

The Spatial Organization of Activities at CA-ORA-662 on Pelican Hill in the Newport Coast Area, Orange County, California

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Abstract

Large scale data recovery excavations at CA-ORA-662, located on Pelican Hill in the Newport Coast area of Orange County, have provided data for the reconstruction of the spatial organization of activities within a Late Prehistoric major residential base. Residential and food preparation activities took place around a series of hearths at the south end of the site. Refuse was deposited in a dump north of the hearths. Other hearths that lacked large amounts of food waste were located north of the dump. Large amounts of debitage were associated with these hearths indicating that this area was used for flaked tool manufacturing.

Introduction

Large-scale data recovery excavations at archaeological site CA-ORA-662 (CHRIS P-19-000662) on Pelican Hill in coastal Orange County, California, were carried out as part of the Newport Coast Archaeological Project (NCAP). The extensive excavations provided data with which to reconstruct the spatial organization of residential and refuse disposal activities at a Late Prehistoric major residential base. This open, hilltop site was one of 35 sites where data recovery excavations were undertaken as part of the NCAP to mitigate the impacts of residential development within The Irvine Company's Newport Coast Planned Community (NCPC) (Figure 1). The NCPC is located

along the coast and in the San Joaquin Hills southeast of Newport Beach.

CA-ORA-662 was located on Pelican Hill, a high point near the center of the NCPC. The terrain drops steeply to the southwest to marine terraces near the Pacific Ocean. On the north, Pelican Hill was bounded by a deep tributary canyon of Buck Gully. Buck Hill lies to the northwest, and Los Trancos Canyon is to the east (Figure 2). ORA-662 was the largest site in the NCPC and covers most of the top and southeastern flank of Pelican Hill. The top and coastal slopes of Pelican Hill were covered with dense coastal sage scrub, and the northern slopes supported a dense mixed chaparral vegetation community. Soil was sandy with organic loam content in the midden areas of the site.

ORA-662 was a complex site made up of several sub-areas. The sub-areas were laid out in a semi-circular configuration which includes the gently sloping southeastern flank of Pelican Hill, the top of the hill, and the ridge extending to the northwest (Figure 3). The central sub-area of the site, designated Area 3, was located on the very top of the hill at an elevation of 725 feet above sea level. From this point, the

Pacific Ocean lies 1.8 kilometers to the south. Area 3 was divided into three sub-areas: Area 3 West, Area 3 East, and Area 3 South. Area 3 East and Area 3 West were physically divided by an access road which was originally graded to bedrock in some areas. Area 3 East was the most intensively occupied area within ORA-662 and is the focus of this study.

The results of the NCAP have been provided in a series of cultural resource management reports filed at the South Central Coastal Information Center at California State University, Fullerton. This paper is based on the report for CA-ORA-662 and CA-ORA-1203 (Mason et al. 1993).

Field and Laboratory Methods

For spatial control, a site grid was established using surveying instruments and tapes across the area

determined by the test program (Macko 1987) to contain cultural material. The origin of the grid was placed to the southwest, off the site. The coordinate of any point in the grid was measured in meters (m) north and east of the origin, producing site-grid coordinates in northings and eastings. Excavation unit datums for the southwest corners of 2 m by 2 m units were laid out systematically 7 meters apart.

Hand excavation consisted of digging square units measuring 2 m by 2 m. Each unit was divided into four 1 m by 1 m quads and was excavated in 10 cm levels measured vertically from the surface. Thus, each level followed the surface contour. The excavated material was then shoveled into buckets and taken to dry screens on site. After dry screening using 3.18 mm (1/8 in) mesh, the material was bagged and taken to the central water screening facility for the project. The material was water screened using 3.18 mm (1/8 in)

