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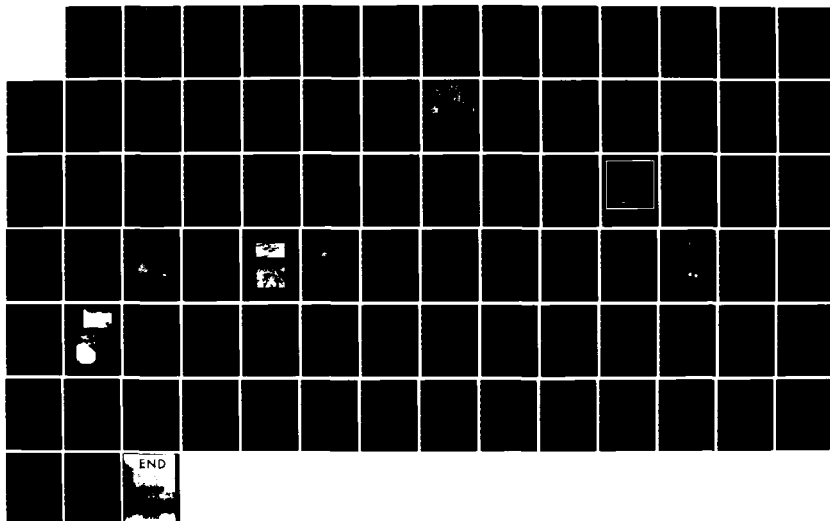
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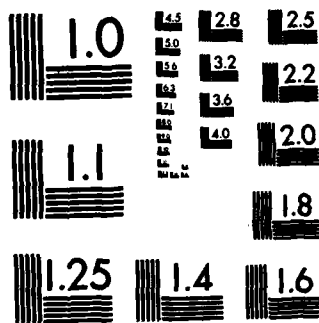
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Archaeological Test Sampling
Of Sites Within the La Quinta
Flood Control Channel Easement

Prepared for:

U.S. Army Corps Engineer District, Los Angeles
Los Angeles, California

Contract No. DACW09-80-M-0975

Prepared by:

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PREFACE

Prior to initiating field activities, contact was made with the Agua Caliente Tribal Council in Palm Springs, California. It was found that Mr. Anthony Andreas, Tribal historian, would be the proper liason. Attempts were made to contact Mr. Andreas directly but with no success. Details and purpose of the project were given to the Tribal council office. No further response was received.

INTRODUCTION

Under contract DACW09-08-M-0975 with the U.S. Army Corps of Engineers, Los Angeles District, members of Archaeological Resource Management Corporation (ARMC) conducted a field reconnaissance and test sampling program for sites within the La Quinta Flood Control Channel project area. This program was undertaken under the direction of the author with the field assistance of Nancy Farrell, Joyce Clevenger, Patricia Jertberg, Lori Pendleton and Toni Snyder. The project was begun on January 15, 1980 and, although field time sustained rain delays and was subsequently augmented due to the discovery of a previously unrecorded site, the field session was accomplished in 36 man/days.

Previous archaeological survey of the project alignment (Berryman 1977) had resulted in the discovery and recording of six archaeological sites, ranging from small concentrations of sherds to extensive scatters of cultural materials. For this project, a brief field reconnaissance of the project area was performed in order to relocate previously recorded sites and to account for all cultural resources in the area. A test sampling program was designed and performed in order to provide detailed descriptions of the sites to be impacted, in terms of areal extent, depth of deposits, archaeological complexity and significance.

GEOGRAPHICAL AND ENVIRONMENTAL SETTING

The project area is located within the Coachella Valley of Riverside County, California (Figure 1). This major geographic component of southeastern California is aligned roughly northwest-southeast and varies in elevation from 2580' at San Geronio Pass in the north, to 273' below sea level at the southern end which is currently occupied by a portion of the Salton Sea.

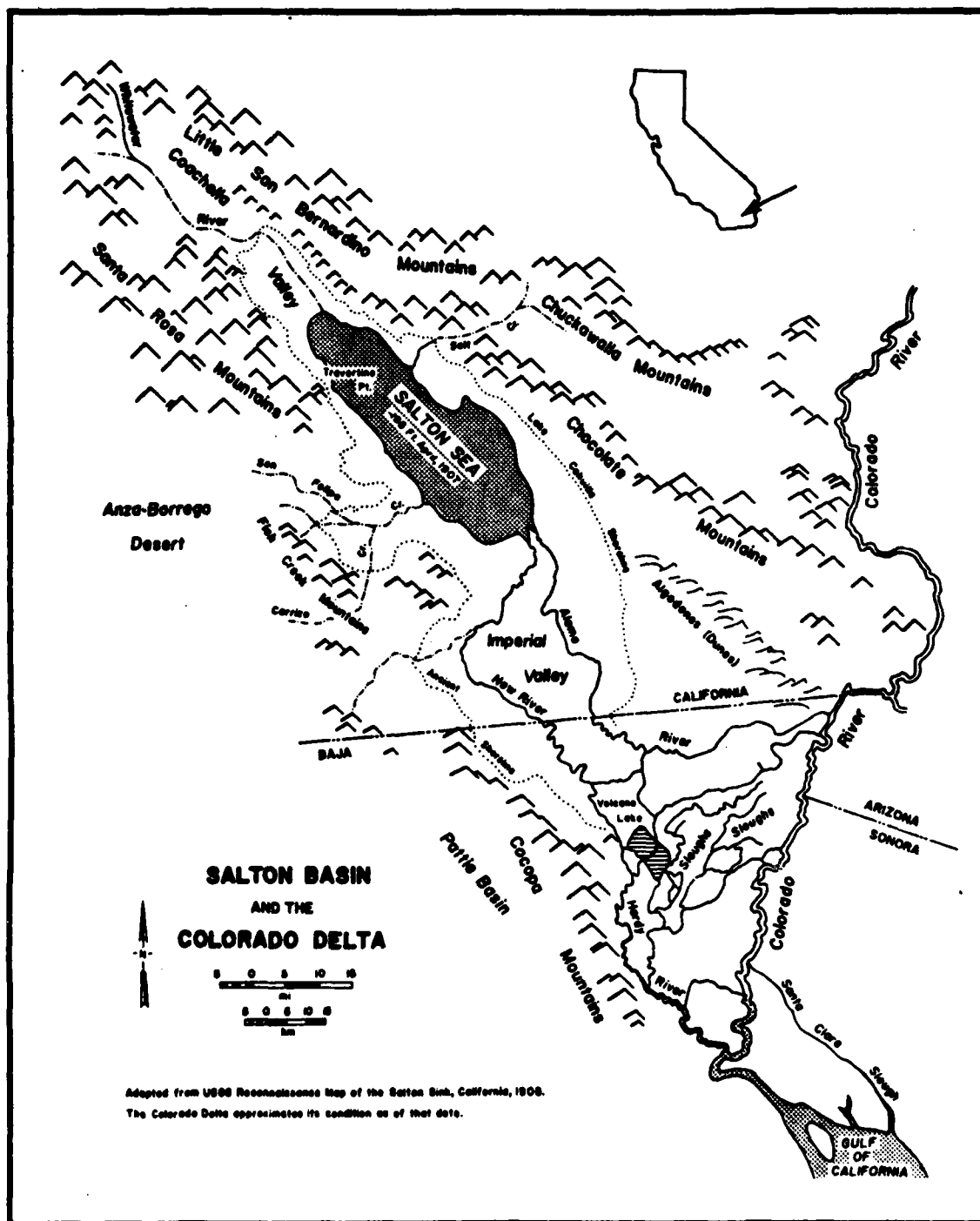
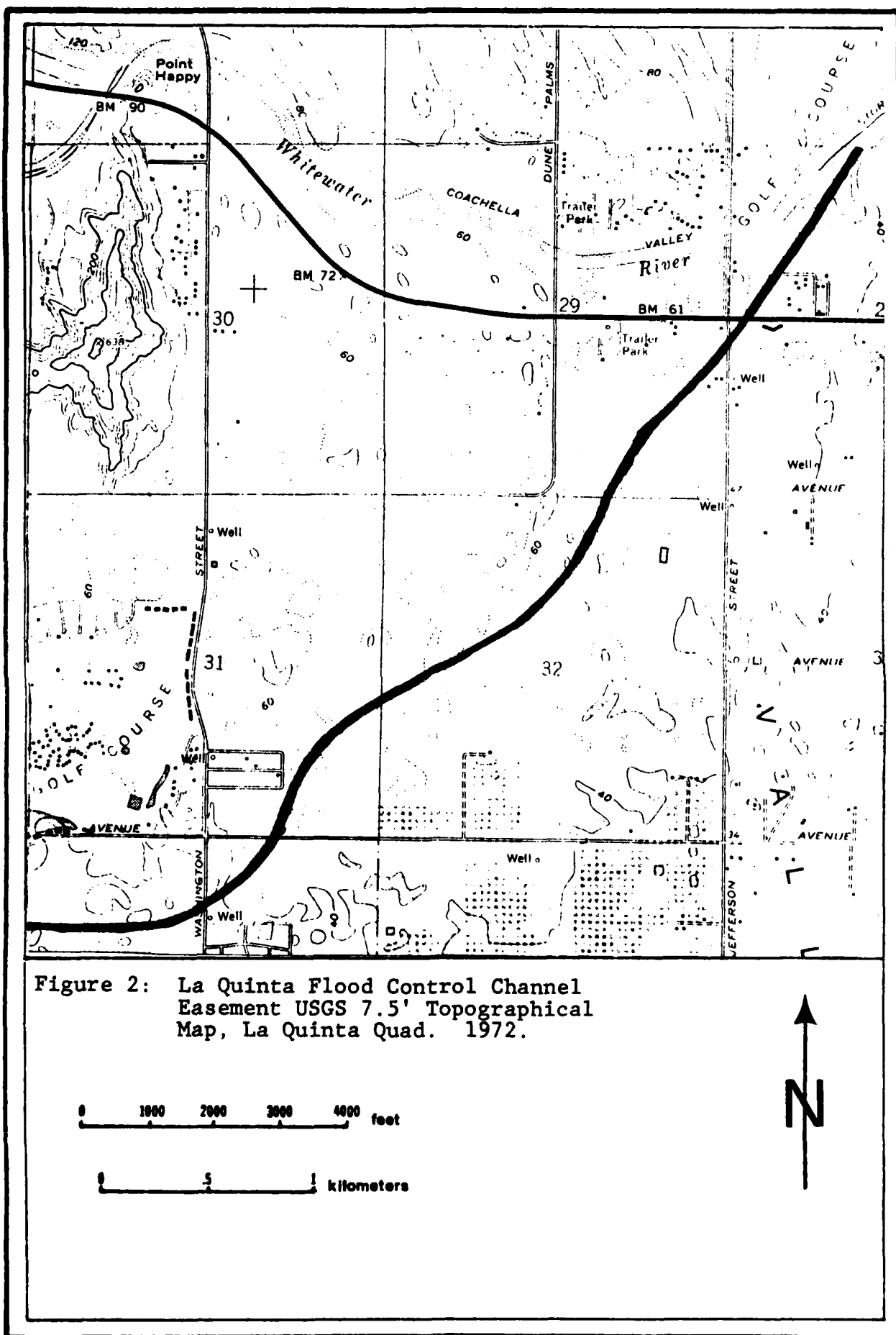


Figure 1: Coachella Valley and Environs
(adapted from Wilke and Lawton
1975).

The project area begins just east of Eisenhower Road in the City of La Quinta and proceeds eastwards, crossing Washington Street, thence northeastwards across Avenue 50, Jefferson Street, Highway 111, and ends at the Whitewater River in the City of Indio (Figure 2). The total length of the alignment is approximately three miles and the channel itself is proposed to extend 170' wide contained within an easement of 240'. Thus, the total area of this project is approximately 35 hectares (87 acres).

The project area is characterized by large, mesquite-covered sand dunes ranging in elevation from 20' to 60' which serve as the major landforms. Many of these dunes have been created by the accumulation of sand around the thickets of mesquite which have come to dominate the area in the last 500 years. With the recent subsidence of the water table in the general area, much of the mesquite is dying away, with the resultant wind erosion deflating many of the dunes. The alignment falls within the creosote-scrub community which occupies most of the Coachella Valley. This vegetational zone extends from about sea level to approximately 3000 - 3500' along the slope of the Santa Rose and Little San Bernardino Mountains. The more important economic plants in this community (for a fuller description of the variety of plants, see Wilke 1976: 44-47) are the mesquite (Prosopis glandulosa var. torreyana), screwbean (P. pubescens), barrel cactus (Ferocactus acanthodes), pricklypear (Opuntia sp.), creosote (Larrea tridentata) and the ocotillo (Fouquieria splendens).

Below the creosote-scrub community lies the alkaline sink community containing plants tolerant of highly alkaline/saline conditions. Here are found the saltbushes (Atriplex spp.), and pickleweed (Allenrolfea occidentalis) in addition to mesquite and screwbean. However, the present environment and physiography is of little consequence to much of the prehistory of this region in that, at various times in the past, the Coachella Valley contained a massive fresh-water lake.



It has long been recognized (e.g., Blake 1854; Heintzelman 1857) that the Coachella and Imperial Valleys had previously supported large bodies of water. Various stands of water have been dated well into the Pleistocene (Hubbs, Bien and Suess 1965) during which the inundation of the valley was most likely from the Gulf of California. However, from the late Pleistocene, the creation of a self-contained, fresh-water lake was due to the Colorado River over-flowing its natural levees and emptying directly into the Salton Sink. This lake has been referred to by many names (i.e., Blake's Sea, Agua Grande, Lake La Conte) but this report will follow the lead of Wilke and Lawton (1975) and use the designation 'Lake Cahuilla'.

The most recent stands of Lake Cahuilla have not been radio-carbon dated. However, there is general agreement that Rogers' (1939) estimate of 1000 B.P. for the beginning of the last stand and final dessication between 400-500 B.P. is plausible. During this stand, the water rose in the valley to the present contour level of 42' (Wilke 1976: 51) (Figure 3). At its maximum stand, Lake Cahuilla became an expansive body of water extending from just north of the present City of Indio, 115 miles southwards, across the international border, into Mexico. Its maximum width was roughly 34 miles and it achieved a depth of 320'. Wilke has reconstructed much of the hydrologic history of this body of water as summarized in Figure 4.

Obviously, with the existence of Lake Cahuilla, the presence and distribution of resources were somewhat altered from the current pattern. Wilke states that there was little or no effect on the vegetation which was more than 100 yards from shore. However, the northern end of the lake (including the project area), extending from La Quinta to well north and east of Indio, was a large freshwater marsh (Figure 5). The sand dunes which sat along

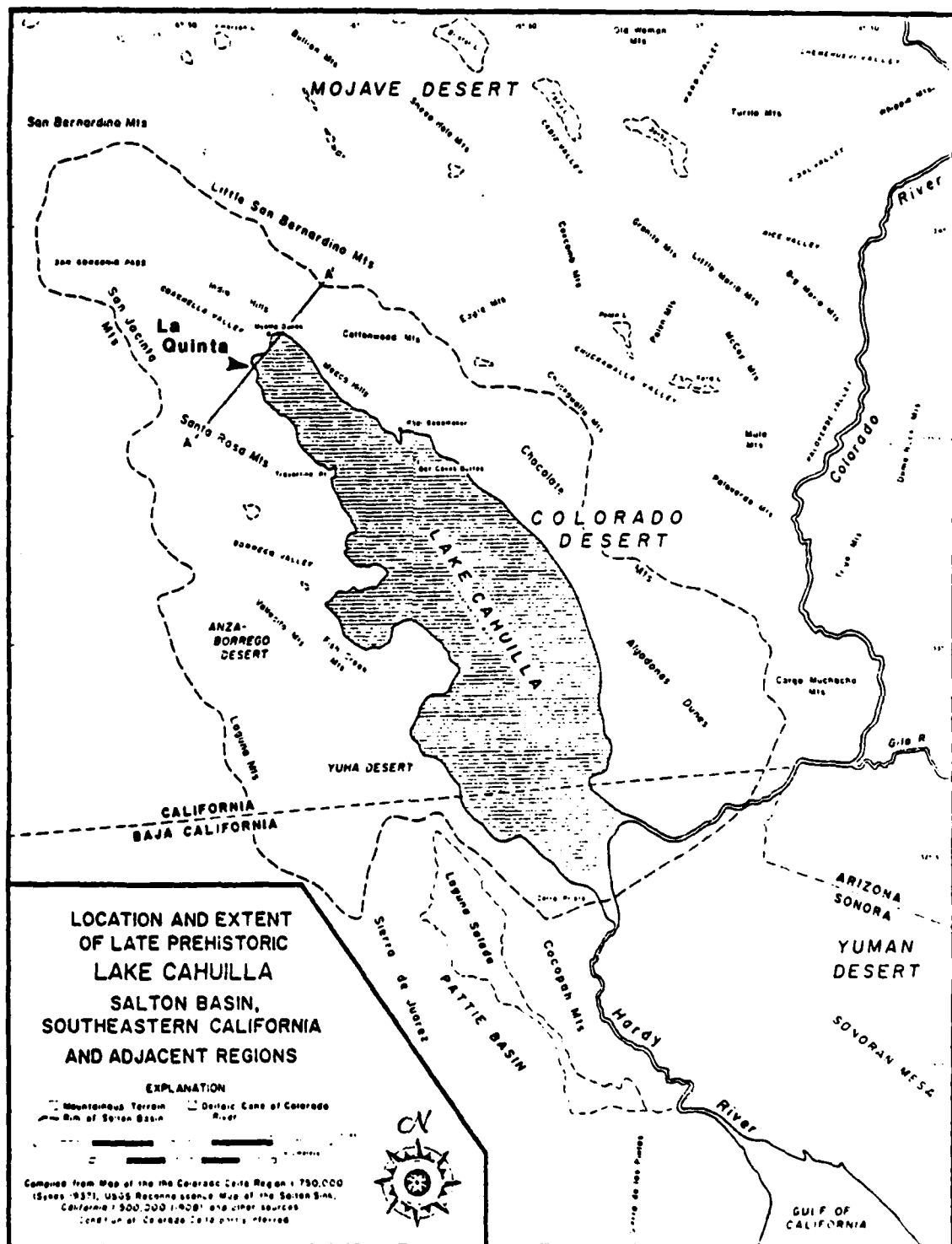


Figure 3: Lake Cahuilla (Adapted from Wilke 1976).

