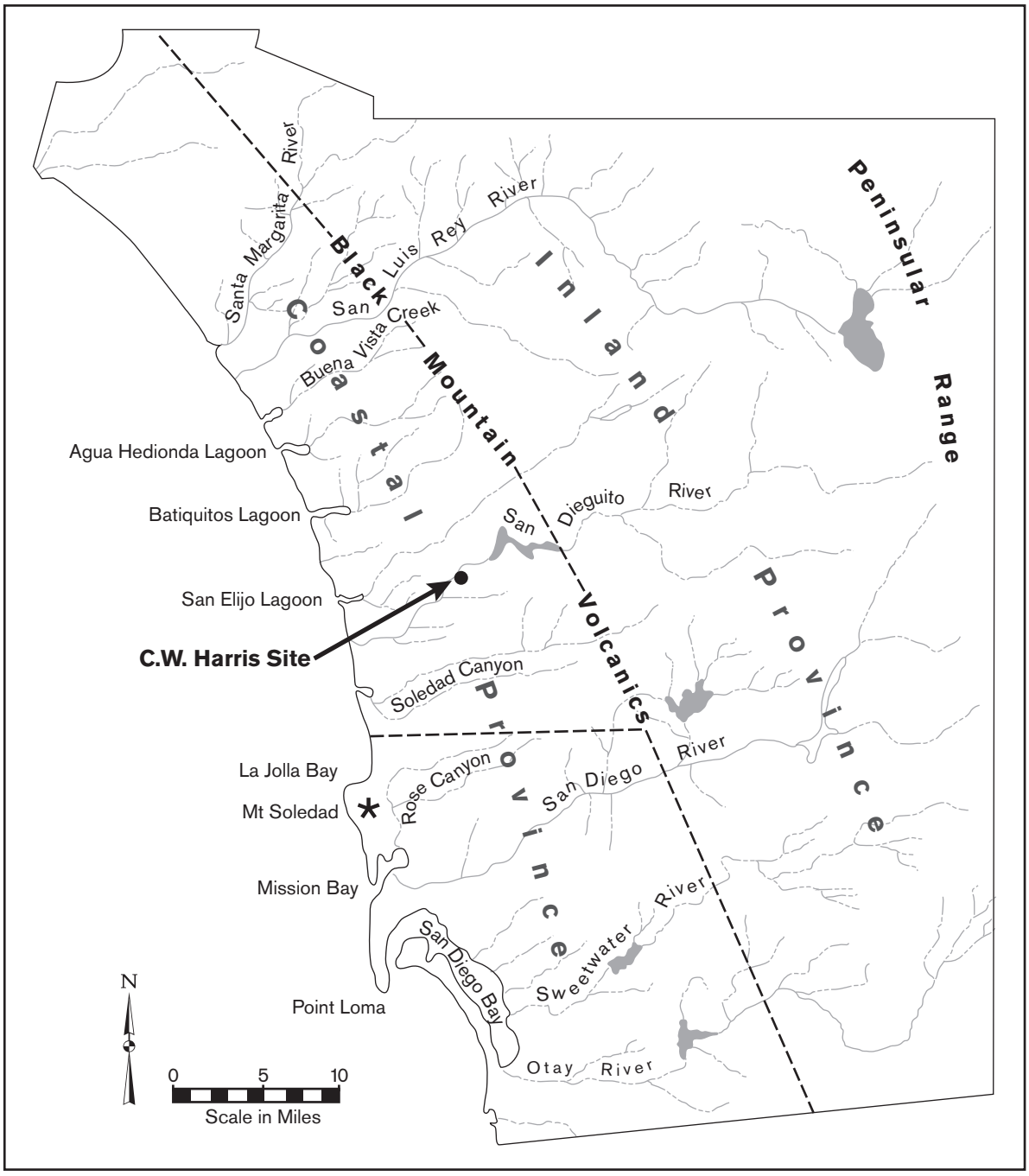

Figure 1. Map of western San Diego County with location of the C. W. Harris Site (CA-SDI-149).

Figure 2. Aerial photograph of geological and environmental setting of the C. W. Harris Site.

Range. Geological processes of the San Dieguito River dominated the formation of the terrace and heavily influenced the stratigraphic and environmental context in which the cultural material was deposited (Fig. 2). At this location, the river channel moved westward and undercut the northwest bank, where there is now an eighty-foot-high bluff (Fig. 3).

The displacement of the channel to the northwest increased the width of the southeast terrace (Figs. 4 and 5). Consequently, the deposits of the terrace increase in age both with depth from the surface and with distance from the modern terrace edge. The deposition of fluvial sediments probably continued until the flow of the river decreased during the early to mid Holocene. During that

Figure 3. Photograph of high bluff on northwest (right) bank of the San Dieguito River, taken from the C. W. Harris Site.

Figure 4. Photograph of the C. W. Harris Site on the terrace of southeast (left) bank of the San Dieguito River, taken from the high bluff on the northwest (right) bank. Arrow indicates location of Warren and True's 1959 excavations.

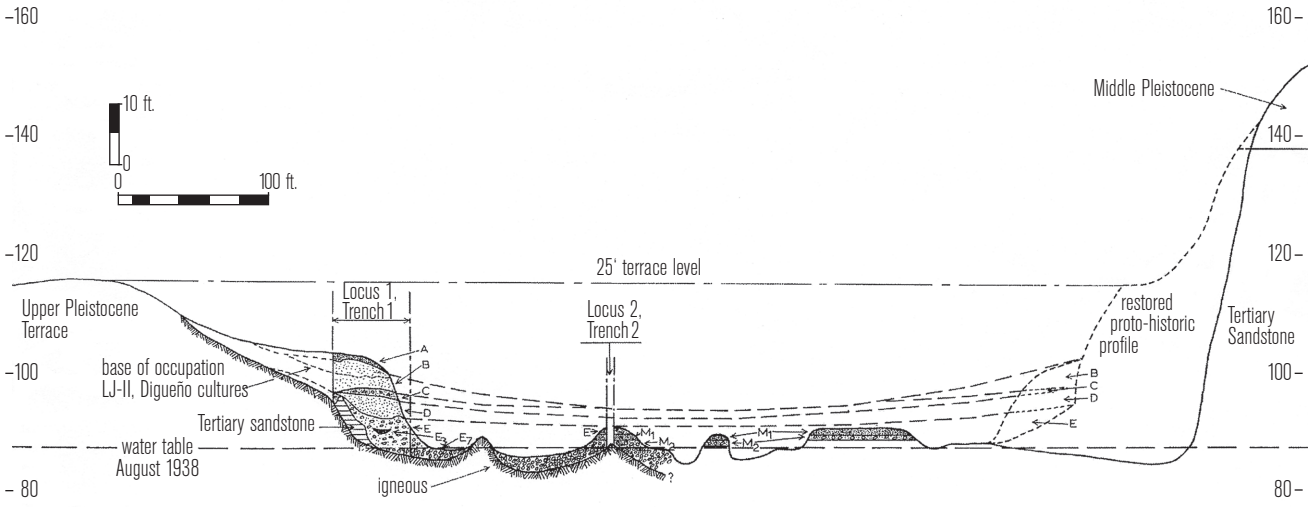

Figure 5. Cross section of San Dieguito River Valley at the C.W. Harris site showing terraces on left bank and high bluff on right bank.

period and later, destructive flash flooding periodically occurred, eroding and depositing cultural material. For archaeologists, these depositional processes complicate the stratigraphic relationships.