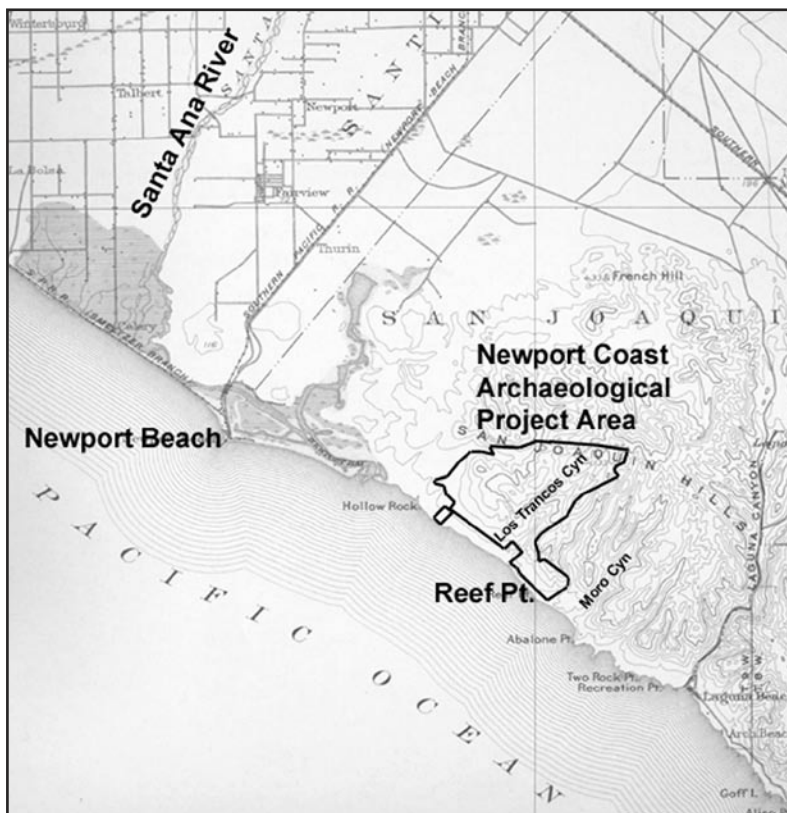


Figure 1. Location of the Newport Coast Archaeological Project.

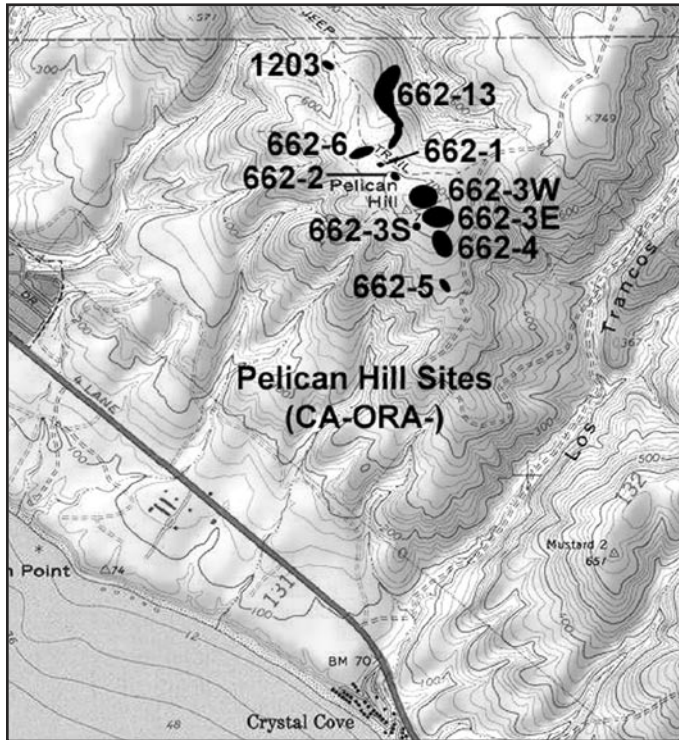


Figure 2. Pelican Hill sites.