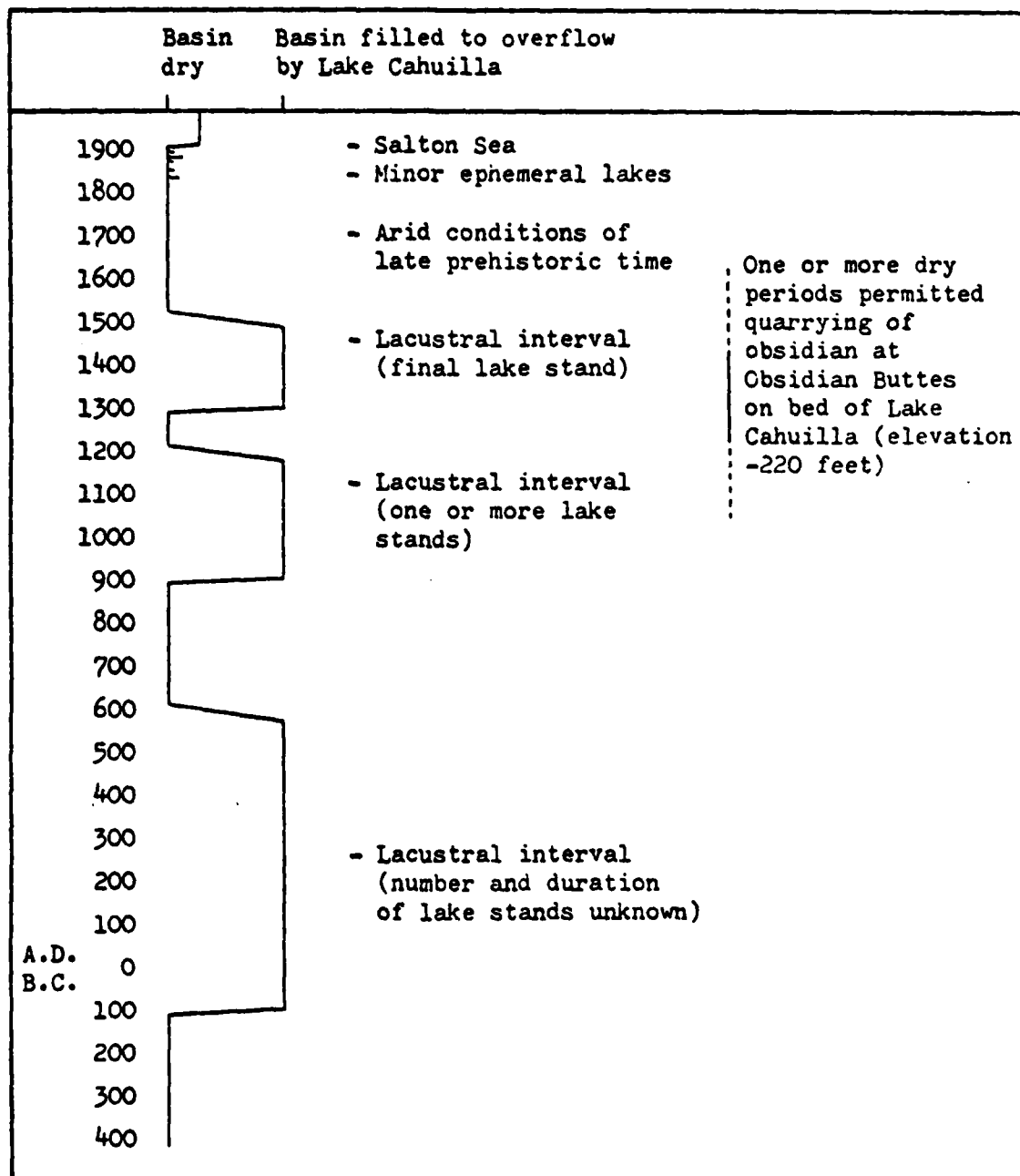


Figure 4: Hydrologic History of Lake Cahuilla
(Taken from Wilke 1976).

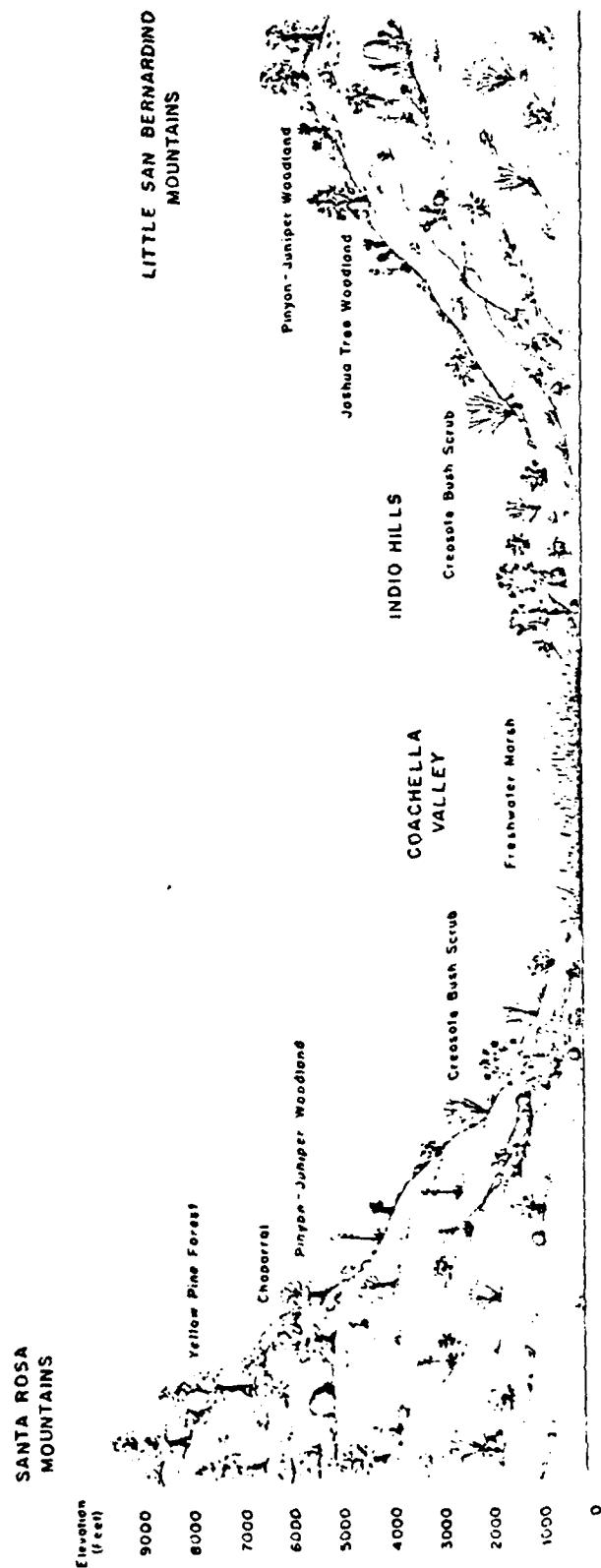


Figure 5: Idealized Cross-Section of Vegetational Zones at the Northern End of Lake Cahuilla (Taken from Wilke 1976).

the shore provided an irregular undulating shoreline, and included many shallow basins among the dunes which were undoubtedly filled with water (Wilke 1976: 62). One only has to look at a current topographic map of the La Quinta area to observe that the 42' contour meanders quite extensively.

This area was still part of the Creosote Scrub community, although to this was added the Freshwater Marsh plant community, containing important plants such as cattail (Typha sp.), tule (Scirpus sp.), and reed (Phragmites australis).

Additional resources included shellfish, primarily in the form of freshwater clam (Anadonta dejecta), as well as a variety of fish and waterfowl. Based upon observations of remains from the shoreline middens, Wilke states that the two most commonly eaten fish were the humpback sucker (Xyrauchen texanus) and the Colorado bonytail chub (Gila elegans). Other fish taken from the lake by the Indians were the Colorado squawfish (Ptychocheilus lucius), the striped mullet (Mugil cephalus), and the desert pupfish (Cyprinodon macularis californiensis).

Today, the Salton Sea is on a major flightpath of migratory birds and presumably this was the case during, at least, the last stand of Lake Cahuilla. Among the waterfowl which probably inhabited the area were ducks, geese, swans, pelicans, cormorants and herons, with marshes around the La Quinta (N.W. end of Lake Cahuilla) area providing food and shelter for large numbers of shore birds, duck and mudhens (Wilke 1976: 66-67).

With the extreme aridity of the Salton Sink area, the lake began to evaporate quickly when the Colorado River resumed its previous channel. Wilke suggests that this immense lake completely disappeared within approximately 55 years and that during the first 25 years the entire complex of aquatic plants and animals associated with Lake Cahuilla withdrew from the area (Wilke 1976: 198).

PREVIOUS INVESTIGATION

The area in and around La Quinta, or more properly, the northern shoreline of Lake Cahuilla has received increased attention in the last decade. This results primarily from the research on late human ecology of Lake Cahuilla by Dr. Philip J. Wilke (1976) and the increase in land developments, requiring environmental impact studies.

Wilke's work in this area included survey of large portions of the shoreline of Lake Cahuilla, excavation of selected sites, and detailed analysis of archaeological remains, primarily human coprolites. Based largely upon floral and fauna remains recovered from the coprolites, Wilke argues that occupation in the Coachella Valley during the last stand of the lake was sedentary and well adapted to lacustrine environs.

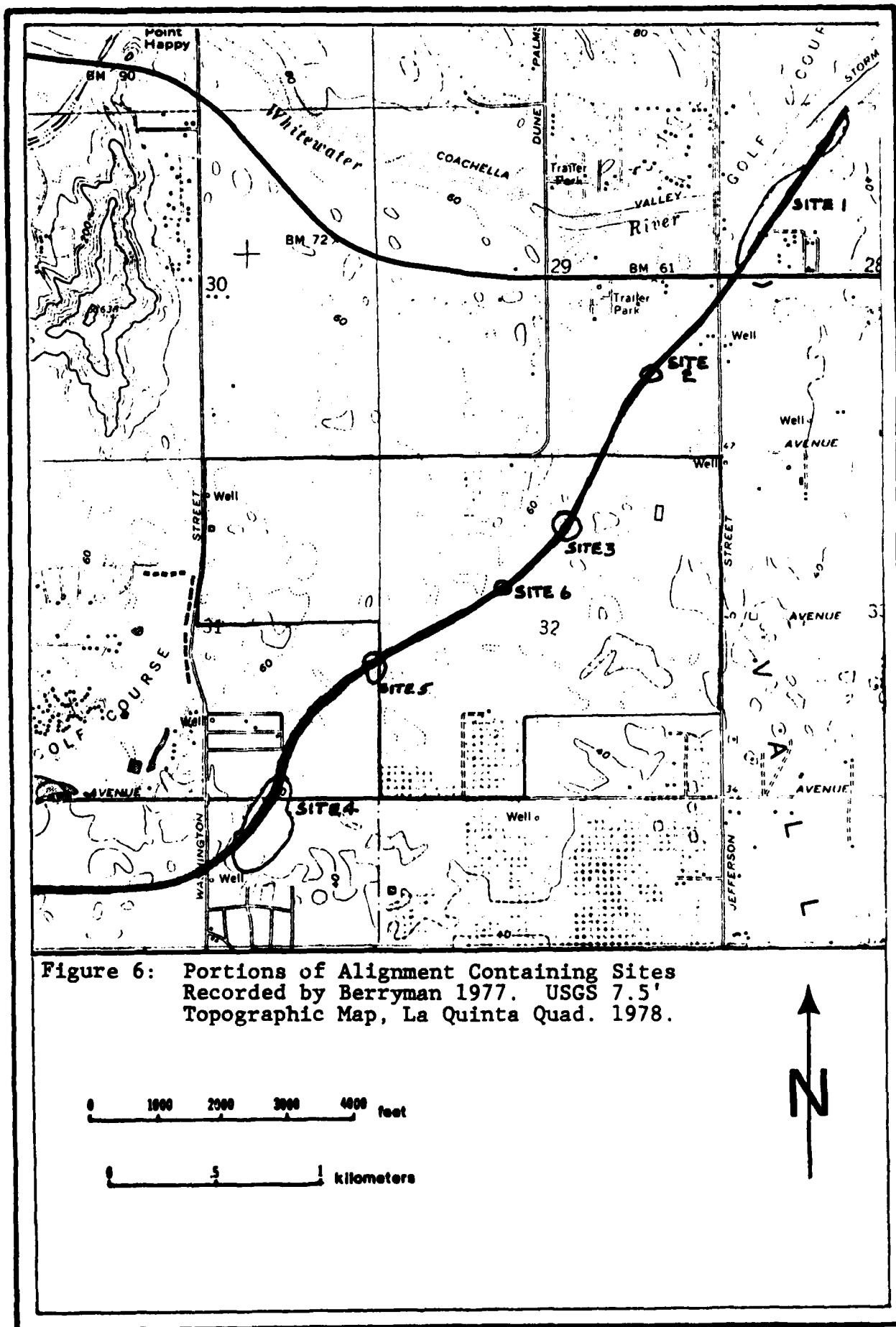
Following his investigation of this general area, Wilke (1976: 197) states that there is little doubt that the aboriginal population at Lake Cahuilla was substantial. One finds graphic support of this with a quick perusal of the La Quinta 7.5' topographic map which reveals a myriad of sites in the environs of the project area, many having been recorded in 1972 during Wilke's shoreline survey. Two surveys have been performed which deal directly with the channel alignment. The initial survey of the proposed channel alignment was undertaken by Stanley R. Berryman of the Toups Corporation for the Coachella Valley Water District in April, 1977. The other survey consisted of 700 acres within Sections 31 and 32 of T.5S/R.7E by Larry Bowles in 1978 for A.T.O. Development.

Berryman's survey encompassed the entire proposed channel alignment during which he recorded six sites (Figure 6). He classified these areas as large dune sites (1,4), sherds scatters (sites 2,5,6), and a campsite (3). Unfortunately, he offers no explicit explanation or rationale for these categories.

The Bowles' survey included the portion of the proposed alignment contained within Section 32. Within the 700 acres surveyed, Bowles recorded 77 "areas of artifact concentration" (Figure 7). He had located the two sites (3,6) recorded by Berryman and also found the scatter apparently missed by Berryman but recorded during our field reconnaissance. Bowles (1978: 6) points out that the greatest concentration of materials (i.e., P-76; P-50) are found along the eastern portion of the parcel which also corresponds to the ancient shoreline of Lake Cahuilla.

The general area through which the proposed alignment will extend has an extremely high archaeological density and, as illustrated in Figure 7, numerous clusters of cultural materials stand in propinquity to the project area. Ethnographic research and early historic accounts suggest that there were no rancharias within the La Quinta area. The nearest Cahuilla settlement was located immediately north of Point Happy, in what is now Indian Wells. It is likely that the La Quinta area was utilized for its resources (i.e., mesquite) but no record of any permanent settlements is available.

In order to avoid confusion, this report will refer to all sites within the project area by the same numbers as in the Berryman report (adding the newly recorded site 7) and will provide parenthetical acknowledgement to the official county numbers.