Rogers' (1966:26) Trench 1 provides a view of the stratigraphy found at the downstream edge of the site (Fig. 6). The stratigraphy in Trench 1 (Fig. 7), as elsewhere in the site, appears misleadingly simple and straightforward. It is important to note that Rogers identified five major strata at this location, designated by letters A through E, and recognized the many subdivisions of Stratum E. The five major strata are described below.

Stratum A is a very late, perhaps historic, flood deposit of fine sand and silt which lacks evidence of human occupation and is not discussed further here.

Stratum B consists of silt and fine sand, horizontally stratified, with lenses of coarser sand and darker, carbonaceous silt and fine sand. Silt comprises upper Stratum B, and is most likely channel and over-bank deposits of a low-energy, meandering stream. Lower Stratum B is fine sand, probably the lateral equivalent to coarser braided stream channel-fill materials. It may be flood plain sediment deposited during the transition from braided to meandering stream. La Jolla and late prehistoric materials are found in the upper levels of Stratum B.

Stratum C consists of unstratified small boulders, gravel, and sand.

Stratum D consists of fine to coarse sand, with variable interstitial clay content, without stratification and structure, and lies unconformably on Stratum E in Rogers' Trench 1. This stratum is much like Stratum B, having been laid down when the river was flowing sluggishly.

Stratum E consists of seven water-deposited gravel and sand sub-strata, some including multiple lenses. In comparing Rogers' Stratum E with comparable strata in Warren and True's (1961) excavation and in Warren's 1965 Trench C (Figs. 6 and 8), two contrasting types of sediments were identified as comprising Stratum E; they are found in both locations. These are Ea, a crudely stratified gravel composed of rounded fragments ranging in size from boulder to pebbles, interpreted as the longitudinal gravel bars of a braided stream. A sandy sediment, type Eb, is associated with the gravel Ea of the gravel bars. This sand is better sorted and stratified than the gravels, and was deposited concurrently with the Type Ea gravel bars (Fig 9).

The relative proportions of the well-sorted Eb type of sediments and the coarser Ea bar-forming gravels is a function of the availability of the different sizes of sediments. Both are deposited concomitantly in braided streams. In this depositional setting, sediments and their ages also represent the environment and time when associated flakes and artifacts were enclosed in the deposits. In order to clarify these relationships, a summary of the braided stream model is presented below.

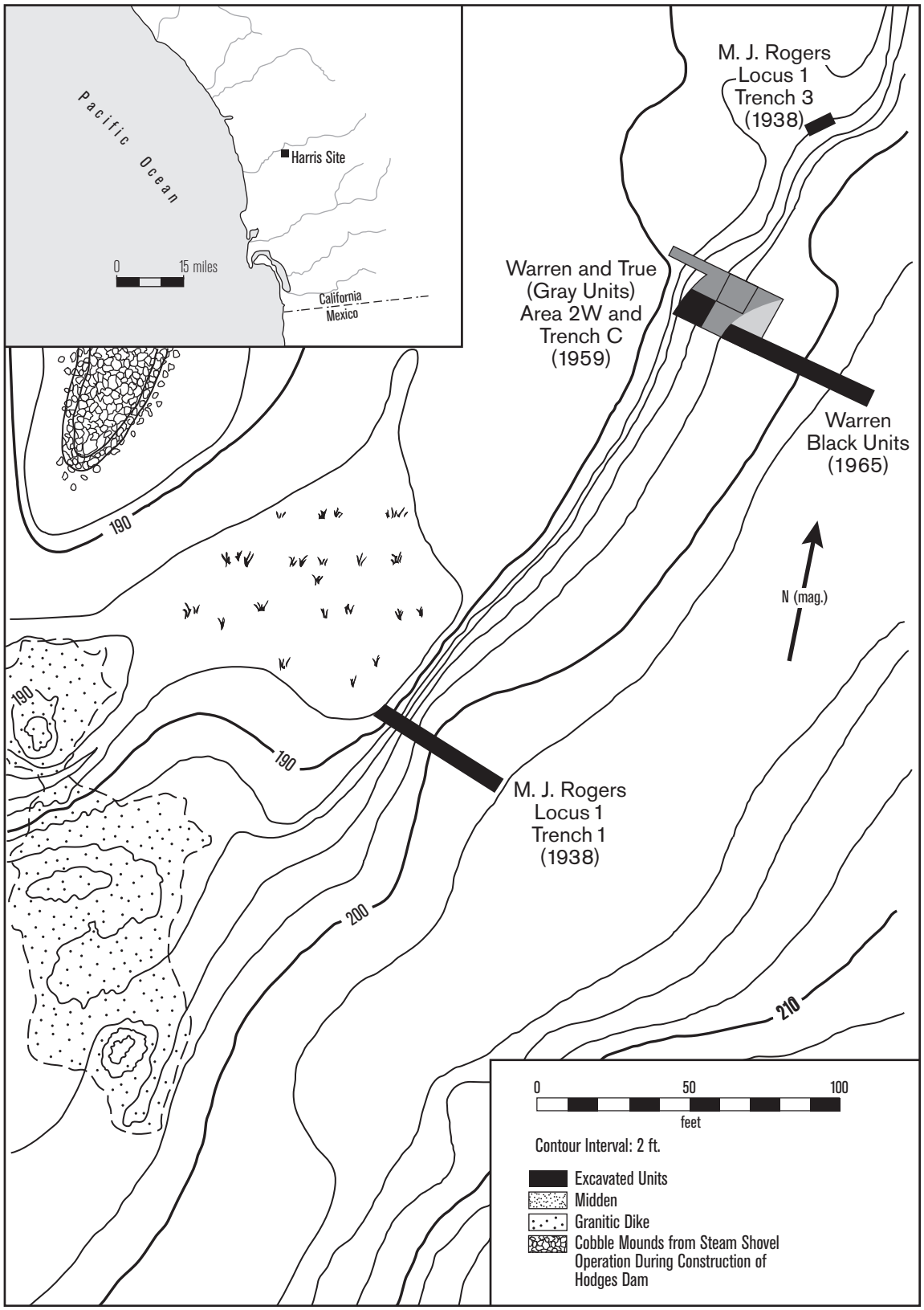

Figure 6. Map of the C. W. Harris Site showing locations of Rogers' trenches 1 and 3, and Warren and True's 1959 and Warren's 1965 excavations.