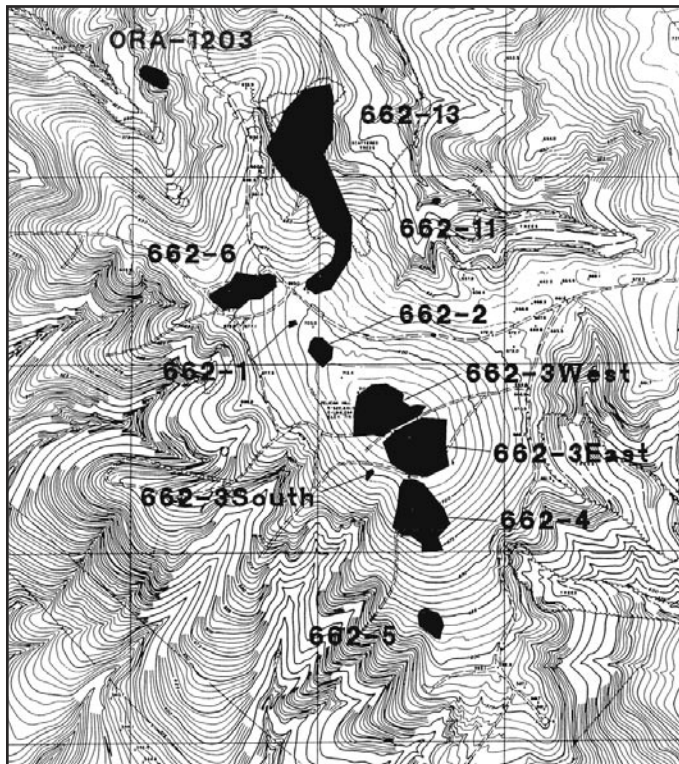


Figure 3. Detailed topography of Pelican Hill.

mesh, and all material remaining in the screens was placed in drying screens until dry. The material was then rebagged, boxed, and moved to temporary storage trailers.

When features were encountered, additional hand excavated 1 m by 1 m units were placed to more fully expose the feature. Each feature was mapped with rocks and artifacts numbered on the map and on a list of "feature items." The depth from datum of each item was recorded. Flotation samples and pollen samples were taken from in and around features. Field notes, forms, and maps were maintained by the Field Director. A lab assistant filed all field notes in site notebooks maintained in the laboratory. A site map showing the location of all units was maintained by the Field Director. The site map was updated daily to show unit numbers assigned, what units were open, and to what depth they had been excavated.

In order to retrieve data on the distribution of artifacts and faunal remains, units were systematically spaced 7 m apart. Unit size was relatively large (2 m by 2 m), and the interval between units was relatively small in order to increase the probability of encountering features and to obtain a larger sample of rare tool classes. The results of a soil phosphate program were employed in conjunction with the test program results (Macko 1987) to help determine the boundaries of the areas to be investigated with systematically spaced units. A magnetometer program was carried out to help locate features between systematic units. Anomalies which could represent buried cultural features consisted of localized variations of two to three or more gammas. These anomalies were usually bipolar, consisting of an anomalously high value next to an anomalously low value. Anomalies were defined using both magnetic contour maps and profiles of magnetic gradients. The most obvious 21 anomalies in Areas 3 East and 3 West were chosen for field verification through excavation. Of the 21 anomalies tested, 10 proved to be subsurface cultural

features containing fire-affected rock. All anomalies located in areas later determined to constitute major activity areas proved to contain cultural features. When features were located, "expansion units" were excavated to fully expose the feature and recover a sample of associated artifacts and faunal remains.

Excavation of the systematically spaced 2 m x 2 m units began in the northern part of Area 3 East (Figure 4) on April 20, 1989, under the direction of Michael Macko who was NCAP Principal Investigator from 1987 to 1990. The author was the managing archaeologist for the project from 1988-1990. Under Macko's direction, the spaces between the systematic units were also excavated in 2 m x 2 m units forming a large block of contiguous units. This block of units was excavated to expose material in a large surface depression which Macko believed represented a pit house, sweat house, or chief's house, possibly similar to the large pit encountered by Ross (1970) at CA-ORA-190 in Corona Del Mar. Although little evidence for a cultural origin of this depression was obtained, the block excavation did expose a number of hearths (Features 3, 5, 6, 8, and 9) on the southeastern edge of the depression. Excavation of the systematically spaced units continued to the south of the block excavation and anomalies located by the magnetometer program outside of the systematic units were tested. This resulted in the discovery of several hearth features including Features 10, 11, 18, 19, 24, 25, 26, 27, and 29, along with Feature 16 which consisted of a hearth surrounded by a shell dump. Expansion units were excavated around most of the hearths. Feature 28, located near the center of Area 3 East, contained cremated human bone. Because cremated human remains were encountered here, another large area was excavated in a contiguous block of units to recover the thousands of small human bone fragments. Ultimately, 121 square meters were excavated in the Feature 28 block, and most excavated material was screened using 1.59 mm (1/16 in) mesh to ensure recovery of small beads and bone fragments. All recovered human bone was reinterred in open

space at the direction of Mr. Jim Velasques, Most Likely Descendant (MLD) for the NCAP, and with the consent of the landowner.