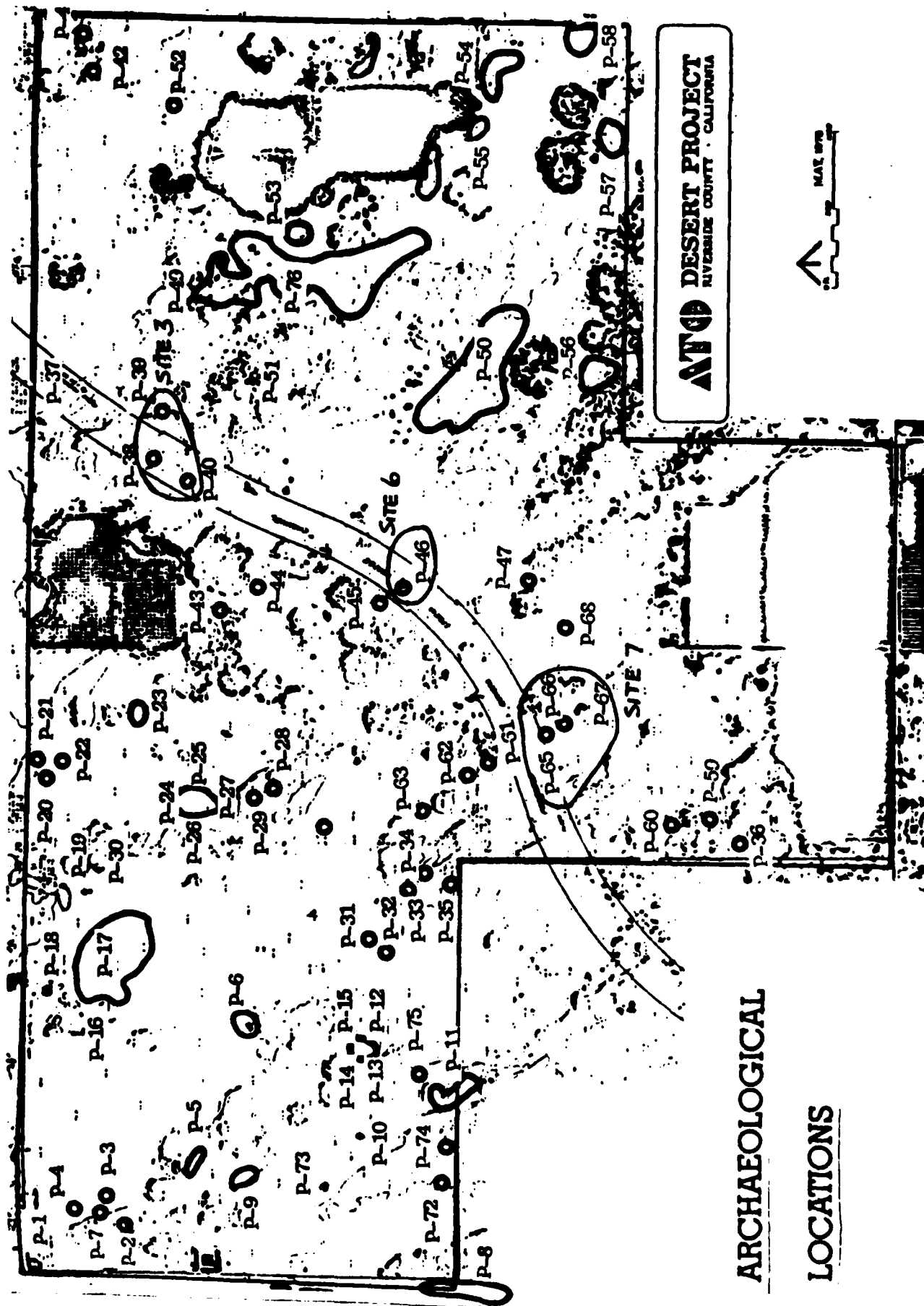


Figure 7: Areas of Artifact Concentration recorded by Bowles 1978.

TABLE 1
Designations for Sites Within Project
Alignment

Berryman (1977)	Bowles (1978)	CA-RIV-
1	-	1174
2	-	35
3	P-38, 39, 40	119
4	-	1180
5	-	158
6	P-46	208
7	P-65, 66, 67	-

RESEARCH GOALS

The major objective of this test sampling program is to obtain sufficient data with which to assess the data potential and significance of the sites within the project area. On a test level investigation, the research problems which can be addressed are, of necessity, general in scope. During this project, three primary, interrelated avenues of investigation were pursued; determination of site composition, chronological placement and settlement/subsistence systems.

Determination of site composition and extent is complicated by the natural factors (i.e., shifting sandy soils, wind patterns) affecting this area. As Wilke observed:

Reconnaissance in the dunes revealed an almost continuous belt of archaeological sites, including shallow middens of Anadonta shells, vast scatters of ceramic sherds, burned rocks and

other artifacts, and bones of birds, fish and other animals. These remains are normally buried within the dunes, but where the anchoring mesquite cover has died, or the wind cut into the deposits, the materials are exposed on the surface to be sandblasted into fragments with each new storm. The northwest faces of the dunes are most susceptible to such deflation because of the direction of the prevailing wind, and many of these deflating surfaces show abundant evidence of former occupation. Sometimes when the wind blows strongly from another direction, as, for example, from the southeast, sites which normally are immense scatters of artifacts and food remains are completely covered with sand and the opposite slopes of the dunes show the only evidence of former occupation. Thus, archaeological reconnaissance in this region is to some extent a hit-or-miss venture, depending on which way the winds have recently blown (1976: 97).

Therefore, the questions to be pursued in this study are rather basic, albeit fundamental, to properly assess the potential of any given site. Our research involves the investigation of surface patterning, the collection of data on the physical characteristics of subsurface deposits and, from sampling, the assessment of the range and quantity of data from each site.

With few extant data relating to site composition, our expectations were unclear. If Wilke's generalizations cited above are correct, we should expect surface exposures of cultural materials to be generally patterned within a site, basically reflecting recent wind patterns (largely exposing the northwest portions of the sites). This also implies that there is a general scatter of cultural materials over a site area, portions of which become exposed while other portions become covered or remain covered. If this assumption is valid, it should be expected that, while the surface may exhibit discontinuous

scatters, subsurface explorations in the intermediate areas between surface scatters should yield evidence of cultural materials. Conversely, it may be that the deposits within these sites are, indeed, highly clustered and exhibit little overall material distribution. Relative to the problem of surface distribution of cultural materials, correlation between surface concentrations and subsurface deposits will be investigated by pursuing such questions as are surface scatters and concentrations adequate indicators of subsurface deposits? Or are these sites relatively thin accumulations? Generally, subsurface deposits, when encountered, are thin, discontinuous lenses. Of the six sites investigated by Wilke, two were excavated: Wadi Beadmaker and Bat Caves Buttes, with the former revealing 20 to 40 centimeters of 'mounded refuse' and the latter yielding a deposit of approximately 10 centimeters (Wilke 1976: 150, 158). Myoma Dunes, on the other hand, had been monitored over a period of a few years and were noticed to have deflated over two feet yielding coprolites the entire time (Wilke 1976:100). Collection of data relative to these questions may aid greatly in assessing the potential of any given site within this general area.

Elevational variations have been known to define cultural layers. If, as a dune deflates, it uncovers cultural strata, it may be expected that within a site having multiple exposures of cultural materials, these would occur at or near similar elevations. On the other hand, if the surface elevation was also variable at the time of occupation, there may be no correlation between exposures and elevation. Similarly, elevational relations may be misleading if deflation continues below the cultural stratum in that surface indications of the heavier materials may sit well below the actual deposit. Obviously, there are numerous factors to consider before suggesting elevation as a significant indicator.

The temporal placement of most shoreline sites in this area belongs to the Late Prehistoric Period which is generally accepted to have begun in the southwestern Great Basin around A.D. 1000. Diagnostic of this time period is the appearance of pottery in the Coachella Valley and the Cottonwood and Desert Side-Notched project point styles (Bettinger and Taylor 1974). The pottery assemblage in the Coachella Valley falls within the Tumco Buff and Tumco Stucco types formulated by Schroeder (1952). These presumably originated around the Colorado River before A.D. 900 and continued to be manufactured until A.D. 1450.

It may be expected that sites found at lower elevations may represent either areas occupied as the lake was receding or after final dessication. Thus, the elevational and geographic placement of the sites may tell us more about the temporal variations in the late period than would the artifact sample. Additionally, the ecofactual sample may also be significant in terms of temporal considerations.

At this level of investigation, only very basic aspects of settlement/subsistence systems can be explored. Definitions of site types based upon range of artifacts and ecofacts present on each site and the functional relationships between these sites will be attempted. Wilke (1976) has identified at least three specific types of site within two general categories. The first category, habitation sites, are represented by the areas found within the Myoma Dunes. The other, special-use sites, may have been periodically utilized by the residents of the Myoma Dunes area (Wilke 1976: 197). These included a fishing site found at the Wadi Beadmaker area along the eastern shore and a bird capturing and processing site found at Bat Caves Butte. The analysis of recovered data will address questions such as: Were these sites inhabitation or collecting/processing areas? Were they occupied year-round or seasonally? Wilke found that areas

along the northwest portion of Lake Cahuilla (i.e., proximal to the La Quinta area) were most likely occupied year-round although this was not necessarily the situation in other areas of the shoreline. With significant variations in topography around the lake, the prehistoric distribution of resources similarly varied and, therefore, influenced the scheduling of site occupation.

METHODS

Given the specific goals and general research problems outlined above, proper methods were needed which would provide appropriate archaeological data within a reasonable time period. In order to examine surface and subsurface site constituents, test sampling is necessary in that it involves a general program of surface collection and subsurface testing from which assessments of extant resources can be made.

Of the seven sites located during the project, all but two were mapped using a transit and stadia. Site 2 was mapped using a Brunton compass and thirty meter tape, while Site 6, consisting of 19 sherds, clustered within an area of less than $\frac{1}{2}$ square meter, was simply located on the topographic map through triangulation with surrounding landmarks (datum stakes for all sites were triangulated - See Appendix A). Maps of the remaining sites included site boundaries and any internal clustering of artifacts and/or ecofactual materials. Any observable clustering were given locus designations. The determination of the presence and distribution of these loci was largely subjective although in most cases they were clearly areas containing a non-random clustering of cultural materials. These areas, as well as the edges of the site, were flagged prior to mapping and subsequently mapped in from datum. Wooden datum stakes, marked as "A.R.M. Datum", were placed on all five sites.

Sites 1,3,4,5,and 7 received systematic surface collection and subsurface testing. The remaining two sites, 2 and 6 (more appropriately referred to as isolated loci), were apparently random scatters which were not part of any larger, more discernable, pattern. Both site 2 and site 6 were totally collected.

In order that all portions of a site be given equal chance to be tested while at the same time preventing any potential clustering of random units, the following sampling scheme was devised. The entire site area was treated as a large circular area which was stratified into four 90° units. Within each unit an angle was chosen at random and a collection transect was drawn along that angle from datum. At every 10 meters along that transect, a data point was established. That point then served as the northwest corner of a 5 x 5 m surface collection unit and finally became the center point of a shovel hole for subsurface testing. These small shovel holes (approximately $.25 \text{ m}^2$) were found to be quite adequate in that they were expedient yet provided the types of data needed to recognize and assess any subsurface deposits. The average depth of these holes was 80 cm., the practical limits for this type of testing. All soil was screened through $1/8$ " mesh. Soil coring was not undertaken due to the looseness of the sandy soil. Test excavation units were not used because they are more time-consuming, and do not provide any more data than that obtained by the shovel tests for this level of research. Among desert sites, backhoe testing should be avoided except as the last phase of a salvage project. The fragile nature of any surface scatter would mitigate against the use of this or any other type of heavy machinery.

RESULTS OF FIELD ACTIVITIES

As specified in the scope of work, the main tasks in this project were: field reconnaissance of the project area and testing of the historic properties contained within. The following describes these activities with discussion, interpretation, and evaluation to be presented in the subsequent section.

Field Reconnaissance

As part of the general work tasks, a brief field reconnaissance was performed in order to relocate the six sites recorded by Berryman and to ascertain that all cultural resources were accounted for.

Upon arrival to the project area, it was discovered that the center line, which had been staked during Berryman's survey, was no longer in evidence. It was possible, through the use of local landmarks, to walk the western end of the alignment from Eisenhower Drive to Avenue 50 as well as the northern end from Jefferson Street and Highway 111 to the Whitewater River.

However, this left a major portion of the alignment through Sections 29, 31 and 32 (Ave. 50 northwards to Jefferson Street) completely unstaked. Given the paucity of landforms on the topographic map from which to gauge location and the myriad of cultural loci in the general area, it became mandatory that this portion of the alignment be restaked. This was the only way the correct project area could be surveyed and would insure the relocation of only those sites to be impacted by the project.

During the reconnaissance, all six of Berryman's sites were found and an additional cultural area (Site 7) was located and recorded as were 3 historic trash dumps (Figure 8). Site 7 was found between Sites 5 and 6 in Section 32. Situated immediately south of center stake P.C. 90+38.74, this site had been previously

documented by Bowles (1978). The dump areas primarily contained modern (i.e., less than 50 years old) materials spread over the surface with no apparent depth. Dump 1 appears to have been associated with a structure no longer in evidence, which sat between three large trees immediately east of Washington Road. Sherds from both chinaware and aboriginal pottery were noted, though not abundant, as well as a few (less than 6) purple glass sherds. Dump 2 situated just east of Site 4, is separated from it by a large sand dune. Again, brownware sherds were noted but associated with modern debris. Lastly, Dump 3 is an enormous scatter in a large wash area, cross-cutting the channel alignment between Site 4 and Site 5. A quick reconnaissance revealed that the materials deposited here are very recent.

Test Sampling Results

In the following section, the field data recovered from each site will be described, with subsequent analysis, interpretation, and evaluation being presented in the 'Discussion' section. The quantitative data from each sampling transect at each site will be presented in tabular form. Abbreviations of the data categories are listed in Appendix B.

The shovel holes proved to be quite expedient in the sandy soils found at all sites. From the surface to approximately 5 cm., the sand was generally dry and loose but with the recent rains in the area, the sand was quite cohesive below the surface zone. Even the 1 m² units that were excavated were found to easily retain their sidewalls. The dampness of the sand also caused slight, naturally-occurring discoloration (i.e., darkening) of the sand. This was noted during initial testing and a few holes were left open to dry. It was found that after the sand had dried it became the same color as observed on the surface.

Artifacts were not usually present in large numbers, with pottery sherds forming the largest sample from any given site. All artifacts are presented in the following tables as actual specimen counts, as are the fire-affected rocks, recognizing that, with larger samples, it may become more meaningful to quantify these materials by weight.

Ecofactual materials consisted entirely of Anadonta shell and bone. The clam shells are extremely thin, fragile and very lightweight, so that they are easily broken and scattered about a site. Quantification of these shells (except for definite midden clusters) is very tenuous in that the weight of a small handful of shell is negligible. Bone, the most commonly occurring ecofact, was usually found to be fragmented. Like the shell sample,

total weights per unit were often quite small. However, within this light amount, many individuals were represented. At this level of investigation only general categories (i.e., bird, mammal, fish) were identified whenever possible. Despite the large sample of coprolites found elsewhere (e.g., Myoma Dunes) in the region, none were observed on any of the sites in this project, but, given the small samples taken, their presence can not be discounted.

Site 1 (RIV-1174)

This is the northernmost site in the project area, situated at the NE corner of Jefferson Street and Highway 111, approximately 600' due south of the current Whitewater River Channel. At present, the relatively flat area of the site is situated at approximately the 50' contour (within 1000' of the 42' contour), with the eastern edge of the scatter sitting atop an extremely steep slope. This area has received considerable disturbance during the last few years. Housing units have been recently built along the northern end of the site while several years ago, a small commercial complex was constructed at the northeast corner of Jefferson Street and Highway 111. With construction taking place along three sides of the site, much of the area has received at least secondary impacts through; 1) dumping of sand into the area, 2) the general increase in activity in the area, and 3) the construction of a small asphalt road.

As a result of these factors, the presence and distribution of materials on the site today is much different than when the site was originally recorded. Fortunately, in 1972, prior to much of this disturbance, Wilke excavated an aboriginal house floor at this site. He began a second excavation of an additional house area but found that several houses has been built overlying each other thus disturbing each to the point where it was

not practical to continue (Wilke pers. comm.). A shell midden formerly existed at the southwest portion of the site which now contains the commercial complex. This midden is illustrated in Wilke's dissertation (1976:65, Figure 12).

The surface limits of the scatter were difficult to determine given the paucity of materials and general disturbance. Currently, the surface distribution of materials is rather limited in size being primarily clustered within a 16 m² area. These materials include sherds, fire-affected rock, shell, bone and a single chipped stone tool. Also present in great abundance were mudstone fragments which often were confused with sherds. However, close examination of these natural formations revealed non-cultural traits which included lack of temper and a sedimentary layering, absent in ceramic sherds.

Eight collection/testing transects were established with four selected for work : A,C,E, and G (Figure 9). A total of 18 data points were collected and excavated resulting in a surface collection of 450 m² and excavation of 3.6 m³ (Table 1 in Appendix C). Anadonta shell fragments were the most commonly encountered material on the surface. However, except where it is part of a definite midden or shell lens, Anadonta was found to be a poor surface indicator of site boundaries and subsurface deposits.

Transects A, C and E were virtually barren. Transect A sampled the southeast portion of the site both on top of the dune and downslope to the bottom. Transect C was in the northeast quadrant and also sampled the top, slope and bottom portions of the general site area. The southwestern area was cross-cut by Transect E and, as can be seen from the profile (Figure 10), a relatively level surface was sampled. This was also the most highly disturbed of the four transects as a result of being located immediately north of the small commercial area.