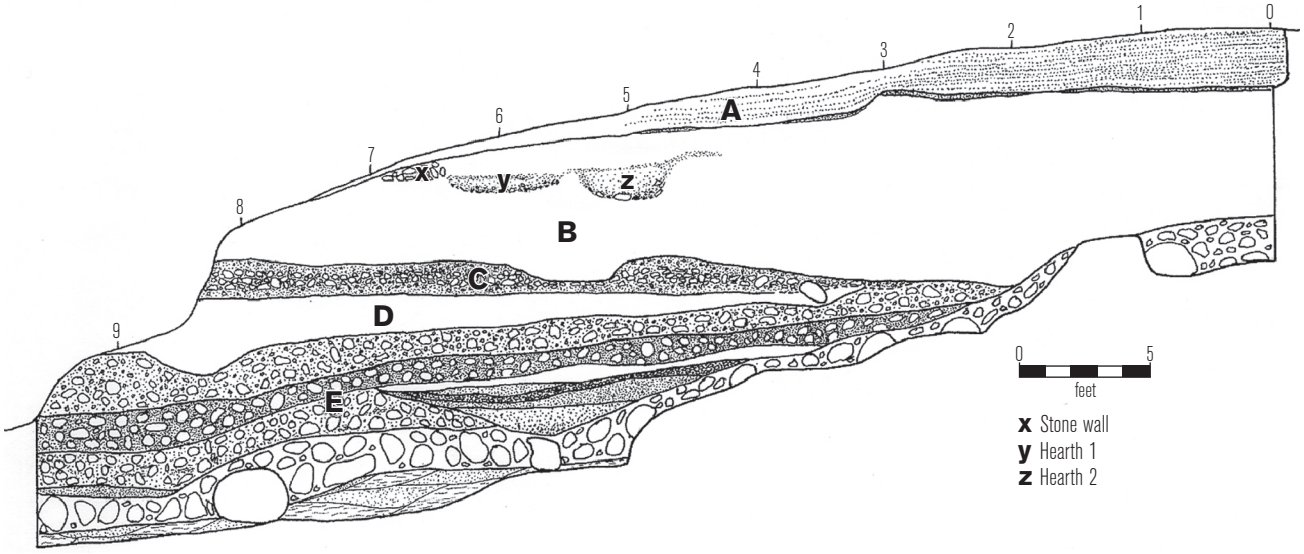

Figure 7. Stratigraphic profile of Rogers' Trench 1.

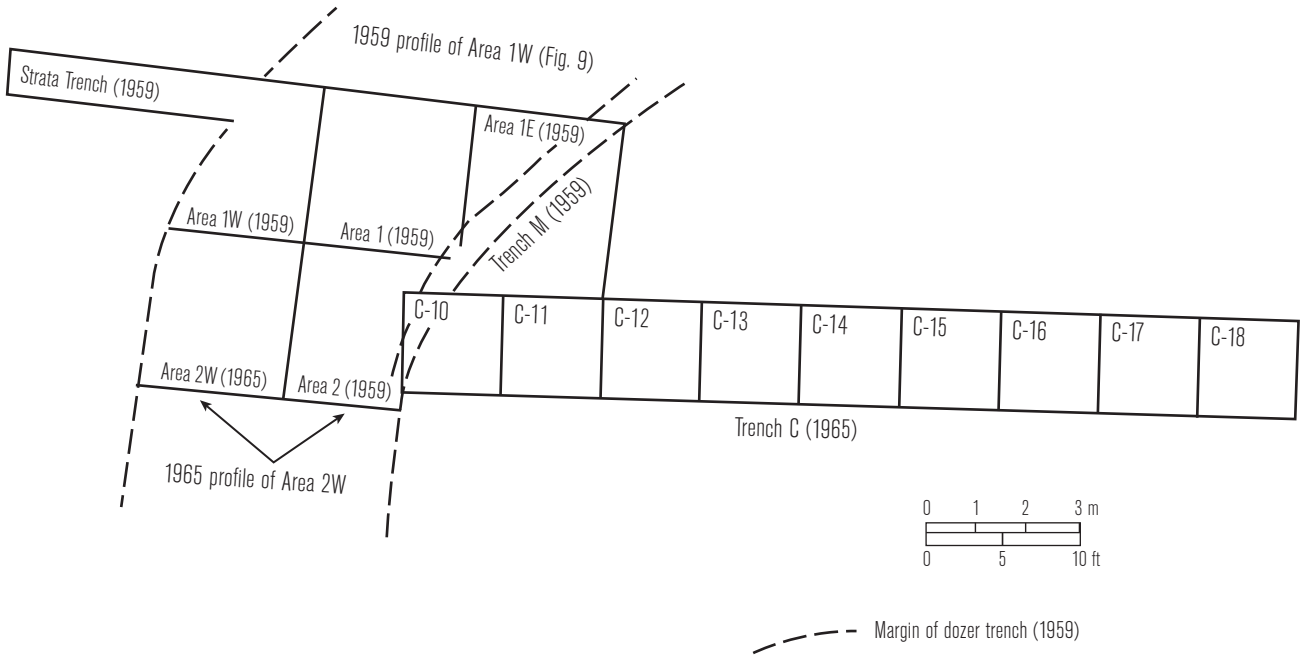

Figure 8. Plan of Warren and True's 1959 excavation, and Trench C and Area 2W of Warren's 1965 and 1967 excavations.

BRAIDED STREAM DEPOSITIONAL MODEL

Assuming that the amount of sediment being furnished to a given stream reach is greater than that leaving it, and that the stream flow is unable to carry a portion of that load, a longitudinal (parallel to the average flow) gravel bar is deposited in the bottom of the channel. These bars are blunt upstream and taper downstream; the upstream ends contain the coarsest gravel clasts, while the downstream ends are finer and grade downstream into sand.

The bar builds up until the flow over its surface is unable to carry more gravel onto the bar surface, at which time the flow avulses; i.e., it moves to the side of the bar, sometimes eroding the lateral channel a bit (Fig. 10). One

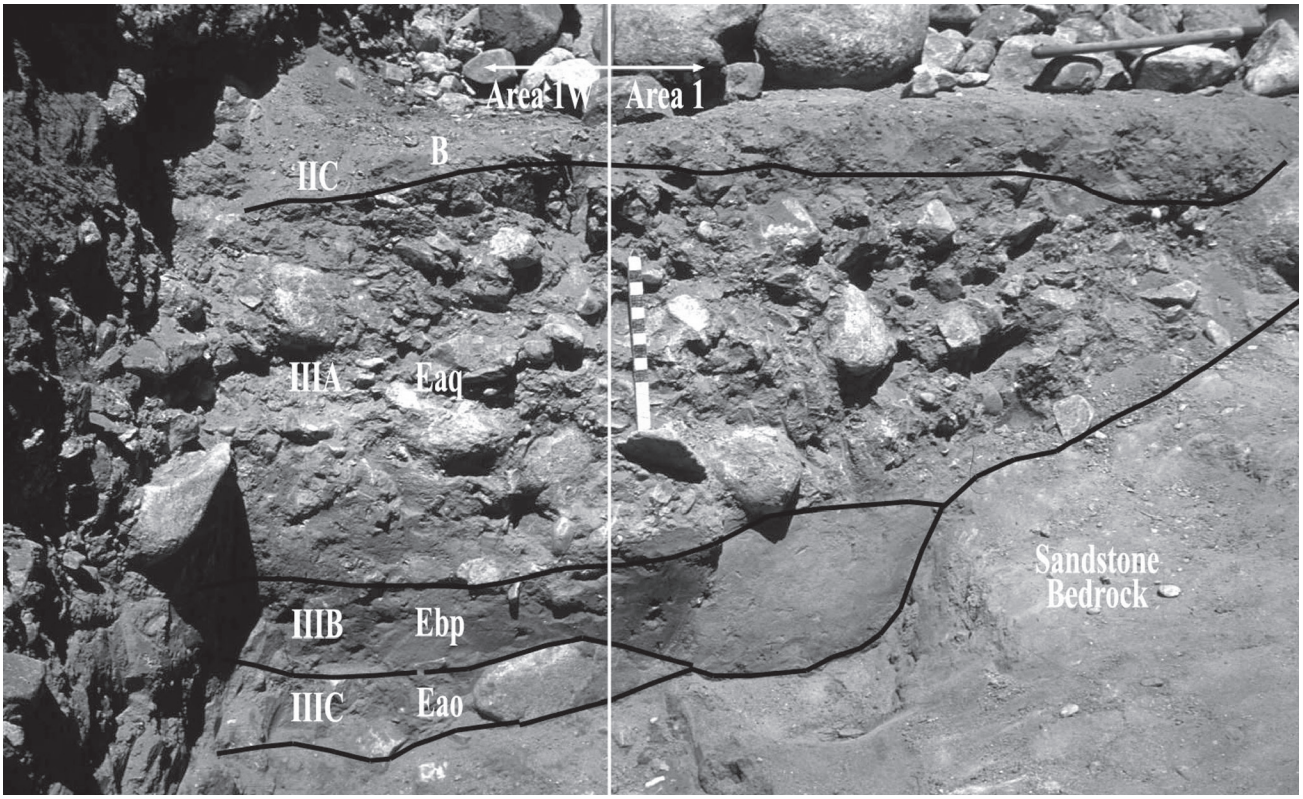

Figure 9. North face of Area 1W and Area 1, Warren and True's 1959 excavation.