A total of 195 2 m by 2 m units were excavated in Area 3 East, including 84 systematic units, 105 expansion units, and 6 other units. In addition, 46 1 m by 1 m units and 49 1 m by 2 m units were excavated. Most of these were expansion units. Thus, a total of 924 square meters were excavated, providing an 11.8 percent sample of the 7,823 square meter area of Area 3 East.

Upon completion of recovery of the large hand excavated sample, a backhoe was used at ORA-662 to mechanically excavate bulk removal units under the direction of Michael Macko. The purpose of the mechanical excavation was to locate features not encountered during hand excavation. Material between the hand-excavated units was removed with a backhoe with a wide, straight blade and placed in a large wooden hopper with chutes emptying into dry screens. The material remaining in the dry screen was bagged and placed in boxes. Such mechanical excavation was closely monitored and halted at the first indication of a probable feature or sensitive area. The mechanical excavation took place in the central part of Area 3 East. It was Macko's intention to have the mechanically excavated material stored unsorted at the Museum of Natural History of Orange County. However, the museum director would not accept the material until it was water screened. During the water screening process, human bone was discovered and Mr. Velasques, MLD, requested that all material be reburied. The landowner complied, and all material was reburied in open space.

Site soils and stratigraphy were defined by Tony Morgan, Project Geomorphologist, based on field inspection. Strata defined by Morgan were delineated on prepared unit walls. These walls were then photographed and stratigraphic drawings were prepared.

Four strata were defined: (1) Stratum 1 was the upper 10 cm consisting of recently formed soil and organics; (2) Stratum 11 was the cultural midden of variable depth below 10 cm containing dense amounts of shell visible in the sidewalls; (3) below Stratum 11 was a transition zone, Stratum 12, consisting of cultural organics which had moved down and mixed with the sterile, sandy subsoil, and (4) these strata rested on decomposing bedrock consisting of Monterey Formation sandstone. The thickness of Stratum 11, which contained the cultural material, was about 30 to 40 cm in Area 3.

No sorting was done in the field. After water screening, all material remaining in the screens was taken to the laboratory where cultural material was separated into classes consisting of chipped stone, ground stone, miscellaneous lithic, bone, shell, fire-affected rock, and organics. Species of unique shell elements (such as hinges and apices) were identified, and lithic material types were also identified. Identifications were checked by a laboratory director. Each class of material was put into a separate bag containing a tag with its provenience and a code for class and material. Identification of chipped stone tools, debitage, ground stone tools, and bone speciation was performed later by specialists.

All catalog information was coded and then entered into a DBase III+ computer data base by a data entry service. A logic check was run to help find errors, and the printout of potential errors was checked by a laboratory director to ensure error-free data.

A sample of the debitage was classified into the following categories: 1) first decortication flakes, 2) second decortication flakes, 3) tertiary flakes, and 4) biface thinning flakes. Cores and core fragments were also identified. All tools were classified and described by Clay Singer who also checked the debitage identifications and material types. Lithics were given catalog numbers and recorded on standard data sheets. This

information was also entered into the computer data base. Macrobotanical remains were sorted, identified, and cataloged by Lisa Panet Klug. Fish remains were identified and cataloged by Mark Roeder. Other vertebrate remains were identified and cataloged by Wayne H. Bonner.

Because of time and budget constraints, only a sample of the excavated material could be sorted in the laboratory. At Michael Macko's direction, most of the units comprising the block excavation in the surface depression at the north end of Area 3 East were sorted. Subsequent to this, Feature 28, containing cremated human bone, was discovered during excavation. In order to recover small beads which might be associated with the human remains, 1.59 mm (1/16 in) screen (rather than the 3.18 mm screen used elsewhere on the site) was used for most of the material from Feature 28 during dry screening and water screening. Additional sorting time was required for these units because of the many smaller items caught by the 1.59 mm (1/16 in) mesh. A large part of the laboratory budget was expended in completely sorting the 60.8 cubic meters excavated from Feature 28. During this period, northeast quads of the systematically spaced 2 m x 2 m units in Areas 3 East were randomly selected for sorting.