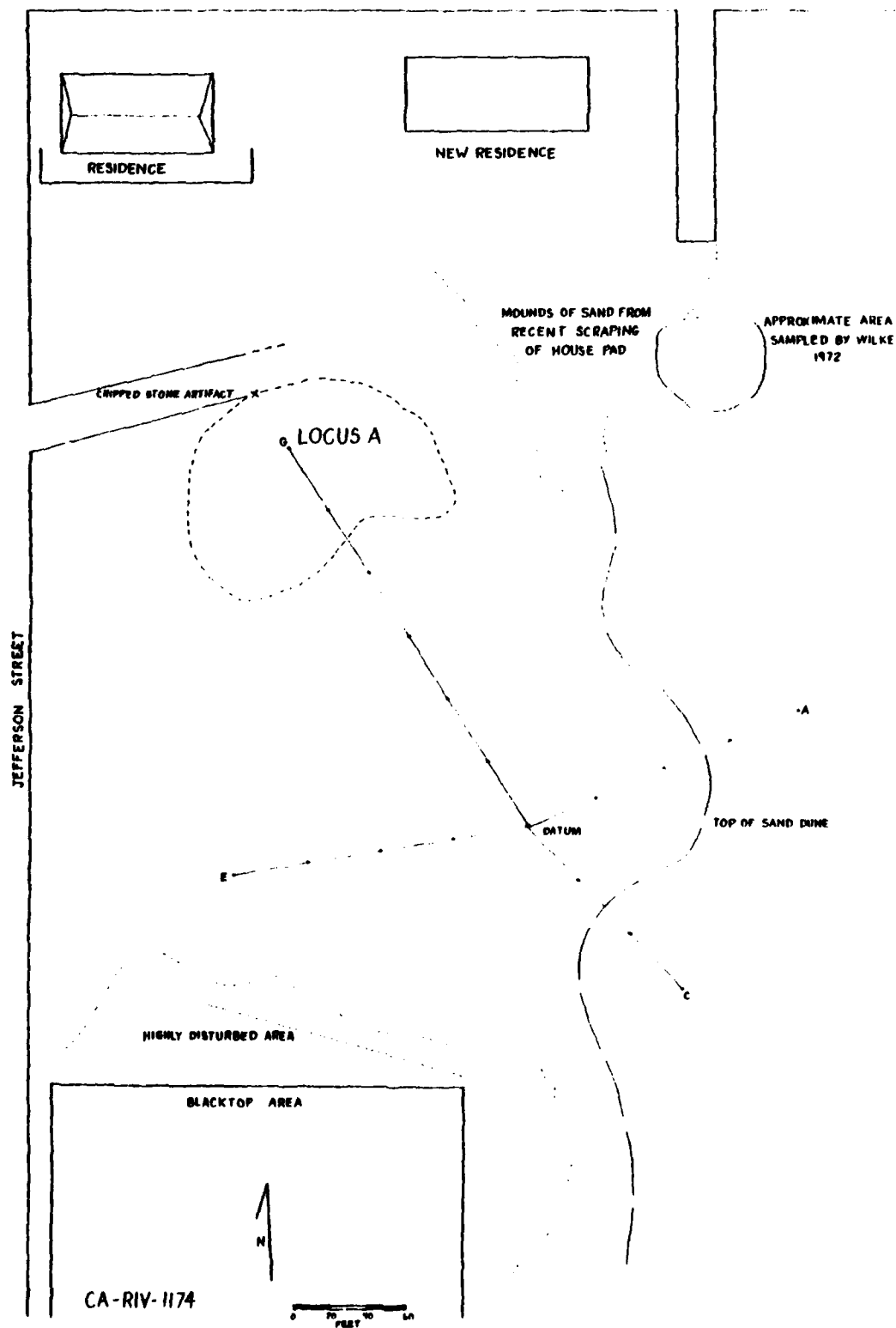


Figure 9: Site 1 (Riv-1174)

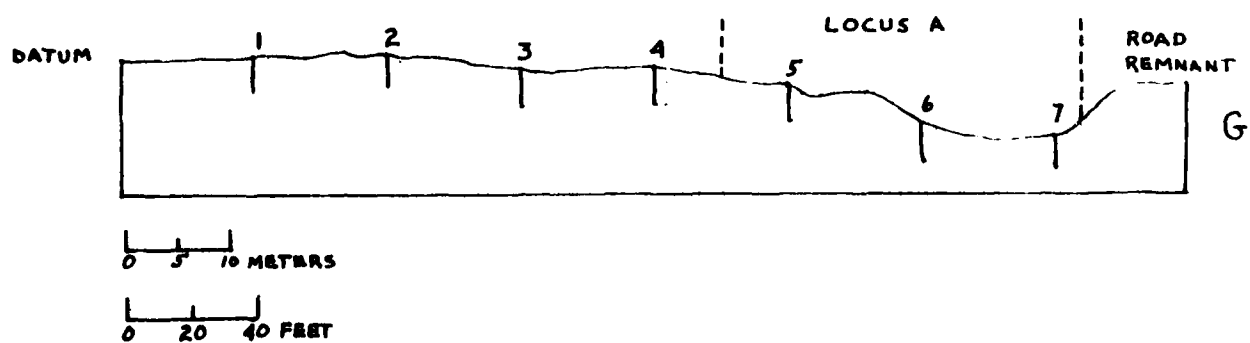
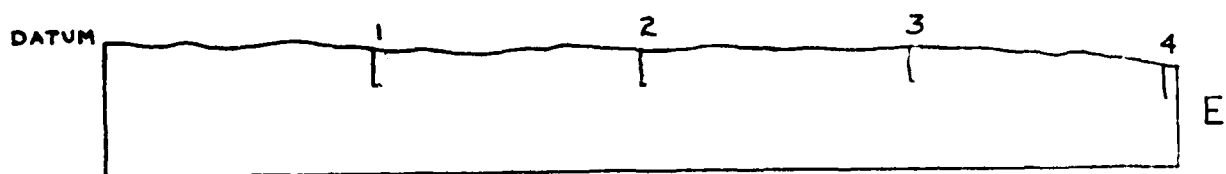
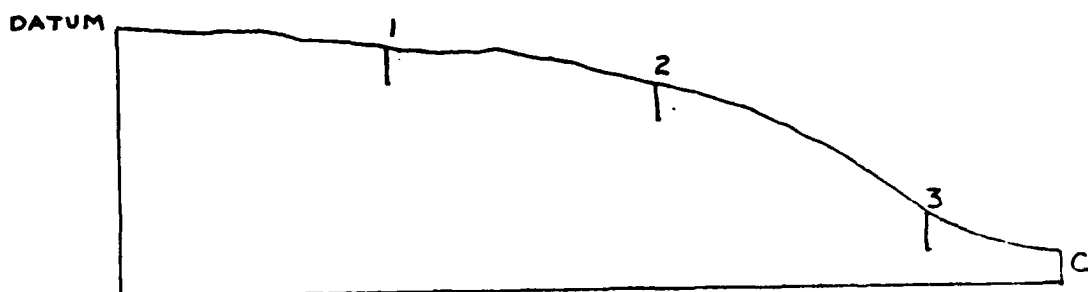
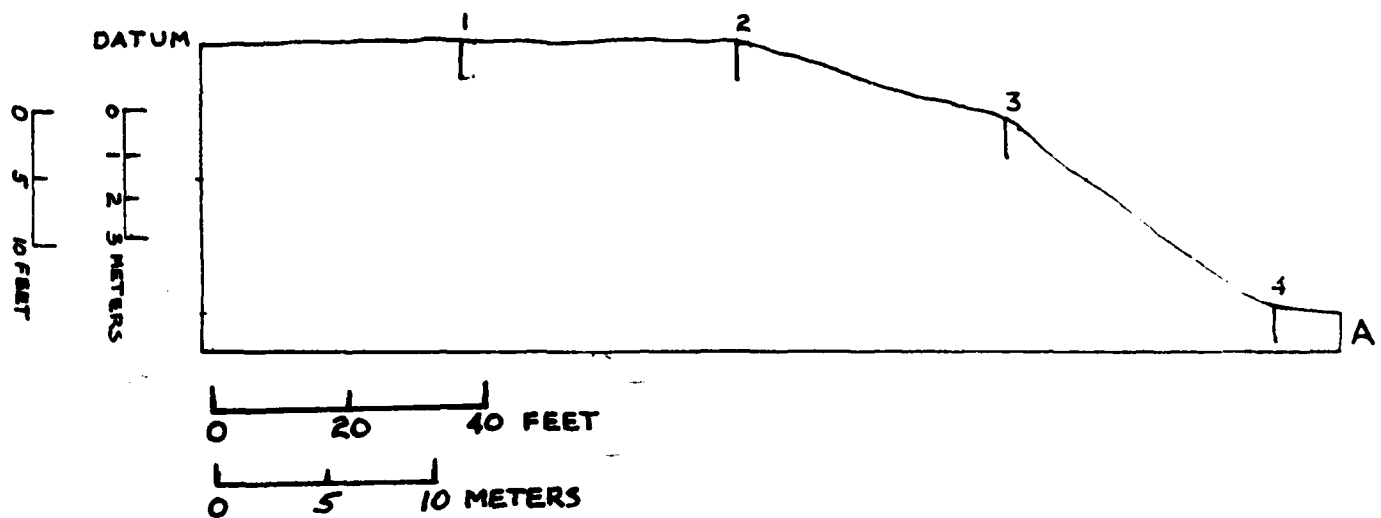


Figure 10: Cross-sections of Sampling Transects at Site 1 (Riv-1174).

Transect G was the only one at this site to exhibit any significant amount of cultural materials, largely due to its placement through Locus A. As indicated in Figure 10, the surface of this transect was rather flat except for the northern end which dropped about six feet. It was in this depression that Locus A was contained. The surface concentration began less than two feet below Datum and was found to be heaviest between five and six feet below Datum.

Except for the ubiquitous fragments of Anadonta, surface collection of this transect demonstrated an absence of cultural materials until Locus A was encountered (Units G-5,6,7). Points G-6 and G-7 contained the heaviest surface concentration largely in the form of fire-affected rocks with 6 occurring in G-6 and 27 in G-7. Artifacts consisted of 1 sherd, 5 groundstone fragments, a chipped stone end-scraper with an ecofactual content of 4.05 grams of unidentified bone fragments.

Despite the apparent surface concentration, these two areas yielded virtually no subsurface materials except for two small pieces of burnt bone in G-6 and four quartz flakes from G-7. The only shovel hole to exhibit any subsurface material was G-4 which is located immediately south of Locus A. Within the first 10 centimeters, one sherd, 5 fish vertebrae and a small amount of shell fragments were found. This depth corresponds to the highest surface elevation of Locus A and most likely represents a covered portion of that scatter. If a wider cultural layer was extant, it would have been revealed in G-1,2,3, since these units also cross-cut this elevation. However, no evidence of any subsurface deposits were noted in these units.

The site area of RIV-1174 was once considerably larger than the small, limited concentration it is today. With recent housing and commercial development in this area, major portions

of the site have been either totally destroyed or severely disturbed. Of the remaining small portion that was investigated in this project, it was discovered that the surface locus did not exhibit any depth and the horizontal, subsurface deposit did not extend much beyond the surface deposit.

Site 2 (RIV-35)

This surface scatter of cultural materials lies among a series of low sand dunes located at the 50' elevation, approximately $\frac{1}{4}$ mile southeast of the end of Dune Palms Road and immediately northwest of center stake PT. 137+82.08. The next stake, immediately north, was used as Datum during mapping of the site (Figure 11).

Berryman described this area as a sherd scatter containing approximately 25 sherds. Our reconnaissance revealed an extremely light scatter of a variety of cultural materials distributed over an area of roughly 210 m^2 . In addition to the sherds described by Berryman, schist metate fragments, fire-affected rocks and unidentified bone were observed. Shell was all but non-existent with only a single piece of Amadonta clam found.

The site is characterized by a light, linear scatter oriented N.W. - S.E., following the long axis of most dunes (i.e., wind pattern) in the area, with only a single locus of any recognizable concentration. This locus sits at the western end of the scatter covering an area of approximately 30 m^2 . Within this locus, all of the metate fragments (N=5) were found in addition to the majority of bone fragments. Sherds were also observed but in no greater concentration than found elsewhere in the site. All surface materials were collected revealing the following sample size:

Sherds-27(159.3 gms), Millingstone fragments-5, Unidentified bone fragments 4.10 gms.

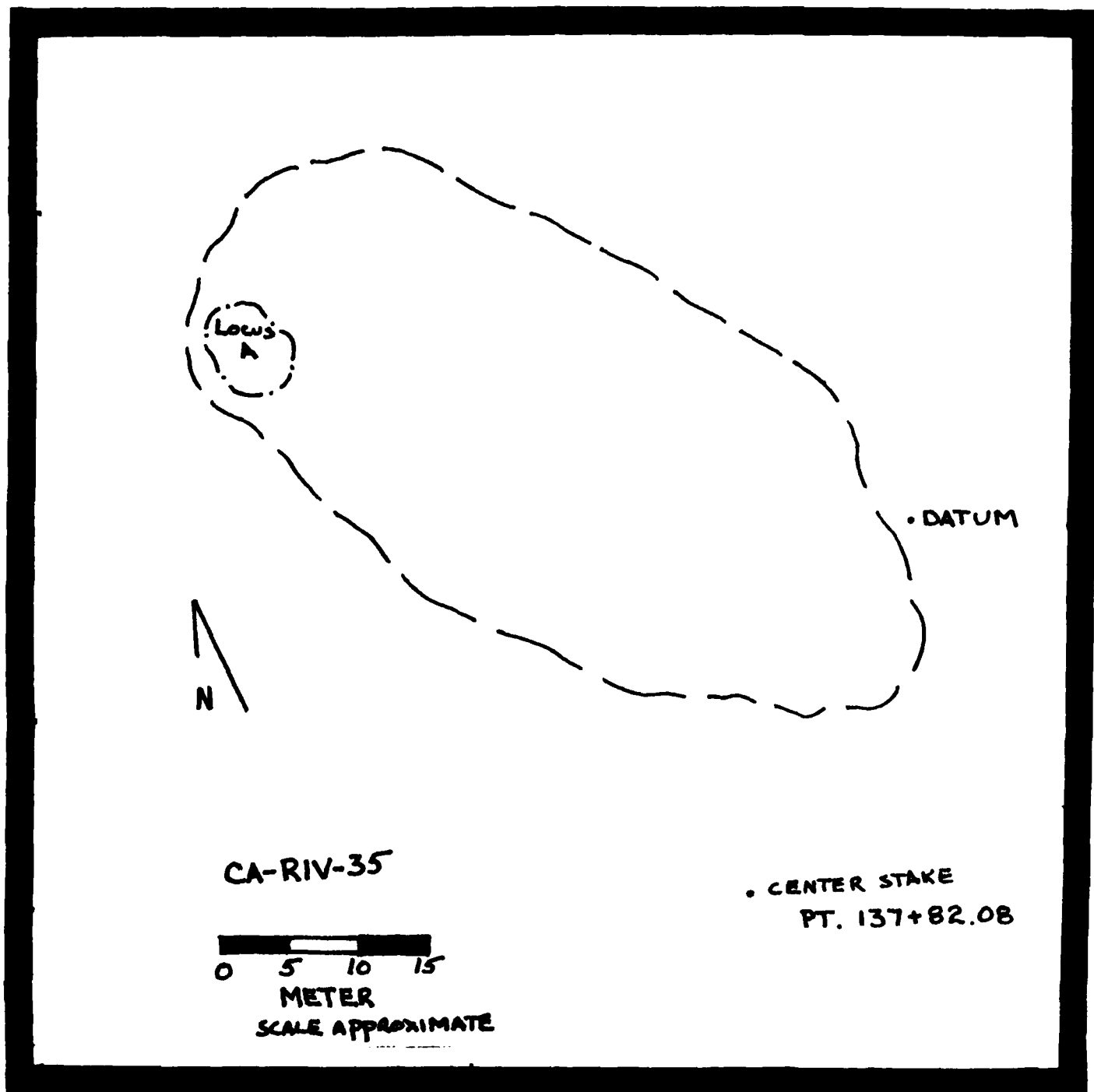


Figure 11: Site 2 (RIV-35)

In all probability, Site 2 was, originally, a small, compact cluster, the remnants of which were observed in the single, discernible locus. The eventual larger, linear scatter may be due, in a large part, to natural factors (i.e., wind, water). From the paucity of materials, relative to other sites in the area, and the limited range of artifacts, this area probably served as a temporary camp and/or processing station with the primary activity being the processing of locally available floral resources.

Site 3 (RIV-119)

The area of the site is totally contained within a large basin formed by several high sand dunes situated directly south of the southern end of Dune Palms Road. The site is situated between the 50' and 65' elevations and is the furthest site, in this project, from the ancient shoreline being at a distance of about 900 m (ca. 3000'). The area is a popular dirt bike and dune buggy thoroughfare and many dirt trails cross the scatters of cultural materials.

Site 3 covers an area of 6344 m^2 ($20,814 \text{ ft}^2$), and contains three loci of materials within a widely dispersed scatter. These clusters were defined by many fire-affected rocks and bone and it became readily apparent that pottery was generally scarce within the site, relative to other sites in the area. However, sherds may have been extensively collected here, given the numbers of people passing through the area. Additionally, though some surface concentrations contained dense clusters of bone, no identifiable fish bone or shell was observed at the site.