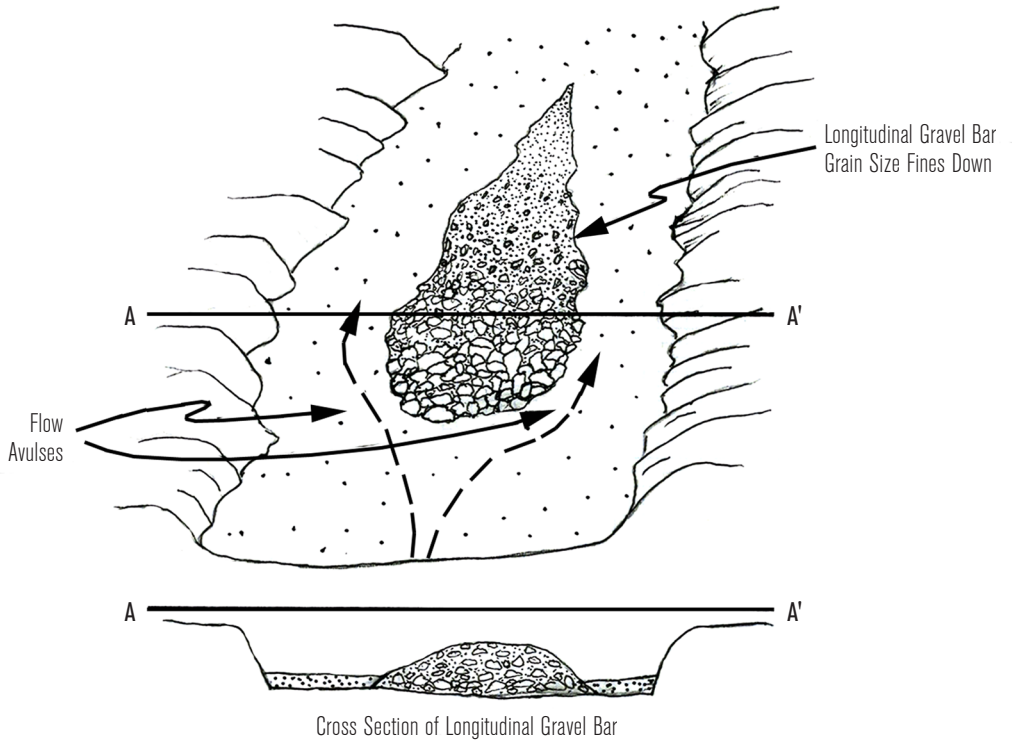

Figure 10. Gravel bar building, stage 1.

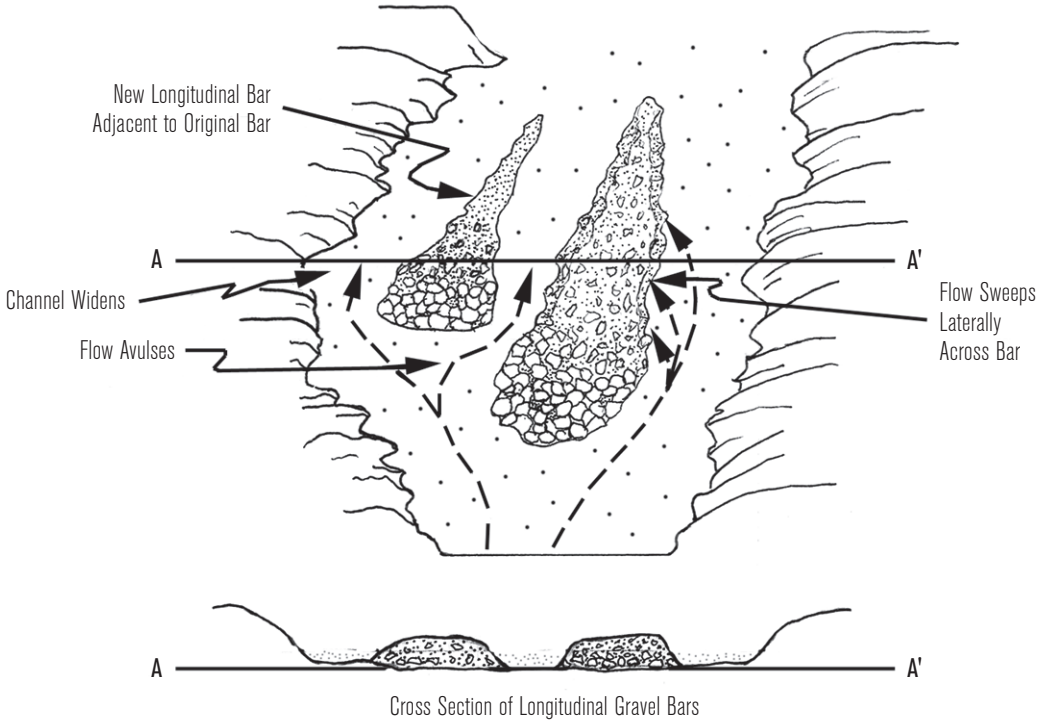

Figure 11. Gravel bar building, stage 2.

side of the bar tends to become the dominant channel. Flow from that side sweeps laterally over the bar surface (Fig. 11), and if a supply of sand is available, deposits a wedge of foreset-cross-laminated sands on top of the gravel bar surface (Fig. 12). These sands are "graded;" i. e., coarser sand slides to the bottom of the foresets, while finer sand remains at the top. Eventually erosion widens and somewhat deepens one or both channels. A new gravel bar is initiated in a channel alongside the old bar, and it, too, eventually builds up until the flow over its surface is insufficient for further upward growth.

As long as more poorly-sorted sediment is supplied to a given reach than leaves it, the process continues: bar deposition, channel avulsion, new bar alongside old, more channel avulsion, new bar deposited on top of first bar, etc., while all the time finer sediments (sands), are being deposited concomitantly and sequentially alongside and on top of the gravel bars. The result is a mélange of overlapping longitudinal bars, with interspersed foreset wedges and laminated channel sands (Fig. 13). If at any time flakes or artifacts become part of the coarse load of the stream, they also get deposited. During the fall, when flows are lower, the bars are dry and may even become vegetated. Carbon samples from the gravel bars may be derived from vegetation that is approximately the same age as the gravel strata.

A COMPARISON OF STRATIGRAPHIC SEQUENCES: ROGERS (1966), WARREN AND TRUE (1961), AND WARREN (1965 AND 1967)

Warren's Trench C provides a view of the stratigraphy at the north end of the site (Figs. 6, 8 and 12), where only three major strata (A, B, and E) are found (Figs. 9 and 14). Rogers recognized that his strata C and D were missing in his Trench 3 (Fig. 15), located just upstream from Warren's Trench C (Fig. 6).