When the author became Principal Investigator for the project in 1990, a sample was chosen which could be sorted with the remaining budget. The first step in this process was to select a sample of the 100 features (mostly fire-affected rock features) within all areas of ORA-662 for analysis. Twenty-five features were chosen based on criteria which included integrity, diversity of tools, amount of faunal and macrobotanical remains, and co-occurrence of terrestrial and marine carbonates for radiocarbon dating. Eight of the 25 features were in Area 3 East and consisted of Features 4, 5, 8, 9, 10, 16, 18, and 28. In features with large amounts of shell (Features 9

and 18), a sample of the shell non-repetitive elements (hinges and apices) was speciated.

The sorting procedure and sample selection resulted in three kinds of 2 x 2 m units or 1 x 1 m quads: (1) those which were sorted and in which the shell was speciated, (2) those which were sorted, but in which the shell was not speciated, and (3) those which were not sorted. In a few units there were combinations of (1) and (2), and in some units not all lots were sorted.

Flotation samples were taken from most features. Samples from the features chosen for analysis were floated, and a subsample consisting of those containing the most macrobotanical material was sorted. The heavy fraction, including material as small as 1.59 mm (1/16 in), was sorted and cataloged by laboratory personnel. The light fraction was sorted, and macrobotanical material was identified by Lisa Panet Klug.

Features

A total of 100 prehistoric features were defined at ORA-662. Of the 100 features, 75 were encountered during hand excavation, and 25 were found during mechanical excavation in Areas 3 West and 3 East. There were 49 features in Area 3 East (Figure 4). Most of the features consisted of fire-affected rock, probably representing hearths and scattered hearths. A few features were concentrated shell deposits or combinations of fire-affected rock and shell deposits. Feature 28 was originally defined as an area containing human bone. Later analysis showed it also contained large amounts of animal bone and shell deposited at a later time as secondary refuse on top of the human remains. The features selected for analysis in Area 3 East are described below.

Feature 4 was a circular hearth about 45 cm in diameter and composed of 52 rocks, 41 of which were fire-affected. Feature 4 was found in the 0 to 10 cm