Despite the wide scatter of materials, there were only three observable surface clusters (Figure 12). Locus A sits at the southern base of a large creosote bush and appears to be

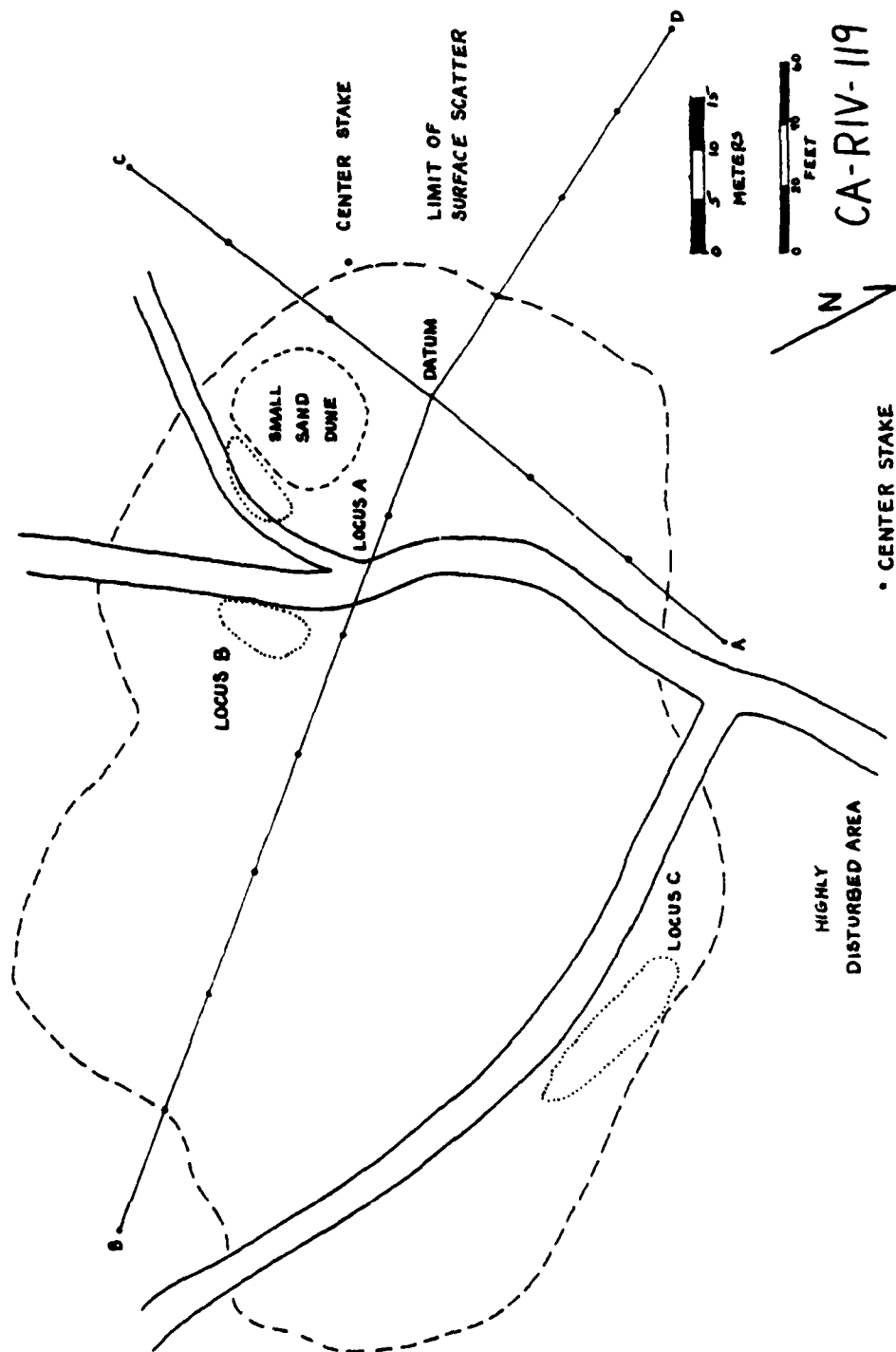


Figure 12: Site 3 (Riv-119)

eroding out of the deflating dune around the bush. This locus is a dense concentration of bone, much of it burnt and highly fragmented. Some of the bone is relatively thick (i.e., $\bar{x}=1$ cm) though, due to the fragmented nature, identification could not be made except to say that it is probably large mammal. Fire-affected rock were also within the cluster and a small, broken obsidian projectile point was found approximately 3 m east of this locus. This was the only point found during this project.

Locus B is located immediately south of one of the dirt roads cross-cutting the site. Similar to Locus A, this area sits near a large creosote bush but does not appear to be exposed as a result of deflation. This area contains numerous fire-affected rocks and a thin scatter of bone. The five sherds noted on the surface were the only artifacts in this locus. In all probability, this is an extension of Locus A which has been divided by the dirt road.

Along the eastern edge of the site, situated along the slope of a large dune, is Locus C. This is a dispersed cluster of fire-affected rocks, currently sitting in isolation from the main site cluster and containing no artifactual or ecofactual materials. Whether their current position represents their original placement during occupation of the site or subsequent rearrangement by modern visitors is unclear. The inter-loci areas are characterized by a thin, widely dispersed scatter of bone with an occasional fire-affected rock or sherd.

Four sampling transects, containing 12 data points, were established and a 1 m^2 test unit was placed within the bone concentration in Locus A. A surface sample was taken from 300 m^2 (4%) and a subsurface sample of 2.3 m^3 was excavated. The sampling transects were established using a Brunton compass and thirty meter tape. Elevational data for each data point was not obtained.

A definite surface clustering of materials was clearly demonstrated within the general site and an almost complete lack of subsurface materials (Table 2, Appendix C). Transects A and D were completely void of any material. Transect C exhibited surface materials near Datum, in the vicinity of Locus A. However, this scatter was totally contained on the surface. Transect B was the longest of the four sampling areas, extending from Datum, upslope, to the top of the eastern sand dune. A very light scatter is indicated by the minimal amounts found both surface and subsurface. Again, most of what was recovered came near Datum, proximal to Locus A and at the lowest elevation within the site. In fact, most of the scatter and all of the concentrations were found within the lowest portions of the site. While some deflation of the general area is assumed, the fact that there are higher limits of the surface scatter is most likely indicative of natural factors (i.e., wind) in that the materials at these levels are lighter materials such as bone.

A 1 m^2 unit was placed within the dense bone scatter forming a large portion of Locus A. The unit was excavated to a depth of 10 cm., with bone being found primarily on the surface but to a depth of 8 cm. 29.85 grams of bone were collected within the 0.1 m^3 . A burnt Olivella cupped bead was the only artifact found in the unit. The bone is extremely fragmented and much of it is burnt. None of the fragments are large enough to be identified although from the thickness of some of the pieces it can be assumed that these came from a rather large mammal.

Site 3 exhibited a pattern which was to be encountered on other sites in this project; that is, yielding a surface concentration of materials while exhibiting little, if any, subsurface deposits. Nevertheless, the surface materials will undoubtedly provide significant amounts of archaeological and ecological data.

Site 4 (RIV-1180)

This is the largest of any of the sites in this project covering roughly $40,431 \text{ m}^2$ ($435,102 \text{ ft}^2$). The overall scatter begins immediately south of Avenue 50 and approximately 240 m (800') east of Washington Street. This is also the only site which sits directly upon the shoreline, ranging between the 45' and 60' elevations. The most concentrated portions of the site are contained south of Avenue 50 and north of a large east-west sand dune. A long north-south dune defines the eastern perimeter of the site and a narrow wash serves as the western edge. The scatter of material north of Avenue 50 is somewhat more dispersed and smaller in quantity with a single locus originally defined in this northern region. However, during the reconnaissance of the project area, after the center stakes had been placed, an additional locus was found which stood in relative isolation to the rest of the site but close enough to consider it a related locus rather than a separate site (Figure 13).

Locus A is found within the general scatter north of Avenue 50 and consists of fire-affected rocks, pottery and bone; all contained within a small basin.

The largest concentration of materials is found within Locus B and B'. These sit at the base of the large east-west dune south of Avenue 50 and contain numerous fire-affected rock, many of which are groundstone fragments. Pottery is also quite abundant here in addition to bone and shell fragments.

Locus C sits at the east edge of the site and is made up of a small cluster of sherds and fire-affected rocks. There is a bone scatter in this general area though not specifically concentrated in this locus.

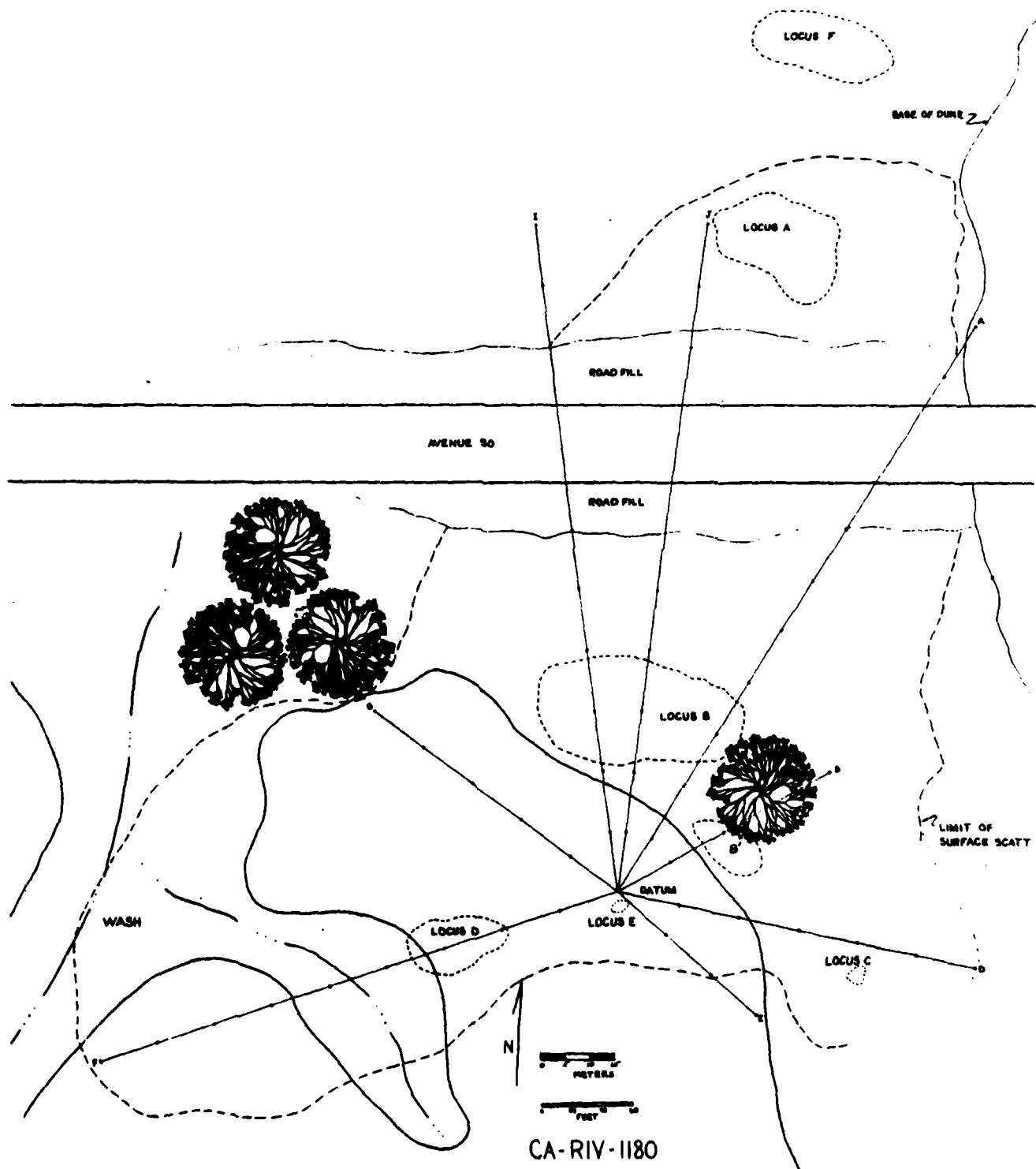


Figure 13: Site 4 (Riv-1180)

Locus D is closer to being defined as a shell midden than another area observed during this project and it certainly is no coincidence that this locus sits directly upon the former shoreline (Figures 14 and 15). The area contains a heavy concentration of shell, bone, fire-affected rock, pottery and the largest sample of debitage found on any site in this project. These flakes were small pressure flakes of chert and possibly jasper. Being barely observable on the surface, most of these flakes were found during the test phase.

On top of the dune, near Datum, was a small bone concentration, identified as Locus E. A few pieces of shell were also observed but no artifactual material was found.

As mentioned above, Locus F was the last area to be found, and actually sits outside of the general surface scatter of Site 4. This is an area containing sherds, fire-affected rocks and bone.

Since this was the largest scatter to be encountered and exhibited many loci, it was decided that in addition to the usual four transects (1 per quadrant), four supplemental transects would be established within the northern quadrants which was identified as the area of maximum surface extent. As a result, eight sampling transects were mapped, collected and tested (Figure 16). A total of 53 data points were contained within these transects yielding 1325 m^2 (3%) surface collection and excavation of 10.6 m^3 (Table 3, Appendix C).

Transect A sampled a northeast portion of the site, cross-cutting Locus B and Avenue 50, finally terminating atop a sand dune at the eastern edge of the site. It was in this transect that the first subsurface lens was observed (A-2). This unit is located between Locus B and B' and sits at a slightly higher



Figure 14: Site 4, Locus D. Looking N.E.
Towards Datum. Foreground sits
at 42' Contour.



Figure 15: Site 4, Locus D. Concentration
of Anadonta shell, bone, and
pottery.

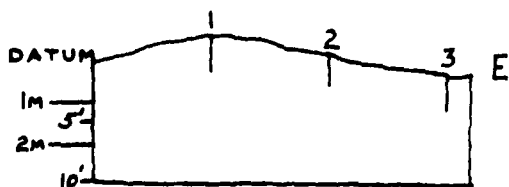
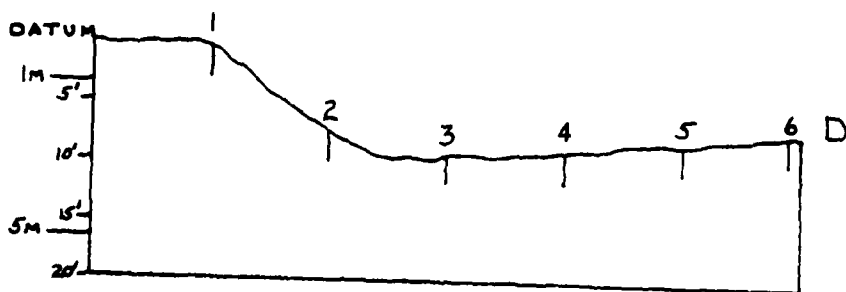
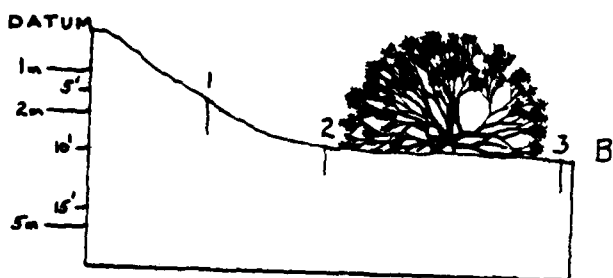
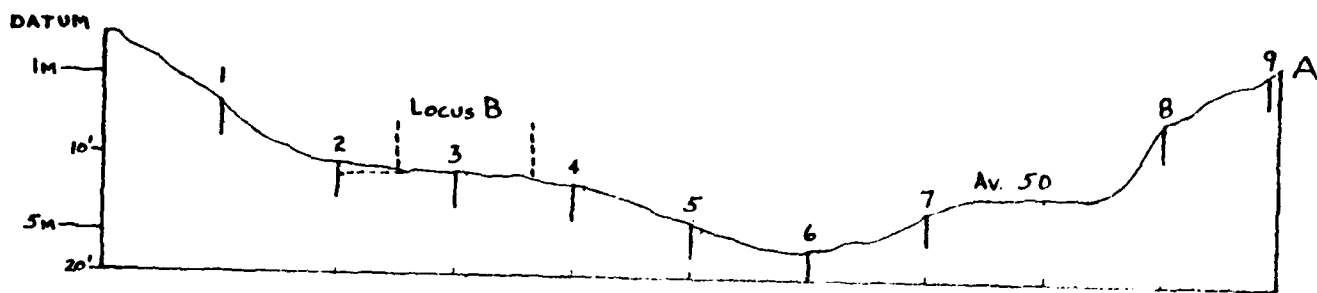


Figure 16: Transects of Site 4 (Riv-1180)