Site Stratigraphy

Rogers (1966:8) described and mapped strata C and D along the section provided by the cut bank of the terrace, and explained the formation of these strata, and their absence in the vicinity of his Trench 3, as due to a period of erosion. Unfortunately, Rogers' profile of the river bank has been lost, and only a schematic of it is presented here (Fig. 16). Rogers wrote:

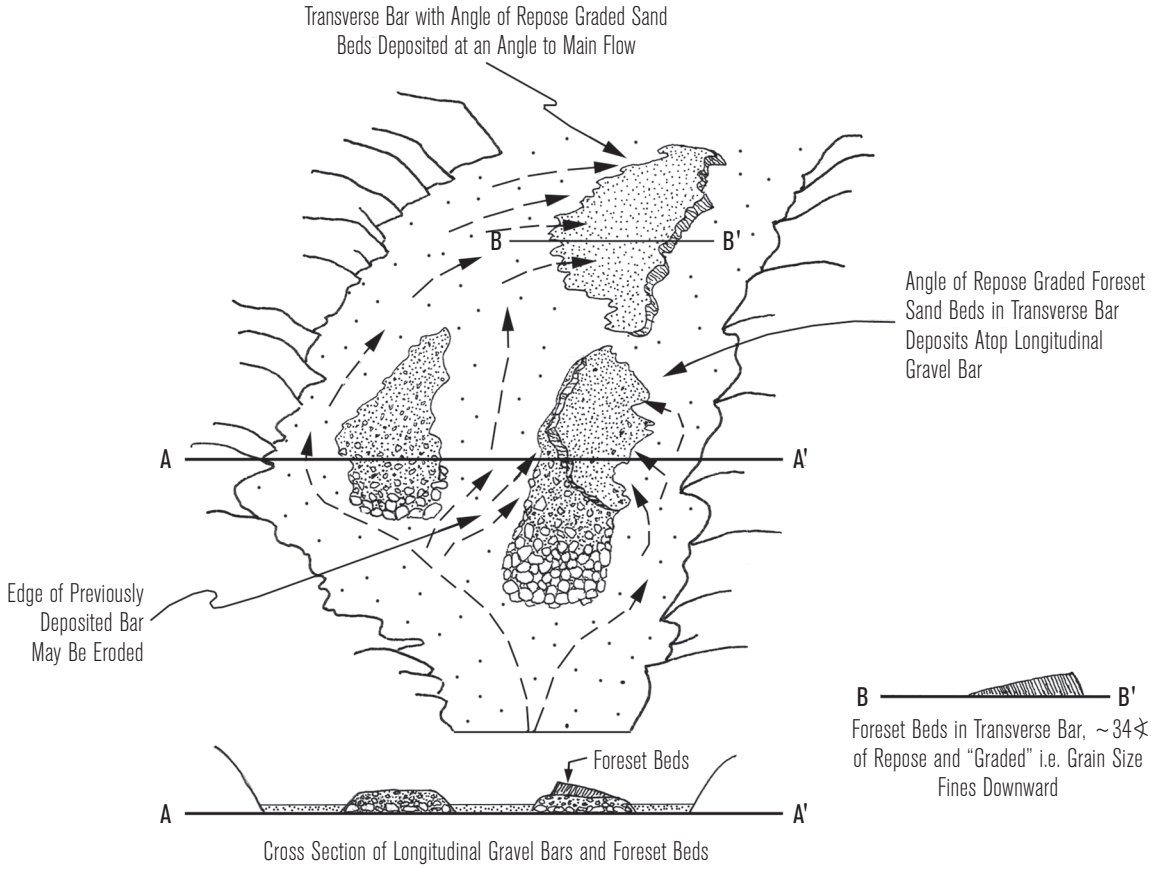

Figure 12. Gravel bar building, stage 3.

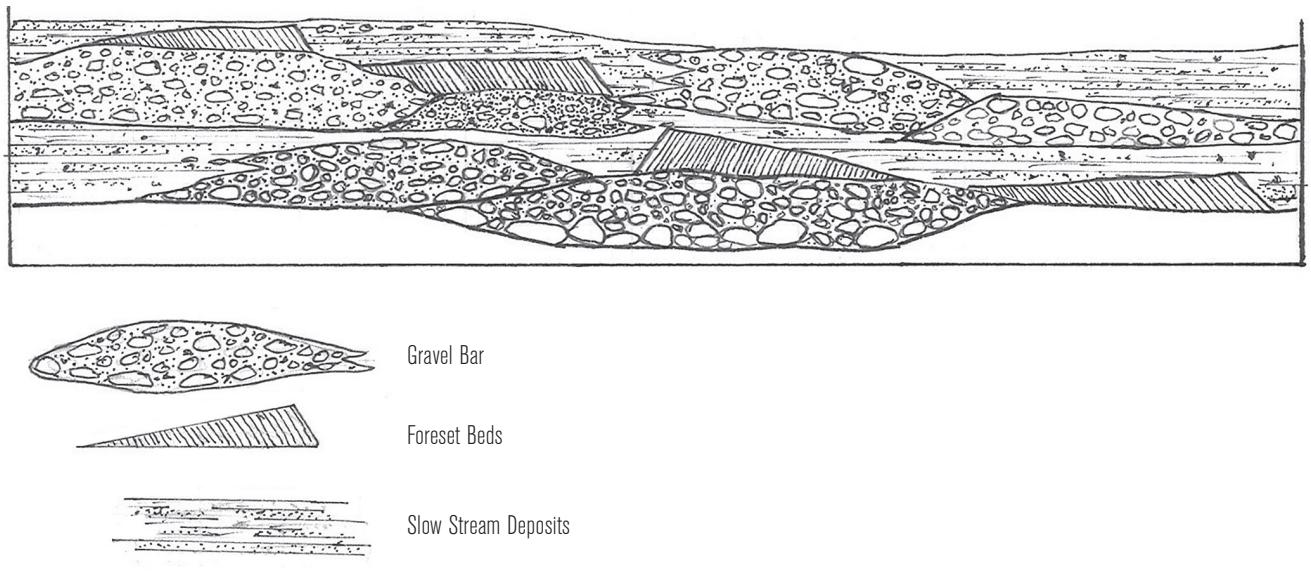

Figure 13. Schematic section of braided stream channel.