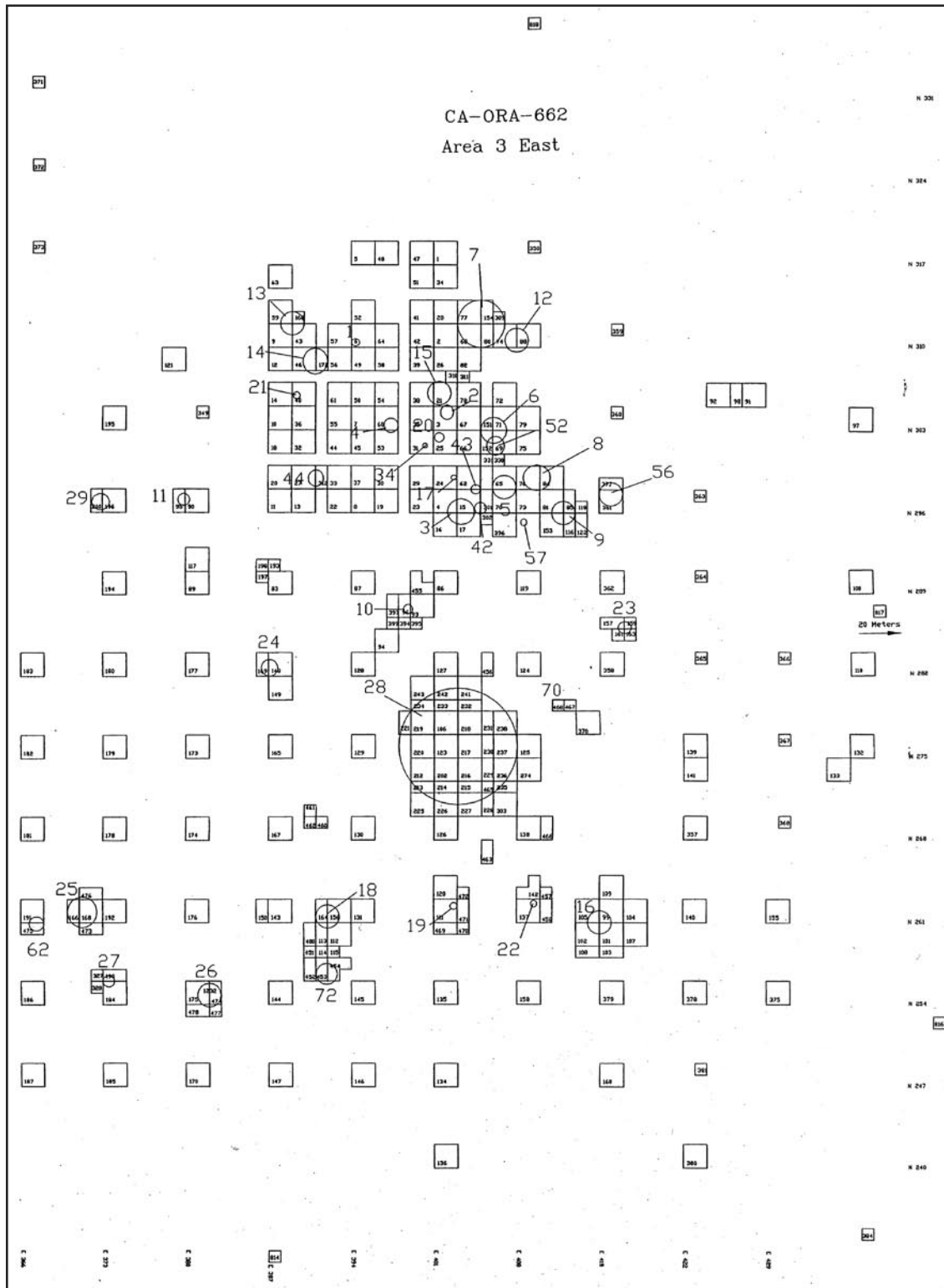


Figure 4. Area 3 East data recovery units and features.

level of Unit 60. Associated artifacts included bifaces, a biface preform, 5 reamers, a utilized flake scraper, cores, a mano, and metates.

Feature 5 was a compact circular hearth averaging about 45 cm in diameter. It was found in the 10 to 30 cm levels of the northeast quad of Unit 70, and a scatter of rock was found in the northwest quad. The hearth was made up of 97 rocks, 87 of which were fire-affected. The small number of associated artifacts included a reamer, a biface preform, cores, and a mortar.

Feature 8 was made up of three layers of fire-affected rock in the 10 to 30 cm levels of Units 73, 76, 81, and 84. While the upper and lower levels consisted of scatters of fire-affected rock, the middle level contained a somewhat compact hearth measuring 75 cm by 50 cm. The entire feature was composed of 314 rocks, 252 of them fire-affected. Associated artifacts included a Pinto dart point, scrapers, cores, reamers, manos, a metate, angular hammers, abraders, a stone ornament fragment, and 2 incised stones.

Feature 9 was a compact cluster of fire-affected rock about 75 cm in diameter and was found in the 10 to 30 cm levels of Unit 85. An extensive scatter of rock was found around this cluster in the 10 to 20 cm levels of Units 81, 85, 116, 118, and 122. The cluster and associated scatter consisted of 638 rocks, 280 of which were fire-affected. Associated artifacts included arrow points, scrapers, cores, manos, 10 metate fragments, and 5 angular hammers.

Feature 10 was a large cluster of fire-affected rock and shell measuring approximately 90 cm by 60 cm. The feature was excavated in three layers, but the lowest layer consisted of only 5 rocks. Feature 10 came from the 10 to 20 cm level of Units 93, 96, 394, 395, and 397. It consisted of 135 rocks, 133 of which were fire-affected. Associated artifacts included a concave base arrow point, a Humboldt dart point, a biface preform,

a scraper, a pick, cores, manos, metate fragments, an incised stone, a fishhook blank, and an *Olivella* wall disc bead.