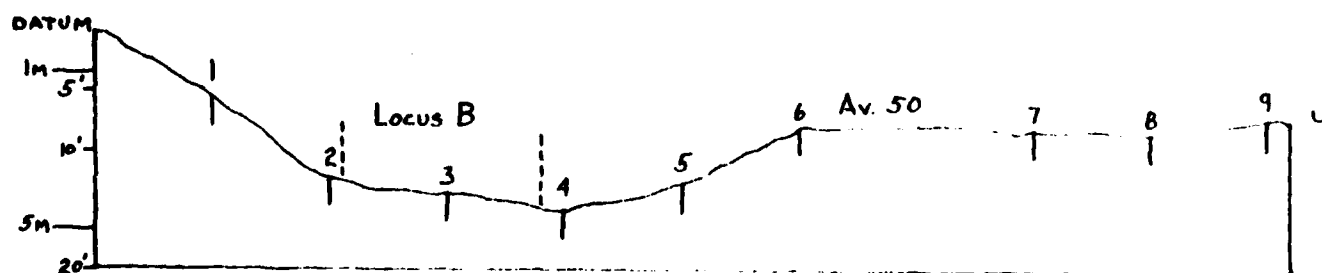
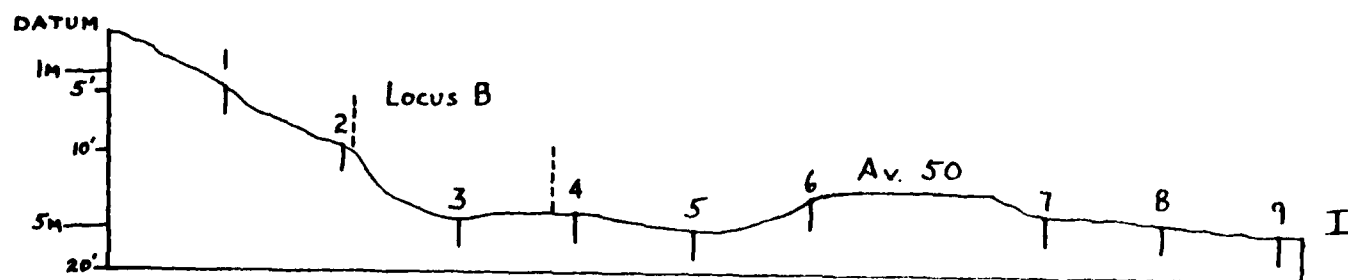
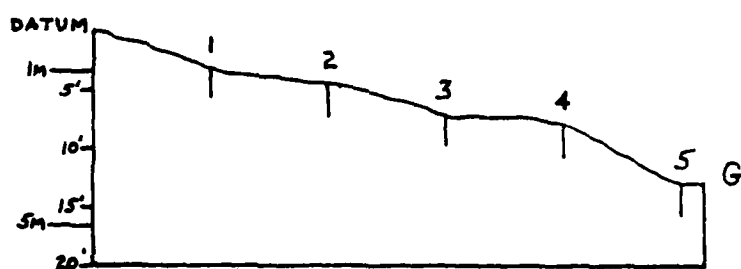
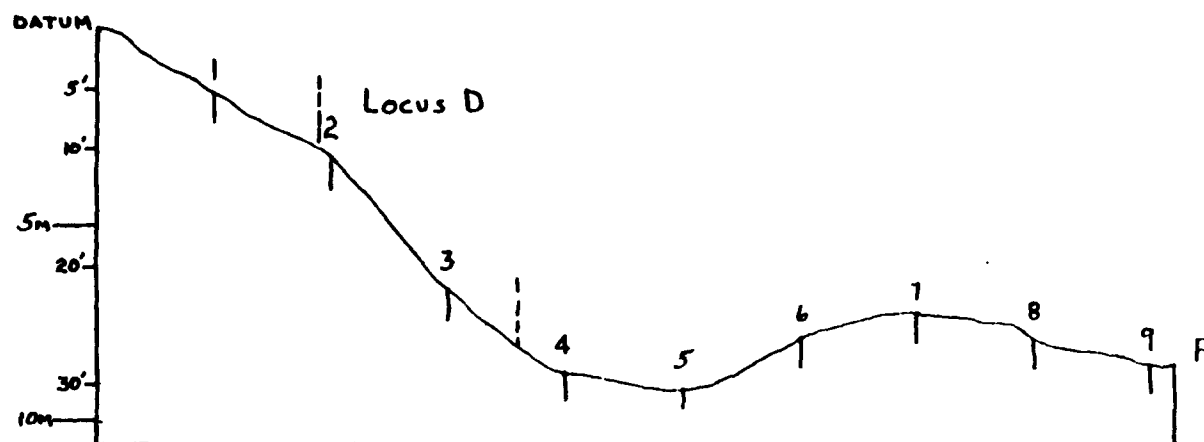


Figure 16 (continued).

elevation than the surface of either of the adjacent loci. At a depth of 32 cm. a narrow band, varying from 2 to 3 cm. in thickness, of dark sandy soil was observed. The soil contained small flecks of charcoal but no artifactual or ecofactual materials. However, the important point is that, this depth is approximately the same elevation (from Datum) as the surface of Locus B. Additionally, A-4, which was situated immediately northeast of Locus B, also exhibited subsurface lenses though not as well defined as in A-2. Very thin (ca. 1+ cm.) charcoal lenses were encountered at a depth of 15-20 cm. As in A-2, very little ecofactual and no artifactual material was recovered from this test hole. Nevertheless, this is only slightly lower than the surface of Locus B and may represent a horizontal extension. The remaining portion of this transect, A-5 to A-9, yielded only traces of ecofactual materials and no artifacts. However, this portion of the site has been severely disturbed by the construction of Avenue 50 with fill from the road extending on both sides of the road.

Transect B was a short sampling area, interrupted by a large mesquite. As seen in Appendix C, the materials along this transect were highly clustered with only one data point (B-2), located within Locus B, exhibiting any surface or subsurface materials. These were primarily fire-affected rocks with a few sherds and very small amounts of bone and shell.

The eastern portion of the site was sampled along Transect D. Materials here were clustered toward the eastern end (D-4, 5, 6) which were situated on the flat area below the dune, near Locus C. Bone (8.57 gms.) and shell (4.32 gms.) were prevalent on the surface of A-4, associated with 2 fire-affected rocks and a single sherd. Subsurface evidence was scant with a single fire-affected rock found immediately below the surface, a single sherd and .22 gms. of unidentified bone. However, the sherd was found

at a depth of 30 cm., and all of the bone was recovered from below this depth. There was no apparent change in soil color observed in this unit or any of the others in transect D, although small amounts of bone was found in the lower (ca. 30+ cm.) portions of D-3 and D-5. This level is approximately 3 m below Datum which is roughly the average elevation of Locus B and B'. Perhaps the materials from D-3, D-4 and D-5 are portions of a large horizontal scatter of materials situated along the base of this large dune. Loci B, B' and C, which appear at similar elevations to each other and to the pockets of subsurface materials in transect D, are surface exposures of this scatter.

Transect E traversed the southeast portion of the site, being totally contained on top of the large, central sand dune. Only traces of shell and bone were found on the surface of these data points and the only subsurface materials were found near the surface of E-2 (less than .5 gms. of shell).

The southwest portion of the site was sampled by a single transect. Transect F cross-cut Locus D which proved to contain the densest surface concentration of artifacts and ecofacts of any locus on any of the sites tested. As indicated in Table 3, Appendix C, the main area of concentration was between F-1 and F-4. The most notable increase was in quantities of bone and shell, with F-2 yielding the densest amounts (Shell = 36.86 gms., Bone = 14.03 gms.). The largest artifactual counts came from F-4 which sits at the base of the sloping dune. Whether these materials are clustered as a result of cultural or natural factors is uncertain. There is a remarkable lack of depth within this surface concentration with only traces of materials (primarily bone and shell) found in the test holes. Thick, clayey (lake bed?) deposits were noted in F-4 and F-5 at approximately 25 cm. below the surface. A second, smaller cluster was noted in the area of F-6, 7 and 8 on a low end of a dune southwest of Locus D. This area, too, exhibited no measureable amount of subsurface materials.

Transect G angles to the northwest of Datum and, similar to transect E, is totally contained atop the large dune. The dune, in general, is covered by a light scatter of bone fragments and pieces of Anadonta shell and this distribution is reflected in the sample from Transect G. Minimal amounts of fish bone and shell were found on the surface of all but one (G-3) of the data points and subsurface testing yielded only traces of these same materials.

Another portion of the northern site area was sampled by Transects I and J. Both cut across Locus B, then over to Avenue 50, eventually terminating approximately 40 m north of the road. Both of these transects exhibited similar patterns in that the data points in or near Locus B contain the largest amounts of materials. The single exception to this is I-3 which, despite its location within Locus B, did not yield any surface materials. Immediately north of Avenue 50, shell fragments became more prevalent along Transect I with I-7 and I-8 yielding 2.25 gms. and 2.1 gms., respectively. However, no other materials were observed to be associated with the shell. Subsurface materials were generally lacking or, at best, minimal. Locus B exhibited virtually no subsurface evidence, with the few materials recovered being immediately 1 to 3 cm. below the sandy surface.

In summary, Site 4 is a large, lake shore site containing numerous surface exposures of cultural materials. Subsurface tests indicate that some of these surface loci may be part of a large horizontal layer, portions of which have been covered by as much as 30 to 40 cm. of sand.

Site 5 (Riv-158)

This site is located approximately 30 m south and east of center stake 82 and immediately adjacent to a powerline which runs north-south along the section line between sections 31 and 32 (T. 5S/ R. 7E). Site 5 is found on two adjacent sand dunes between power poles T6523D and T6524D, at an elevation of roughly 55'. The scatter of materials was found clustered in two spatially distinct loci, each situated on top of a sand dune, approximately 40 m apart and separated by a narrow wash. Combined, these loci comprise an overall site area of roughly 750 m². Given the paucity of materials and the limited distribution, it was decided that the precise location of each artifact would be mapped and then the item would be collected (Figure 17). As collection proceeded, the loose sandy surface was hand-raked in order to uncover any additional materials.

Locus A covers roughly 360 m² and contains a scatter of materials found among two large cresosote bushes which sit atop a high sand dune. This locus consisted of 39 sherds, 104 highly fire-affected rocks, 5 pieces of white quartz (one of which was worked), 2 hammerstones and 3 fragments of ground millingstones. Unidentified bone was present but the quantities were negligible.

Locus B is located on a north-facing slope of a dune and is comprised primarily of bone with a few fire-affected rocks and millingstone fragments found at the base of the slope. This cluster of heavier materials may be the result of deflation of that portion of the dune or simply the erosion of these materials from further upslope. Few artifacts were located in this locus relative to Locus A. However, the major feature of Locus B is a definite darkening of the soil and an extremely thick concentration of bone materials.

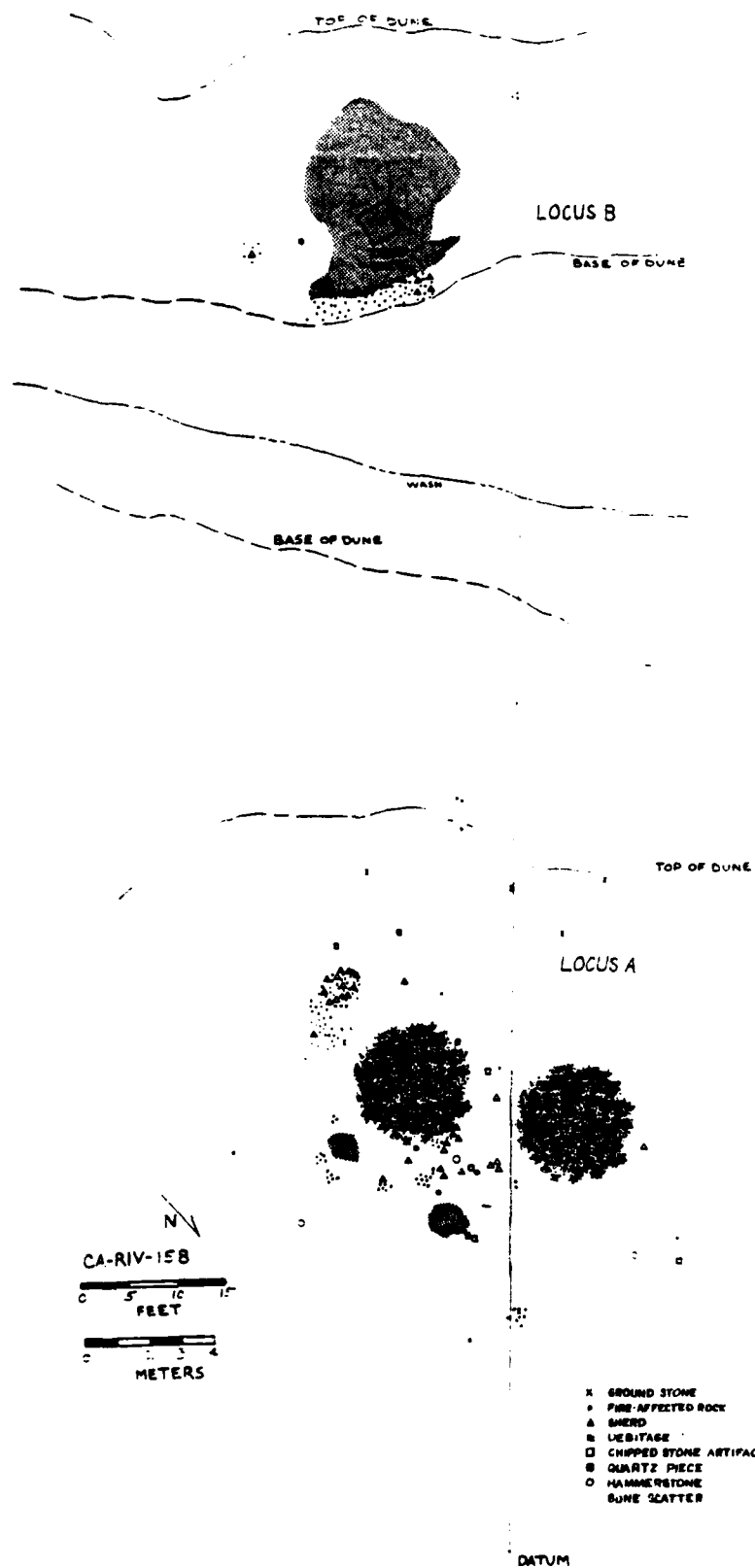


Figure 17: Site 5 (RIV-158)

Table 2: Artifactual Materials
From Site 5

	Fire-Affected Rocks	Sherds	Quartz Pieces	Groundstone Fragments	Hammerstones
Locus A	104	40	5	2	2
Locus B	69	8	-	2	-

As indicated in Figure 18, the surface contours of the two loci are disparate yet have an interesting similarity. Locus A is relatively flat, ranging from 1 m to 1.5 m below Datum. Locus B, on the other hand, exhibits a steep slope. However, the highest edge of the scatter begins at 1 m below Datum, as does Locus A. Possibly this slope was less severe during occupation of the site and has, subsequently, been modified through erosion. As will be discussed below, the midden soil in this locus does not exhibit as steep an incline as the present surface. Possibly, these two loci were part of a single, large scatter and the later formation of washes within the area served to bisect the site.

A single sampling transect was established from Datum (Figure 18) and four shovel holes were excavated. No specific evidence for subsurface deposits was found in any of the test holes. However, given the obvious surface indications in other areas of Locus B, a 1 m² test unit was placed at random within this dark soil area.

The surface of this unit was covered with numerous small bones, many of which were readily identified as fish vertebrae. In addition, large pieces of charcoal were also observed. This was the darkest soil found within any of the sites in this project and it lay immediately (1 to 2 cm.) below the loose sandy surface.

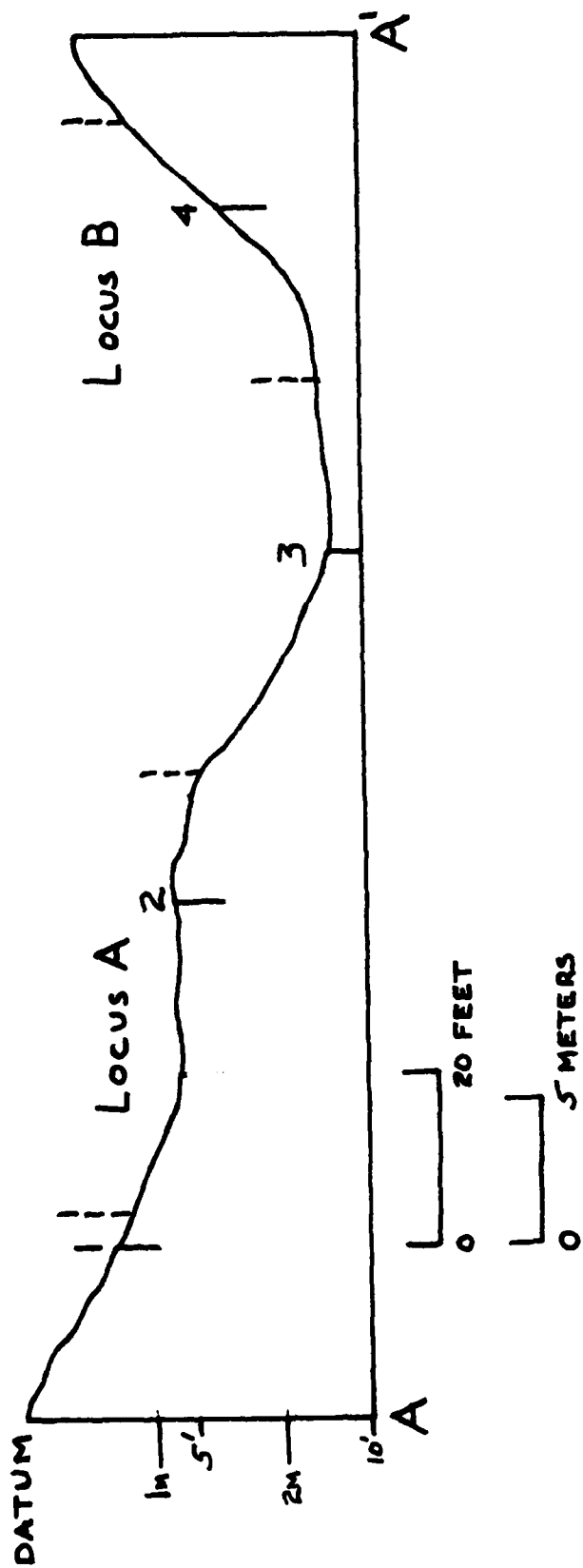


Figure 18: Sampling Transect of Site 5 (Riv-158)

The unit was excavated to a depth of 20 cm. and it was found that the dark brown layer varied between 3 and 5 cm. in thickness (Figures 19 and 20). No artifactual materials were found in this unit and, in fact, the majority of the bone was found on the surface the general configuration of this layer is uncertain although it appears to be relatively horizontal and does not conform to the slope of the dune. Soil samples were taken from this layer for future analysis and charcoal fragments were collected for eventual radiocarbon considerations.