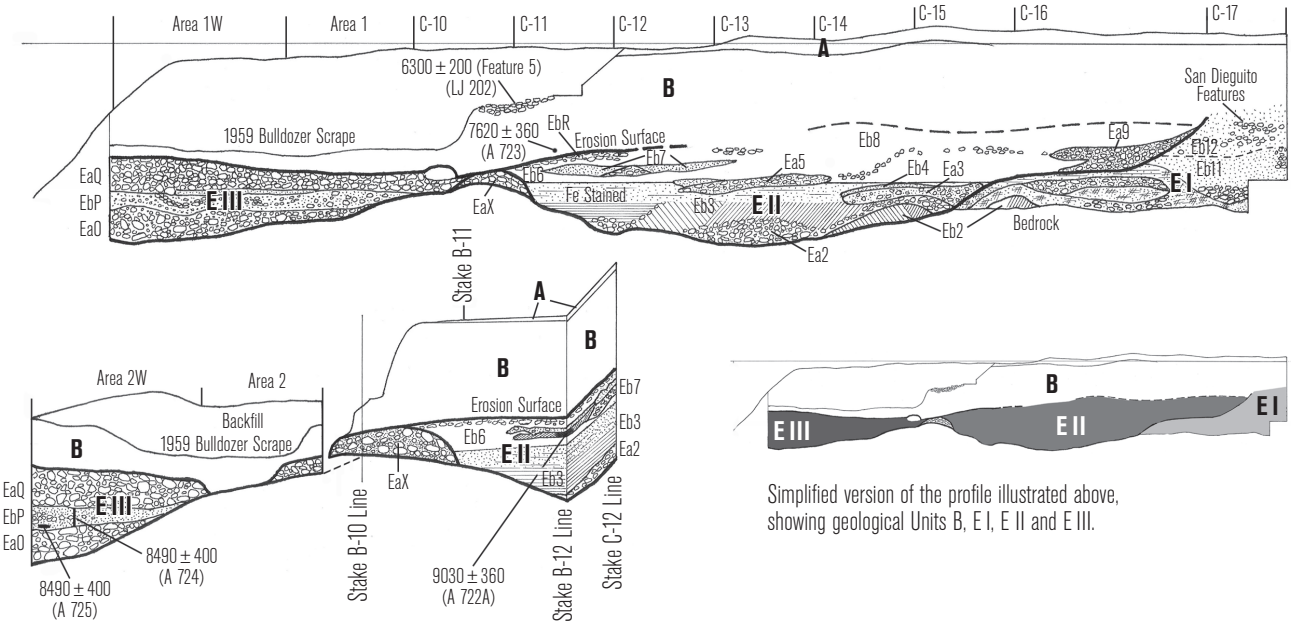

Figure 14. Profile of Area 2W, Area 2, and Trench C units C-10 through C-17.

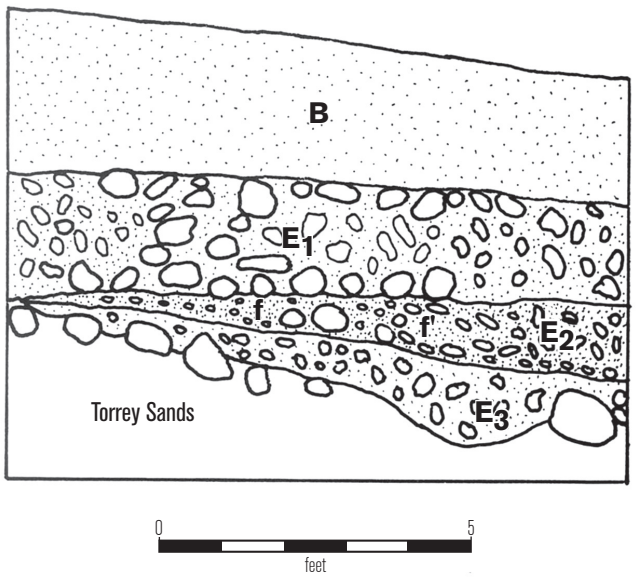

Figure 15. Profile of Rogers' Trench 3, Locus 1.

Both D and B-Stratum [sic] are of the same geological age, but…[a] lens of cobbles (Stratum C) separates these two in the area of Trench 1.

At a point 160 feet upstream from the dyke, Stratum C merges with Stratum E. Stratum C rests disconformably on Stratum D. This disconformity must represent the planing off of unknown amounts of material from the top of D. This relationship between strata C and D indicates that a single freakish flood interrupted the even progress of still water deposition where the fine sediments of the D-B formation were being deposited [Rogers 1966:8].

One may take issue with Rogers' "single freakish flood," but evidence from Warren's Trench C (Units C-10, C-11, and C-12: Fig. 14), including the erosion surface, suggests Rogers was generally correct. The erosion surface represents a period during which bedrock was exposed at the western edge of Unit C-10, and in all or part of areas 1W, 1, 1E, 2W, and 2 (Warren and True 1961). Strata EaQ, EbP, and probably EaO were deposited afterwards. This period of erosion and deposition was a major geological event in the development of the C. W. Harris Site. The erosion removed the over-bank sediments (Stratum D) in the northwestern part of the site and created the erosion surface that runs the length of the site. In the central-to-downstream section of the site, the erosion surface rests on a remnant of Stratum D, which is capped by gravel Stratum C, deposited by a high-energy stream event or events. Rogers reports that this Stratum C also contained artifacts and flakes. Stratum B rests on Stratum C and is fine-grained over-bank sediment of the flood plain. Rogers argued that strata B and D were the result of the same geological process of flood plain development which was interrupted by

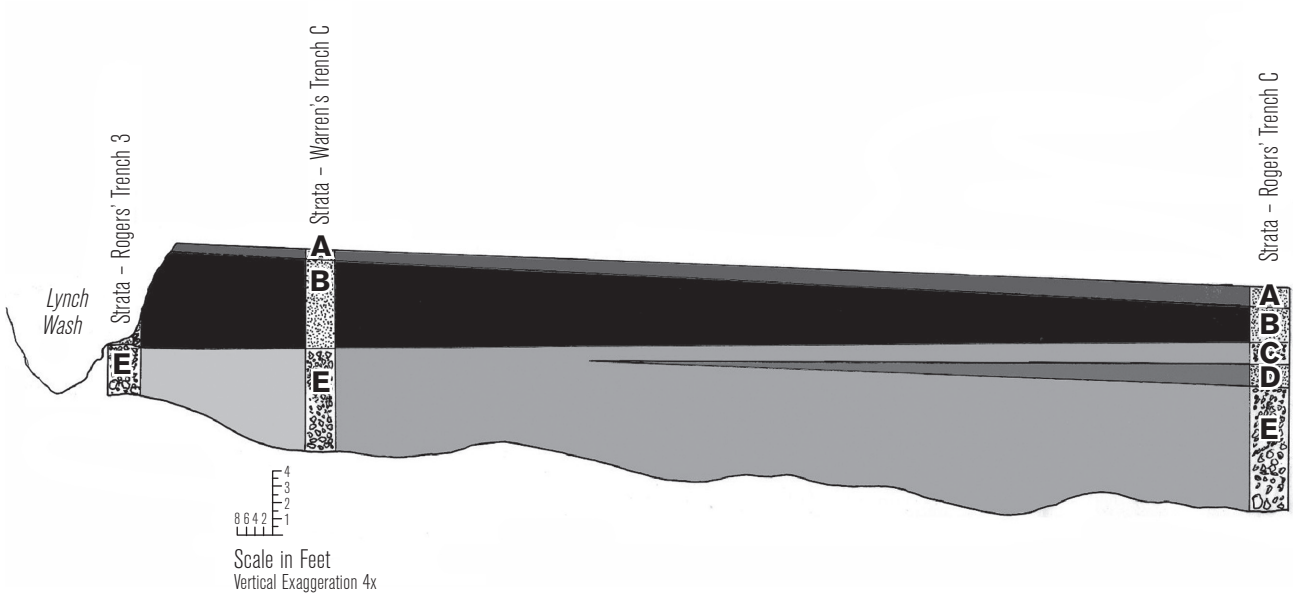

Figure 16. Schematic profile of terrace edge showing stratigraphic relationship of strata C and D to stratigraphy in Rogers' Trench 1 and Trench 3, and Warren's Trench C.

a flood event indicated by the erosion surface and deposition of Stratum C.