Feature 16 consisted of a large scattered hearth excavated in two layers from the 10 to 20 cm level of Units 101 and 102. It was surrounded by a large shell deposit which covered 28 square meters in Units 99, 101-105, and 107-109. The hearth measured about 110 cm by 80 cm in the lower, larger layer. The feature contained 294 rocks, 283 of which were fire-affected. Associated artifacts included 4 concave base arrow points, a Humboldt dart point, scrapers, cores, a chopper, three reamers, bone tools (including three awl fragments), a fishhook fragment, and 14 *Olivella* and *Mytilus* beads.

Feature 18 consisted of a small, tightly clustered hearth in the 10 to 30 cm level of the southwestern portion of Unit 112. It was surrounded by a scatter of rocks and a dense shell deposit covering 14 square meters in Units 112-115, 131, 156, 164, 400, and 451-454. The hearth measured 70 cm by 60 cm, and the feature contained 847 rocks, 799 of which were fire-affected. Associated artifacts included 7 arrow points, 15 biface preforms, scrapers, reamers, a perforator, pestles, metates, 18 bone tool fragments (including awls, gorges, and two tools with one pointed tip and one blunt tip), 9 fishhooks, 3 fishhook blanks, a pipe fragment, a quartz crystal, 42 *Olivella* beads, 45 *Mytilus* ground disc beads, and 2 *Haliotis* ornaments.

Feature 25, consisting of two adjacent large hearths with associated shell deposits, was found in the 10 to 30 cm levels of Units 166, 168, 192, 473, and 476. The larger of the two hearths measured 90 cm by 70 cm, and the smaller was 60 cm in diameter. The feature contained 256 rocks, 248 of which were fire-affected. Associated artifacts included 7 projectile points, 5 biface preforms, a reamer, an eccentric crescentic, cores, a mano, a mortar, abrading hammers and angular hammers, two asymmetric shouldered pestles,

2 gorges, 1 awl, 3 bone tool fragments, a fishhook fragment, 12 *Olivella* beads, and a pipe fragment.

Feature 28 was a large area containing cremated human bone and large amounts of shell and animal bone. In order to recover the human bone fragments, 121 contiguous 1 m by 1 m units were hand excavated to a depth of 70 to 80 cm producing a hand excavated volume of 60.8 cubic meters. During this process, 5 areas of fire-affected rock were encountered. Two of these were small clusters probably representing hearths, and the other three were scatters covering several square meters. These clusters and scatters of fire-affected rock were recorded 10 to 30 cm below surface. Large amounts of animal bone, shell, and debitage also came from the 0 to 40 cm levels. The distribution of human bone fragments by weight indicated the cremations were originally located in a five square meter area in the 40 to 60 cm levels of Units 123, 202, and 217 (the southeast quad of Unit 123, the northwest, northeast, and southeast quads of Unit 202, and the southwest quad of Unit 217). Bone fragments were likely dispersed throughout the rest of the Feature 28 area through formation processes. A large number of representatives of all artifact categories were recovered from Feature 28 indicating use of the upper levels (0 to 40 cm) as a refuse disposal area after its use as a cremation site.

Feature 42 was a small cluster of fire-affected rocks about 50 cm in diameter with three other large fire-affected rocks about 70 cm away. The feature was located in the 10 to 20 cm level of Units 301 and 302 and portions of Units 15 and 17. The feature contained 66 rocks, 59 of which were fire-affected. Associated artifacts included a Pinto projectile point, two biface preforms, a reamer, core fragments, a scraper, an angular hammer, and a *Mytilus* ground disc bead.

Spatial Distribution of Cultural Material

The spatial distribution of cultural material at ORA-662 is discussed in terms of four major classes of material: shell, animal bone, fire-affected rock, and chipped stone. The spatial distribution of functional categories of tools and social/ceremonial artifacts is also presented. This is followed by a discussion of feature characteristics and spatial distribution.

The spatial distribution of the major classes of material is presented on maps with lines enclosing units which had more than a threshold level per 1 x 1 quad of that class of material. These threshold levels are defined separately for each class so as to enclose zones with large quantities of material. The threshold values are arbitrary but are based in part on the frequency distribution of values in each area and the maximum value for that area. While the lines enclose units with similar values, there are often large areas between data points for which information is not available because some units were not sorted and areas between units were not excavated. Thus, it should not be assumed that all the zone enclosed by a line indicating a certain threshold value has values above the threshold; only the data points (analyzed units) within these zones have such values.