While small in areal extent and yielding few artifacts, Site 5 did exhibit a midden layer from which important data can be extracted. It obviously was contemporaneous with Lake Cahuilla although it must have sat well away from the shoreline. Today, it is approximately 900 m from the 42' contour.

Site 6 (Riv-208)

Although this area has been listed as a site by Berryman and subsequently received a site number, this small, compact scatter is more specifically an isolated locus. This cluster is situated at about the 55' elevation near the base of a dune approximately 200 m east of the powerline, 100 m northeast of site 7 and 25 m north and east from center stake 101. Surface indications of this locus consisted of six brownware sherds clustered within a radius of 40 cm. No other artifacts or ecofacts were observed within or around the sherds. As the sherds were being collected, the sand in which they sat was hand-raked. It was discovered that additional sherds lay immediately below the surface. A 1 m² unit was then troweled to a depth of 10 cm. in an effort to recover all extant sherds. The entirety of subsurface sherds were found immediately (i.e., within 2 cm.) below the surface cluster and, again, no other cultural materials were observed.



Figure 19: Site 5, Excavating Test Unit in
Locus B. Looking N.E. towards
Datum and Locus A.



Figure 20: Site 5, Soil Profile showing Dark Layer.

Thirteen sherds were found below the surface, bringing the total sample from this locus to 19 (69.74 gms.). Given the compact clustering and uniformity of color of these sherds, it may be presumed that they represent a single vessel although no rim sherds were found. The collection of these specimens constitute complete salvage of this locus.

Site 7

This site was not located during the Berryman survey but was subsequently found during Bowles' survey and re-located during the reconnaissance of the channel for this project. Site 7 sits immediately south of center stake P.C. 90+38.74 which is roughly 261 m (750') east of the powerline and approximately 300 m (1000') E.N.E. of Site 5. The north and east portions of the site are bordered by high sand dunes topping off at about the 60' elevation with the majority of the site floor at around the 50' elevation. A jeep trail running in a general northeast-southwest direction, crosses the northern edge of the site.

The surface scatter is highly concentrated along the western slope of the easternmost sand dunes (Figure 21) and, as the scatter reaches the edge of the wash which transects the site, the materials become more dispersed. The western bank of the wash is characterized by a series of benches formed from the indigenous clayey soils, possibly older lake bed deposits. All of the material along the bank appear to have washed down slope from the more concentrated areas.

Within the overall site limits (10,739 m²), seven separate loci were identified, each varying in either size or contents. Locus A is a large (80 m²) scatter of materials found along the northeastern portion of the site. This area is deflating from the

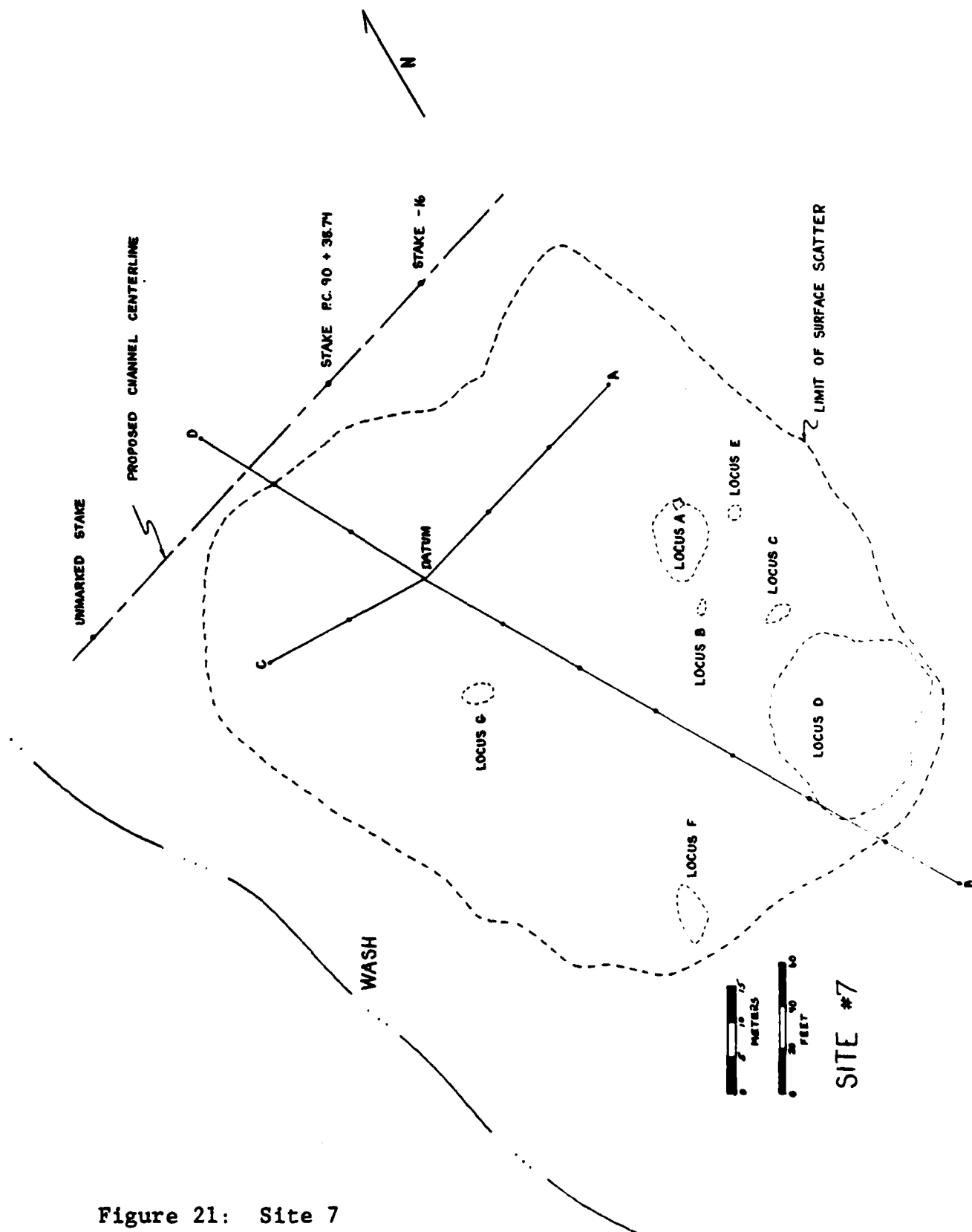


Figure 21: Site 7

base of a low dune containing a stand of Artiplex, which serves to obscure the eastern (i.e., highest) edge of the locus. However, it is readily apparent that this locus is defined by a definite concentration of fire-affected rocks, many of which are highly crystallized and are fragments of millingstones. Also within the locus are sherds (though not in great numbers), bone fragments and a general presence of small pieces of decomposing granite which may be the result of the decomposition of the fire-affected stones.

Locus B is a small (3 m^2) cluster of fire-affected rocks (primarily schist and granites), some of which were broken millingstones. No bone or other ecofacts were noted nor any other class of artifacts.

A compact (9 m^2) bone cluster associated with five fire-affected rocks forms Locus C. The bones are extremely small although many small mammal vertebrae were noted.

Locus D is the largest (531 m^2) exposed area and is located near the top of the eastern dune towards the southeast corner of the site. There are numerous fire-affected rocks in this locus as well as the densest bone concentrations found on any site during this project. Hundreds of complete and fragmented small bones were found along the south-eastern (i.e., highest) portion of this locus, many of which were fish vertebrae and bird bones. Anadonta shell was present but not in great quantities. In this same area were many burned pieces of bone as well as an Olivella cupped bead. Numerous small pieces of unworked white quartz were the only lithics other than the fire-affected stones found in the locus. No debitage or lithic tools were observed on the surface.

Locus E comprises a small (6 m^2) burned area immediately north of and, apparently, separate from Locus A. Seven fire-affected rocks are contained in this locus as are many pieces of charcoal and small bone fragments.

Both the F (31 m^2) and G (12 m^2) loci are comprised of loose clusters of bone with some pottery and a few fire-affected rocks. Whether these clusters are the result of cultural or natural deposition is unclear. Since both are downslope from the larger Locus D, these areas may represent catchments for downslope movement of materials.

Four sampling transects were established from Datum forming a total of 15 data points (Figure 22). In all, 275 m^2 (roughly 3%) were collected and approximately 3 m^3 was excavated by shovel hole. Additionally, three 1 m^2 units were placed at random within two of the loci, one in Locus A and two in Locus D, bringing the total excavation sample to 3.3 m^3 .

Similar to the results from the other sites, evidence of subsurface deposits was scant. The shovel hole testing revealed no evidence of any depth to the site. Transect A sampled the north-east portion of the site which mostly sits at the base of the eastern sand dune. The surface scatter here is very light and no subsurface materials were noted below the loose sand on the surface (2 to 3 cm.). Transect B angles southeastwards, upslope, cross-cutting a corner of Locus D. Surface materials were fairly clustered (Appendix C) with 3 of the 7 collection units yielding no materials. Bone and shell were found in small quantities in the other collection areas with fire-affected rocks being the most common item. Expectedly, B-5, situated along the southwestern edge of Locus D, exhibited the largest surface scatter, although it consisted entirely of fire-affected rocks ($N = 18$).

Transect C sampled the western side of the site towards the banks of the wash. It gradually became apparent that this portion of the site overlaid a thick, hard clayey deposit. Though not found in C-1, this clay deposit became evident in C-2 at a

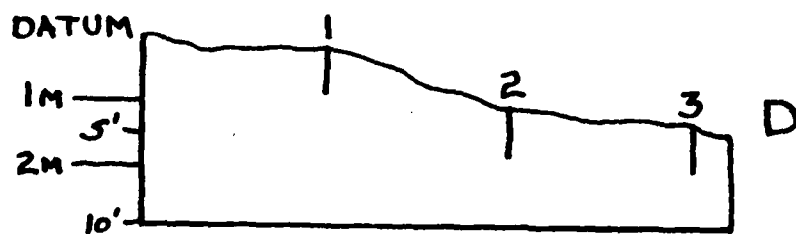
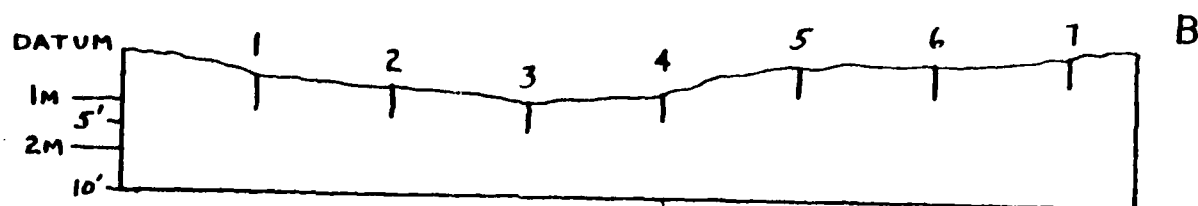
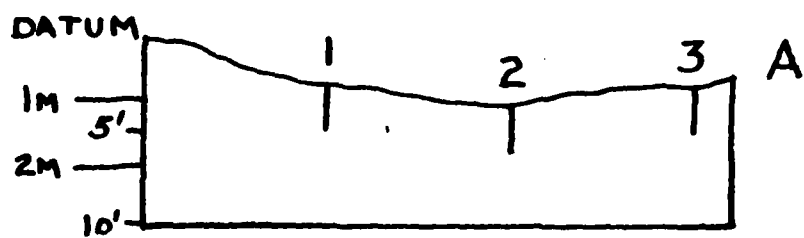


Figure 22: Transect of Site 7.

depth of 20 cm. and continued to 60 cm. where it became quite hard. No further data points were established along this line because, beyond C-2, the clay deposits were exposed on the surface and the surface materials were extremely disturbed.

Finally, Transect D sampled the northwest portion of the site and it was found that the scatter was so light and dispersed that no artifacts and ecofacts were collected on the surface nor were any found during excavation of the shovel holes.

Three 1 m^2 test units were excavated, one (A^1) within Locus A and two (D^1 , D^2) within Locus D. These were dug in order to gather additional data on the composition and depth of the two largest surface loci within the site, and to gather a representative sample of the materials contained therein.

Unit A^1 was located towards the northern end of Locus A and was excavated to a depth of 20 cm. In this portion of the locus, the scatter consisted entirely of fire-affected rock and small pieces of decomposing granites. No artifacts or ecofacts were found in this thin (less than 10 cm.) deposit.

Unit D^1 was placed at random within Locus D and, subsequently, excavated to a depth of 10 cm., at which point no further cultural materials were observed. Within the 0.1 m^3 removed from the unit were 4 small sherds, 1 Olivella cupped bead, 0.4 gms. of shell, and 18.0 gms. of small bones (largely fish and small mammal). The deposit is relatively thin, extending approximately 6 cm. below the surface with no discernible difference in soil color from other areas of the site.

Unit D^2 was placed within a dense bone cluster towards the southern end of locus D. Like the previous unit, this was excavated to a depth of 10 cm., at which point sterile sand (identified as containing no cultural materials) was encountered.

27.5 gms. of bone was found in this unit, much of it identifiable as fish, bird and mammal. Additionally, one small sherd and 6 small retouch flakes were observed. Again, the soil in this unit did not significantly vary in color from the surrounding areas.

Site 7 is a relatively compact cluster of loci, most of which are contained along a northwest facing slope at the eastern edge of the scatter. The site does not appear to have much depth although surface remains are considerable. Ecofactual evidence definitely indicates that this site was contemporaneous with Lake Cahuilla.

DISCUSSION

From the above description of the field data, it can be seen that the sites within the Flood Control Channel Easement vary in size, complexity and range of data. This section will be devoted to the examination of these data in terms of the previously stated research problems.

The first, and possibly most important, series of problems to be discussed are those relating to site composition. It must be emphasized that, given the relatively unstable soil conditions and the erosional factors within this area, these sites, as they exist today, are as much geological deposits as they are cultural deposits. This is not to argue that there has been extensive disturbance to these areas but rather recognizes that modification of these previously inhabited areas have largely taken place through natural factors.

Examination of the patterns of surface scatters demonstrate that Wilke's observations regarding surface exposures largely facing the northwest (prevailing wind direction) also holds true for the sites in this project. Sites 4,5,7 are found along the slopes of sand dunes having a northwest facing slope. The major surface scatters within these sites (including the entirety of Site 7) are found along these exposed surfaces. Site 2 appears to have originally consisted of a rather small, concentrated locus of materials which have subsequently been extended in a southeastern direction, most likely through wind erosion. With Site 1 it is difficult to determine the factors serving to expose cultural materials given the extensive disturbance to this area. However, originally this area was open to the northwest and, undoubtedly, exhibited surface patterns similar to the above mentioned sites. The single exception to this pattern was found at Site 3. Here the concentration of materials were contained within a small area at the southeast base of a rather large sand dune, presumably protected from the prevailing winds.

From the above patterns, an obvious question arises; if site areas exposed to the northwest should exhibit surface scatters as the result of wind erosion, should it be expected that other areas of a site (e.g., those sheltered from the winds or those which catch the blowing sand) would yield subsurface remains?

However, the data obtained from the sites in the project indicate that this question may be based upon an invalid assumption, that is, that there is a general horizontal scatter of material, portions of which could be covered when others are exposed. The results from the subsurface tests undertaken on the five sites seem to demonstrate that the cultural materials within these sites are relatively clustered and that no general scatter is predominant within any site. There are portions of these loci which have been covered with sand, though usually not to any great depth (i.e., less than 10 cm.). The exception to this is found at Site 4 where an apparent extension of the large surface scatter is covered by the base of a large northwest facing dune. In the lower areas, this scatter has been exposed (e.g., Locus B and B') while the areas situated closer to the base have been covered to a depth of approximately 30 cm. by the blowing sand as it came in contact with this barrier. Additionally, there is generally no subsurface evidence of any intermediate areas between large loci although the individual loci are likely to extend somewhat more than the observable surface dimensions.

It has also been shown that there is virtually no correlation between surface concentrations and subsurface deposits. Even within the densest concentrations, the depth is minimal. It must be emphasized though that the lack of depth should not be construed in a negative sense, for it has also been shown that surface remains on some of these sites (i.e., Sites 3,4,5,7) are considerable.