At the northwestern edge of the site, Stratum D has been removed by the erosion event, but the erosion surface can be traced only a short distance eastward into the present terrace. It rises toward the east and may have ended at the surface of the terrace, which was probably about 180 to 200 cm. lower than today. The coarse sands, strata Eb6, Eb8, and Eb12 in Trench C (Figs. 6, 8, and 14), located below and east of the erosion surface, appear to be stratigraphically equivalent to Rogers' Stratum D. The erosion was restricted to the western edge of the terrace and did not extend as far east as Unit C-14; the coarse sand is present east of this point, resting on early E strata. This coarse sand becomes increasingly fine in an upward direction, transitioning into Stratum B. Upward fining (graded bedding) is characteristic of point bar deposits, with sands prograding toward the stream center on the convex side of meanders.

Three horizontal subdivisions of Stratum E are recognized at the north end of the site (Fig. 14). These are based on the cutting and filling of Channel 1, and the erosion of the deposits in Channel 2. Unit IE comprises the strata located east of Channel 1, including the ancient gravel bars, sand, and pebbles lenses overlain by a fine sand (Eb11), and a superimposed coarse sand containing San Dieguito artifacts and features (Eb12, Fig. 14). Unit IIE strata are those deposits filling Channel 1 and overlying it below Stratum B. Unit IIIE comprises sand and gravel strata that fill Channel 2. All three units underlie Stratum B and rest on soft yellow sandstone bedrock into which channels have been eroded. These subdivisions of Stratum E are described below together with associated radiocarbon dates.

Unit IE: East of Channel 1. The strata east of Channel 1 are early gravel bars, associated with sand lenses, including the overlying fine sand (Eb11) and coarse sand (Eb12) (Fig. 14). The eastern edge of Channel 1, as indicated by the upper edge of gravel Stratum Ea9, is elevated above the base of the coarse sand (Eb12). This indicates that Channel 1 was cut through the coarse sand of Stratum Eb12. The fill of Channel 1 is therefore younger than Stratum Eb12. The age of Stratum Eb12 and the underlying deposits is unknown, but a San Dieguito feature and artifacts were found in Stratum Eb12 and flakes were found in Stratum Eb11. In unit C-17, between 180 and 200 cm. in depth within Stratum Eb12, there was a rock feature resembling a hearth. In addition, 90 flakes, two bifaces, and two scrapers were recovered. In C-17, flakes were found to a depth of 275 cm., but were not associated with additional tools.

Unit IIE: Channel 1. Gravel and sand strata Ea2, Ea3, Eb2, and Eb4 were deposited in the eastern portion of Channel I by a relatively high-energy stream flow. However, laminated sand and foreset deposits (Stratum Eb3) form the major portion of the Channel 1 fill (Fig. 14). The upper portion of this laminated sand exhibits an orange-colored iron staining, and is capped by lenses of gravel and sand (strata Ea5 and Eb6). A stratum of coarse sand (Eb8), which encloses Stratum Eb7, overlays the laminated sand and represents the transition from channel fill to floodplain. The earliest radiocarbon sample, dated to 9,030 (11,222 to 9,322) B.P., consisted of fine charcoal from a gray to dark gray carbonaceous, calcareous sandy clay. This sample "predates San Dieguito artifacts which were immediately below the contact" (Haynes et al. 1967:10). This stratigraphic relationship has been taken by some archaeologists to mean that the date is stratigraphically earlier than *all* the San Dieguito artifacts at the C. W. Harris Site. This is not the case; tools and flakes were found from top to bottom of Channel 1 (EII) fill (Fig 14).

In excavation units C-11 through C-13 and into C-14, the sandy deposits and gravel lenses (Ea5, Eb6, and Eb7) overlaying the culturally sterile laminated sand (Eb3) contained some flakes and a few tools (Fig. 14). Flakes but no tools were found in the gravel Ea2 at the base of the deposit in C-13 and C-14. In unit C-14, Stratum Eb3 interlaminates with Ea2, Ea3, and Eb4. This interlaminating indicates contemporaneity of Eb3 with the cobble gravel and pebbly sand of Ea2, Ea3, and Eb4. Stratum Eb7, with the carbon date of 9,030 (11,222 to 9,322) B.P., overlies Stratum Eb3, Eb4, Ea3, and Ea5 and is therefore younger than these deposits and the artifacts incorporated in them.

In units C-14 and C-15, below 240 cm. in strata Ea2, Ea3, and Eb4, 27 tools and more than 2,700 flakes were recovered. The tools included 13 bifaces, 2 projectile points, 9 unifaces, and 3 other flaked stone tools.

The coarse sand (Eb8) above Channel 1 is stratigraphically equivalent to Stratum Eb12, though it is younger. Channel 1 cut through Stratum Eb12 and interrupted the deposition of this coarse sand at this location. When Channel 1 was again filled to this elevation, the deposition of coarse sand recommenced as Stratum Eb8. This coarse sand represents the early floodplain deposit at this locality, and it extended some unknown distance to the west. The coarse sand, Stratum Eb8, was then removed and its formation temporarily terminated in units C-10, C-11, and C-12, and in areas 1W, 1, 1E, 2W, 2, and 2E, as indicated by the erosion surface in units C-10, C-11, and C-12. Strata Eb12 and Eb8 thus predate the erosion and appear to be the stratigraphic equivalent of Rogers' Stratum D. The distribution of artifacts in relationship to the 9,030 (11,222 to 9,322) B.P. date indicates the artifacts in Channel 1 were deposited earlier than 9,030 (11,222 to 9,322) years ago, and that the artifacts and flakes found throughout Channel 1 and in strata Eb11 and Eb12 in Unit EI are older than the cutting of Channel 1.

Unit IIIE: Channel 2. Channel 2 contains three strata of gravel and sand that had been transported by high-energy streams (EaO, EbP, EaQ; Fig. 14). They all contain pebble to cobble-sized clasts, with an occasional boulder. Coarse to fine sand is present in all strata, but EbP contains more sand, often in the form of small sand bars. Stratum EaO rests disconformably on soft yellow sandstone bedrock, and has generally larger clasts, including more boulders, than the later strata. The boundary between EaO and EbP is less clear. Stratum EbP has a greater quantity of sand and fewer cobbles than the other two strata, and flecks of charcoal, rarely forming small lenses, are found throughout the EbP deposit. No charcoal was noted in strata EaO and EaQ. Stratum EaQ contains no sand bars, less sand, and a greater density of cobble and pebble clasts than EbP. The boundary between EaQ and EbP is less distinct than that between EbP and EaO.

Stratum EaQ extends eastward beneath Stratum B, as illustrated by Warren and True (1961 [2006:31, Fig. 2]), and into units C-10 and C-11 (Fig. 14). In units C-10 and C-11, the erosion surface is found on the surface of a stratum of sand and pebbles (EbR) which—as it rises to the east—cuts off the west end of Stratum Eb7. Stratum EbR also contains the San Dieguito felsite flakes and artifacts referred to by Haynes et al. (1967:10).

Two carbon samples from Stratum EbP, consisting of carbon-like fragments that were "either partially pyrolyzed wood or unpyrolyzed but partially decayed" (Haynes et al. 1967:10), are not attributed by us to human activity. Rather, they are interpreted as wood incorporated in the sand at the time of its deposition or shortly thereafter. One dated sample was composed of

small fragments disseminated throughout the alluvial sand and gravel of Stratum EbP. The second sample was from a single small lens enclosed within the same stratum. The samples produced identical dates of 8,490 (10,561 to 8,540) B.P. (A 724 and A 725), which indicates their essentially concurrent deposition.

A concentration of carbon and a charcoal lens was exposed in the north wall of Warren and True's excavation units 1 and 1W (Fig. 9); it was enclosed in Warren and True's (1961 [2006:8]) Stratum IIIB. Stratum IIIB was a sandy stratum positioned between gravel strata IIIA and IIIC. Warren and True made the following comments regarding this feature:

> …a small lens of charcoal-stained sand [was] found in the sand of Stratum IIIB.... The lens measured 16 inches long and 3 inches thick. It contained a few flecks of charcoal but unfortunately there was too small an amount for dating. This feature is important because it indicates that, at least in part, the cultural material found here is undoubtedly primary deposit and was not washed in from further upstream [1961 (2006:8)].

At the present time we are not as certain of these interpretations as Warren and True were in 1961. It now seems likely that the charcoal was naturally deposited. The feature was exposed in the side wall of areas 1 and 1W, 20 feet north of the south wall of areas 2 and 2W (Figs. 8 and 9). The proximity of the two locations, their position against the steep slope of bedrock, and the similarities in stratigraphic sequence suggest that Warren and True's strata IIIA, IIIB, and IIIC are the stratigraphic equivalents of our strata EaQ, EbP, and EaO (Figs. 8, 9, and 14). The charcoal lens could have resulted from natural causes. On the other hand, the artifacts and charcoal lenses were located in sand, with some pebbles and cobbles, at an edge of a stream. This location may have been a popular activity area 8,490 (10,561 to 8,540) years ago. However, there can be little doubt that the artifacts in the gravel deposits EaO and EaQ were deposited concurrently with the gravel that encloses them.

All of these Stratum E deposits are overlain by flood plain Stratum B. However, in Unit EI, the coarse sand is deeper than the edge of Channel 1 and transitions upwards into Stratum B. In Unit EII, east of Unit C-12, there is a transition from gravel lenses and laminated sands to the coarse sand of Stratum Eb8, and again there is a transition to Stratum B. In Unit EIII, there is a clear break, an unconformity between Stratum E and Stratum B, and clay is present in the lowest level of Stratum B.

Stratum B produced two significant radiocarbon dates. The first is 6,300 + 200 (7,541 to 6,747) B. P. (LJ-2002) on charcoal from Warren and True's La Jolla Feature 5, located between 80 and 100 cm. below the ground surface and ca. 90 cm. above the erosion surface (Fig. 14). This feature was associated with charcoal, carbonized pine nuts, and *mulvaceae* seeds (Warren and True 1961 [2006:10]). The second date, 7,620 (9,404 to 7,792) B.P., is from isolated charcoal in Stratum B, 20 cm. above the erosion contact and ca. 70 cm. below Feature 5 (Fig. 14).

The fact that these dates are all on charcoal and are located in alluvial deposits makes it theoretically possible that the four oldest samples may be stream-deposited charcoal derived from old strata and redeposited here, giving ages older than the strata in which they were found. In this sequence, however, each stratum is sealed off by an overlying stratum. If the 9,030 (11,222 to 9,3222) B.P. date in Stratum Eb7 is derived from an older deposit, then Stratum Eb7 must still be older than 8,490 (10,561 to 8,540) B.P., the date for deposits associated with the erosion surface that overlay the 9,030 (11,222 to 9,322) years-old date. Likewise, if the 8,490 (10,561 to 8,540) B.P. date from EIII deposits is from an older source, that source must be older than 7,620 (9,404 to 7,792) B.P., the date for the lower Stratum B that overlays the EIII deposits and is separated from them by a disconformity. It is hard to imagine a situation where charcoal would be randomly eroded from a series of older deposits and then redeposited in sequential order in sealed strata.

Units EI, EII, and EIII are three stratigraphic units within Stratum E that demonstrate the horizontal differences in the ages of these stream deposits. Unit EI is the oldest of the three, and the coarse sand (Eb12) is the most recent stratum of EI. Eb12, the coarse sand of EI, is the oldest stratum so far identified as containing San Dieguito tools.

Unit EII is the fill of Channel 1, which was cut alongside of and into Unit EI; it contains San Dieguito artifacts and flakes throughout the depth of the channel deposits (Fig. 14). The artifacts were deposited in the sand and gravel of the stream channel, but not in the laminated stream deposits. These artifacts are thought to have been derived from the EI deposits into which

Channel 1 was cut. The upper laminated stream deposits are rusty orange, iron-stained, well-sorted clayey fine sands which exhibit a sharp contact with overlying coarse sand (Eb8). The coarse sand (Eb8) is the stratigraphic equivalent of coarse sand Eb12, but is somewhat younger. Stratum Eb7, dated to 9,030 (11,222 to 9,322) years ago, is enclosed in coarse sand Eb8. San Dieguito artifacts and flakes found in Eb8 are probably not redeposited and some may be slightly younger than 9,000 years.

Erosion events occurred after 9,030 (11,222 to 9,322) B.P. that removed the Eb8 coarse sand in units C-10 and C-11, exposing an ancient gravel bar (EaX) and the rise in bedrock (Fig 14). To the west of this rise in bedrock, the erosion exposed bedrock in parts or all of areas 2W, 2, 1W, 1, 1E (Figs. 6, 8, and 14). Periods of deposition accompanied this erosion. The units of EIII (strata EaO, EbP, and EaQ) are redeposited gravel and sand containing San Dieguito artifacts and flakes. EbP is dated to 8,490 (10,561 to 8,540) B.P. Stratum EaQ overlies Stratum EbP and is separated from overlying Stratum B by a disconformity.

Stratum B consists of the floodplain deposits, slightly over 2 meters thick, of the San Dieguito River that are lacking the coarse sand at its base and are younger than the coarse sand that occurs at about the same elevation in units EI and EII. A carbon sample from Stratum B, located 20 cm. above the erosion surface in Unit C-11, is dated to 7,620 (9,404 to 7,792) B.P. (Fig. 14).

The earliest deposits and San Dieguito artifacts are found in Unit EI (Fig. 14). Unit EII is known to be younger than Unit EI because Channel 1 cut into EI. Therefore, the fill of Channel 1 is younger than Unit EI, but the artifacts in Channel 1 were redeposited and are probably as old as the coarse sand (Eb12) of EI. Enclosed in the coarse sand (Eb8) overlying the Channel 1 fill, Stratum Eb7 produced the date of 9,030 (11,222 to 9,322) B.P. Therefore, all stratigraphic units and artifacts in Channel 1 below Stratum Eb7 are older than Eb7, and are older than 9,030 (11,222 to 9,322) B.P.

Erosion events occurred after 9,030 (11,222 to 9,322) B.P. that removed the Eb8 coarse sand in units C-10 and C-11 and in much of the excavated area west of Unit C-10. Periods of deposition accompanied this erosion and resulted in strata EaO and EaQ with their associated artifacts. Stratum EbP was also deposited at this time; it is dated to 8,490 (10,561 to 8,540) B.P. The artifacts and charcoal lenses, however, might be the result of human occupation at this location.

Stratum B clearly overlies and is younger than Stratum E. Units EI, EII, and EIII in Trench C and Area 2 clearly demonstrate that much of the San Dieguito occupation dates to more than 9,030 (11,222 to 9,322) years ago (Fig. 14). The artifacts in lower Stratum Eb12 of Unit EI clearly are older than Channel 1 and its fill. It is also clear that artifacts found in the fill of Channel 1 are older than 9,030 (11,222 to 9,322) B.P. and were probably eroded from EI deposits. Artifacts in strata EaO and EaQ were redeposited with the gravel in which they were found. Artifacts in EbP may or may not represent an occupation at 8,490 (10,561 to 8,540) B.P., but there are no San Dieguito artifacts that can be shown to be younger than ca. 8,500 (9,500) years ago.

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