The last aspect dealing with site composition is that of elevational variations and its use in predicting cultural layers. Data from the transect profiles indicate that elevation could be used as a general predictor although, again, it must be recognized that cultural layers are often discontinuous. Therefore, it would seem reasonable that elevation may be useful in the areas immediately proximal to surface scatters though becomes less useful further away from these loci.

In summarizing the important points regarding site composition, it must first be reemphasized that both the cultural and geological processes responsible for forming the archaeological deposits in this area must be more fully understood. These sites were largely found to be highly clustered deposits often containing large quantities of artifactual and ecofactual materials. These deposits consist of thin cultural layers of which major portions are usually exposed on the surface. None of the sites exhibited multiple horizontal layers and rarely exceeded 5 cm. in depth. Only with the accumulation of additional data relative to the physical characteristics of sites in this area can a more complete understanding of these deposits be developed.

Chronological Considerations

Charcoal and soil samples containing organic materials were taken from some of the sites so that in the future, radiocarbon dates may be obtained. However, at this point we must rely upon the few classes of diagnostic artifacts and ecofacts recovered during the testing to provide temporal data.

Pottery was present, though in varying densities, at all the sites. While there is a wide variety of surface color, largely due to the firing, all sherds are readily assigned to the Tumco Buff and Tumco Stucco type with the Buff ware being more

common (Figure 23). As stated earlier, the first appearance of this pottery is dated to before A.D. 900 along the Colorado River (Schreden 1953) and, most likely, entered the Coachella Valley sometime after A.D. 1000 (Bettinger and Taylor 1974), where it was manufactured into the historic period.

The second distinctive class of artifacts in this area is projectile points. A single point was found, located on the surface of Site 3 (RIV-119) (Figure 24). The specimen was broken with the base missing and the remaining portion exhibited a small (1.7 cm x 1.7 cm), thin (.4 cm) triangular outline with serrated edges. Exact stylistic determination of this point cannot be made given its incomplete form, however, its diminutive size and general morphology suggests affinities to the Cottonwood series which, similar to the ceramic assemblage, is identified with the Late prehistoric period. Moreover, this point is made from obsidian from Obsidian Butte which, situated at 220 feet below sea level, would have been accessible only during dry periods between lake stands. Referring back to Figure 4, we see that this lithic source would have been accessible about A.D. 1200-1300 and then after the final stand of Lake Cahuilla.

Olivella shell beads (N=3) were found in two sites (3,7) (Figure 25). Bead styles have been found valuable as temporal indicators in other areas of southern California (i.e., Santa Barbara area) and are useful in this study in that many of the shell artifacts found in the Coachella Valley may have had their origin along the southern California coast.

All three beads fall into the 'cupped' type established by King (1979). These are made from the callus portion of the Olivella shell and exhibit a circular outline and cupped-shaped cross-section. According to King these mark the beginning of the Late Horizon (A.D. 900-1000) for coastal southern California and continued to the historic period.

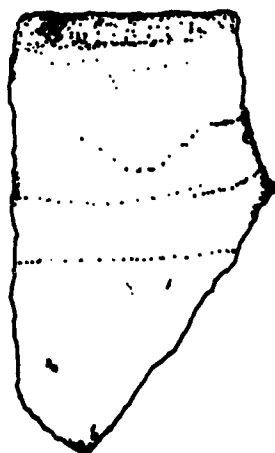
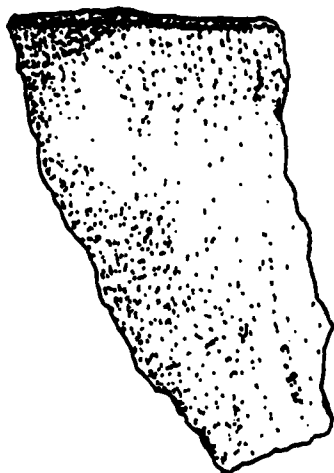
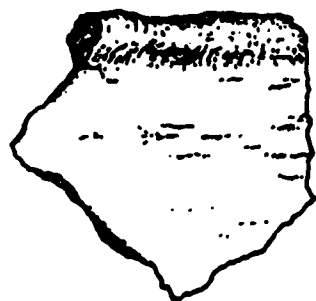


Figure 23: Variations in Rim Form



2½ X

Actual Size

Figure 24: Projectile Point RIV-119.



Figure 25: Olivella cupped beads.

As discussed above, lacustrine ecofacts were present on all but two sites (3,6) though varied greatly in concentration. At present, it is difficult to gauge whether the absence of shell and fishbone on a given site (above the 42' contour) is indicative of a post-lake occupation or a site contemporaneous with the lake yet functionally distinct from the other sites.

In summary, available chronological data suggest that all of the sites investigated in this project date to the late prehistoric period in the Coachella Valley. At least four of the sites (1,4,5,7) are directly associated with the last stand of Lake Cahuilla while the probability is high that the other three (2,3,6) are also contemporaneous.

Settlement System

Settlement system analysis involves the examination of functional relationships between contemporaneous sites which includes defining site types, investigating organizational patterns (i.e., the cultural processes responsible for the spatial patterning of sites) and scheduling (i.e., seasonality of occupation). This differs from a settlement pattern which is simply the observable spatial distribution of contemporaneous sites. Unfortunately, though not suprisingly, the test level investigation of these sites does not provide adequate data to explore these avenues, except on a rather speculative basis. It should be emphasized though that sufficient materials do exist on these sites and, with detailed analysis, can provide significant data on the local settlement system.

Given that the project area comprised a narrow strip which cross-cut a larger area containing an extremely high site density, the distribution of sites in this project offer no specific observable pattern. In fact, no readily apparent pattern can be seen in the general La Quinta area except that, as expected the larger scatters of cultural materials cluster near the shoreline. However, as Bowles' survey demonstrated, many cultural loci are dispersed through areas further away from the shore (including Sites 3,5,7).

For the sites in the project, it can be said that all are situated above the 42' contour and, therefore, are above the shoreline of Lake Cahuilla. However, whether all of the sites were contemporaneous with the lake is uncertain.

Definition of functional site types is speculative at present, based upon the range of artifacts and ecofacts present at each site. As stated earlier, Wilke's site types were based largely upon the range and quantities of extant ecofactual material and, given the general paucity of artifacts other than pottery sherds on most sites in this area, this approach seems reasonable. Sites in this area have been collected by pot-hunters for decades, thus reducing the validity of comparing artifact inventories between sites. Other criteria such as site size and number of loci, in addition to the range and quantity of ecofacts will have to be incorporated into any site typology for this area. In this report the classification of sites into types is based on the premise that:

*all sites in which a particular
exploitative and maintained acti-
vities were carried out will dis-
close a similar structure of
material elements and thus become
examples of a single settlement
type (Struever 1968:287).*

Table 3 presents comparison of artifact/ecofact inventory for each site and demonstrates a rather uniform pattern.

TABLE 3

Variation in Cultural Materials
Recovered from Sites

	Pottery	Proj.Point	Beads	G.S*	Debitage	Shell	Fish
1	x	-	-	x	x ¹	x	x
2	x	-	-	x	-	x ¹	-
3	x	x	x	x	-	-	-
4	x	-	-	x	x	x	x
5	x	-	-	x	-	x	x
7	x	-	x	x	x ¹	x	x

x¹ - Present but exceedingly rare.

* - Ground Stone.

Given the size, location and amounts of artifactual and eco-factual materials, Site 4 is classified as a lakeside camp. Further examination of ecofactual materials (i.e., bird bone and plant remains) from this site could provide data on whether this area was occupied at specific times of the year or continuously. Site 1 also fits into this category though the data potential for further analysis is much less.

Of the remaining sites, all but Sites 2 and 6 are tentatively classified as camps based on overall size, internal configuration (more than a single locus) and concentration of cultural materials.

Site 2 may have been a processing station where mesquite beans and/or other plant remains were collected and prepared.

From this brief examination of research problems, it becomes clear that further, more intensive data collecting is necessary. As in any study, the acquisition of new data leaves us with more questions than answers. Only with the increase of problem-oriented testing and salvage operations and intelligent analysis can these questions begin to be satisfactorily answered.

SITE EVALUATIONS AND RECOMMENDATIONS FOR FURTHER WORK

The general area (i.e., the southwest shore of Lake Cahuilla) in which the sites in this project are situated, is an extremely significant archaeological region. Wilke's work in the area has demonstrated that close analysis of materials from archaeological sites in the area can reveal an important array of data relative to the past lifeways of the aboriginal inhabitants. Preliminary examination of the sites tested in this project demonstrates that many are rich in cultural materials and can provide invaluable data.

Berryman (1977) suggested that three sites (1,3,4) are of National Register quality and subsequently the area of the Flood Control Channel was nominated for eligibility to the National Register of Historic Places (Federal Register Volume 44, No. 26, p. 7635, February 6, 1979).

Site 1 (RIV-1174)

Only a small portion of this formerly intensive shoreline site remains. This certainly would have been a valuable archaeological resource but the test results indicate a very low

potential. Fortunately, Wilke's excavation in this site has provided additional data from this area. It is recommended that no further work is necessary at this site.

Site 2 (RIV-35)

This small surface scatter was totally collected and while the few materials obtained await further laboratory analysis, it is not felt to be necessary to conduct any further field investigation of this site.

Site 3 (RIV-119)

Despite the impacts this site has received, and continues to receive, valuable data are contained within. This site is most probably representative of the post-lake utilization of the La Quinta area as it was returning to desert conditions. Its location and composition would be important in the analysis of late, proto-historic settlement systems in the Coachella Valley. For example, this may have been a small, satellite encampment from the larger rancheria which is known from historic records to have been located in the area of Indian Wells.

It is recommended that further sampling of the bone concentration at Locus A be conducted as well as the area of Locus B. Test units should be placed around the surface exposures of these loci in order to establish the total horizontal limits. In addition to the ecofactual data to be obtained, further data relative to site composition should be collected.

Site 4 (RIV-1180)

This was the most extensive and complex site encountered during this project and unquestionably warrants further investigation. This site sits directly upon a portion of the shoreline of Lake Cahuilla and offers a great deal of ecofactual materials. Again, investigation should be directed towards further identification of surface loci, especially Locus B which appears to have some portions covered by as much as 30 cm of sand. Investigation of specific loci, as spatially discrete clusters, may provide types of data necessary to more accurately define site types. Loci investigation may also provide data on inter-site patterning.

Locus D is another important portion of this site which should receive additional sampling. The range of artifacts and ecofacts in this area was considerable, and will provide data relative to a number of various research questions.

Site 5 (RIV-158)

With the mapping and collecting of each artifact within the two loci comprising this site, much of the investigation of this site has been completed. However, it is felt that further sampling of the dark midden area within Locus B should be undertaken. This area is important in that it is only one of two identifiable midden layers (the other being found subsurface adjacent to Locus B in Site 4) and may be able to provide floral materials through flotation techniques.

Site 6 (RIV-208)

This should have not received a site number in that it is only a small, apparently isolated cluster of sherds. As stated previously, this area was totally collected, necessitating no further work.

Site 7

Though not as large in overall areal extent as Site 4, this site also contains a large amount of materials within its surface scatter. Ecofactual materials indicate this area was occupied contemporaneously with Lake Cahuilla and from the amounts of identifiable bone observed in Site 7, investigation into aspects of subsistence and settlement (i.e., seasonality) could be pursued. Again, attention should be directed towards specific surface loci.

In summary, the above sites are situated within an extremely important portion of the Coachella Valley. The numbers of archaeological sites at the northern end of Lake Cahuilla attest to the intensity of occupation and utilization of this area. Four (Sites 1,4,5,7) of the seven sites investigated in this project contain evidence that they were utilized during a stand (presumably the last) of Lake Cahuilla. Two (Sites 2,3) were probably visited after the dessication of the lake and formed a part of the later settlement system. Although these sites are almost entirely surface scatters, they contain large amounts of important data relative to many varied research problems. It is imperative that the data from these sites be retrieved through careful, systematic archaeological techniques prior to any disturbance of this area.

Methods for the retrieval of significant amounts of this archaeological data should focus upon further delineation and investigation of the major loci identified during the test phase. This may include, for example, the establishment of a large grid system consisting of 30 m x 30 m blocis, over each of the sites (this does not apply to Site 5) with these blocks further subdivided into 5 m x 5 m units in and around the surface loci. At this point surface collection can be performed and, subsequently, hand excavation of 2 m x 2 m pits would take place. Given the fineness of the sandy soil and the minuteness of many of the ecofacts, fine screening (.e., 1/8" or 1/16") of excavated soil must be undertaken. Further delineation and investigation of the possible midden area in Locus B of Site 5 should also receive careful excavation though would not entail any extensive site grid.

The following is a reasonable time estimate for work at each site (given in man-days):

Site 3.....	16 man days
Site 4.....	32 man days
Site 5.....	8 man days
Site 7.....	20 man days
Total	76 man days

REFERENCES CITED

Berryman, Stanley R.

- 1977 Archaeological Investigation of the Excavation Channel.
Ms. on file at the Coachella Valley Water District.

Bettinger, Robert & R.E. Taylor

- 1974 Suggested Revisions in Archaeological Sequences of the
Great Basin in Interior Southern California, Reno; Nevada
Archaeological Survey Research Papers 5:1-26.

Blake, William P.

- 1854 Ancient Lake in the Colorado Desert. American Journal
of Science (Second Series) 17:435-438.

Bowles, Larry

- 1978 Environmental Assessment. A.T.O. Development.

Heintzelman, S.P.

- 1854 Indian Affairs of the Pacific House Executive Document
76:34-58 (34th Congress, 3rd Session on December 1, 1856
- March 3, 1857).

Hubbs, Carl L, George S. Bien & Hans E. Suess

- 1965 La Jolla Natural Radiocarbon Measurements IV. Radio-
Carbon 7:66-117.

King, Chester

- 1979 Appendix B: Bead Analysis. In, Archaeological Report -
Volume II, Data Presentation, pp. 316-325. Ms. on file
at Archaeological Resource Management Corporation, Garden
Grove, California.

Struever, Stuart

- 1968 Woodland Subsistence-Settlement Systems in the Lower
Illinois Valley. In, New Perspectives in Archaeology.
Sally and Lewis Binford Editors, pp. 285-312.

REFERENCES, Continued

Wilke, Philip J.

- 1976 Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California. Unpublished Ph.D. Dissertation. Department of Anthropology, University of California, Riverside.

Wilke, Philip J. & Harry W. Lawton

- 1975 Early Observations on the Cultural Geography of Coachella Valley. Ballena Press Anthropological Papers 3:9-43, Ramona, California.

APPENDIX A

Triangulation Points For Site Datum Stakes

Site #1 (RIV-1174)

1. 139° End of Pointing Finger of Statue at Shield's Dates.
2. 266.5° Top of Concrete Block Wall behind Circle K
3. 319.5° Top end (west) of Concrete Block Wall Behind house immediately east of Jefferson Road.

Site #2 (RIV-35)

1. 290° Point A
2. 271° La Quinta Peak
3. 258° Peak 1952

Site #3 (Riv-119)

1. 281° La Quinta Peak
2. 262.5° Peak 1952
3. 191.5° Peak 1482

Site #4 (RIV-1180)

1. 318° La Quinta Peak
2. 280.5° 1st Chimney west of Washington/Av. 50.
3. 176° Peak 1482

Site #5 (RIV-158)

1. 333° Point A
2. 300.5° La Quinta Peak
3. 181.5° Peak 1482

Site #6 (RIV-208)

1. 293° La Quinta Peak
2. 269° Peak 1952

Site #7

1. 327.5° Point A
2. 296.5° La Quinta Peak
3. 185° Peak 1482

APPENDIX B

DESIGNATIONS FOR ABBREVIATIONS IN

APPENDIX C

FAR - Fire-affected rock.
P - Pottery sherds.
D - Debitage.
H - Hammerstone.
GS - Ground stone.
CS - Chipped stone
B - Bone (Unidentified).
MB - Mammal bone.
FB - Fish bone.
FV - Fish vertebrae.
S - Shell (Anadonta)
* - Less than 0.1 gram.

APPENDIX C
SAMPLING DATA

TABLE 1
SITE 1 (RIV-11174)

A				C				G				E			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Surface	S*	-	S*	-	S*	-	-	S*	-	S*	-	6FAR	17D 27FAR	-	-
					1B	-	3B	-	-	5GS B-4.0	1P 1GS MB*				
Subsurface	S*	S*	-	S*	-	-	-	1FB	-	S*	5MB	S* FB*	4 Quartz	-	S*
										5FV	1P	2MB	Pieces	-	

TABLE 3

		A										B										D								
		1	2	3	4	5	6	7	8	1	2									3	1	2	3	4	5	6				
Surface	1P	1GS	1FAR											22FAR	B-.94									2FAR	9P B-272	1P				
	5*	B*	S*	1P	S*	-	-	5-8	-	4P	-									S-.7	S*	S*	-	1P	1D S-1.29	B-.87				
		S*	FB.12	B-.19											2D									B-8.57	1H	S-3				
Subsurface	1P	B*	1FAR	S-.15	B-.28	B-.38	S*	-											1LS									S-4.32	FB-.39	B*
									4FAR	-									FB41FAR	B*	S*	S*	1P	S-.20						
																														B-.22

TABLE 4

[illegible]

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