Area 3 East had a large spatially extensive zone containing units with more than 500 unique shell elements (hinges or apices) per 1 m x 1 m quad (Figure 5). This zone extended across the southern part of the area and encompassed Features 16, 18, 19, 22, and 25. In and around each of these features, the number of shell elements exceeded 2000 per 1 m by 1 m quad. Counts exceeding 2000 elements also occurred in Units 130 and 174 and in parts of Feature 28, the upper levels of which represent a refuse dump. Smaller zones with greater than 500 elements per quad occurred in Feature 10 and northwest of Feature 10, extending to the southwest from Feature 44.



Figure 5. Spatial distribution of shell, Area 3 East.

The spatial distribution of animal bone was similar to that of shell, but more spatially restricted. In Area 3 East, quads with more than 500 animal bone fragments were restricted to the zone in and around Features 16, 18, 19, 22 and 28 (Figure 6). Portions of Features 18 and 28 exceeded 2000 bone fragments per 1 m by 1 m quad. The area extending west toward Feature 25 which was included in the shell distribution was excluded from the spatial distribution of quads with more than 500 bone fragments, except for one quad in Feature 25 which had a value of 506. Feature 10 and the area northwest of Feature 10 which were included in the shell distribution were also excluded from the bone distribution.

The distribution of fire-affected rock was similar to that of shell. In Area 3 East, quads with more than 100 grams of fire-affected rock produced a distribution around Features 16, 18, 19, 22, 25 and 28 that was nearly identical to the distribution of quads with more than 500 unique shell elements (Figure 7). Feature 10 northwest of Feature 28 was also included in this pattern. However, the multiple zones of dense fire-affected rock north of Feature 10 in the block excavated area were not represented in the shell or bone distributions.

The spatial distribution of chipped stone (mostly debitage) differed somewhat from the other classes of material. In Area 3 East the most extensive zone of chipped stone was in the northern and northwestern part of the area (Figure 8) where shell and bone were sparse, although fire-affected rock was present. An extensive zone with chipped stone greater than 300 pieces per quad extended throughout the block excavated area and extended to the southwest and to the east of the block excavated area. A smaller zone with more than 500 pieces per quad was located in the center of the block excavated area between the two zones of fire-affected rock. In the southern part of Area 3 East, where the shell and bone distributions were dense and extensive, there were small restricted

areas within features where debitage exceeded 300 pieces and, in a few quads, exceeded 500 pieces per quad. However, the extensive zone of high density surrounding all these features in the southern part of Area 3 East seen in the shell and bone distributions is not present in the chipped stone distribution.

The spatial distribution of tools and other artifacts classified by functional category provides information on the spatial organization of activities at ORA-662. Information is presented for Area 3 East, on a series of maps showing the number of tools or other artifacts classified within a particular category per 1 m by 1 m quad. Only counts of artifacts recovered during hand excavation were mapped. The spatial distribution was biased toward features because contiguous block areas around many of them were excavated and sorted. For most systematically spaced units only the northeast quad was sorted and some were not sorted at all.

In Area 3 East, procurement tools (projectile points, gorges, and fishhooks) were concentrated in Feature 28 (a refuse dump) and Feature 18 (Figure 9). They were also present in Features 10, 16, 19, 22, 25, as well as in the block excavated area north of Feature 10. As previously discussed, the area north of Feature 10 also had large amounts of debitage.

Plant food processing tools more than 15 percent complete, including manos, metates, mortars, and pestles, were found in Features 6, 7, 8, 10, 11, 14, 23, and 56, located north of Feature 28, and in Features 16, 25, and 27, located south of Feature 28 (Figure 10). There were also nine processing tools in Feature 28. The absence of processing tools in Features 18, 19, and 22, located south of Feature 28, is notable since these features had high counts of most other classes of material and Feature 18 had the highest seed density of any analyzed feature. Feature 18 did, however, have two metate fragments less than 15 percent complete and two asymmetric shouldered pestle fragments less than 15 percent complete.

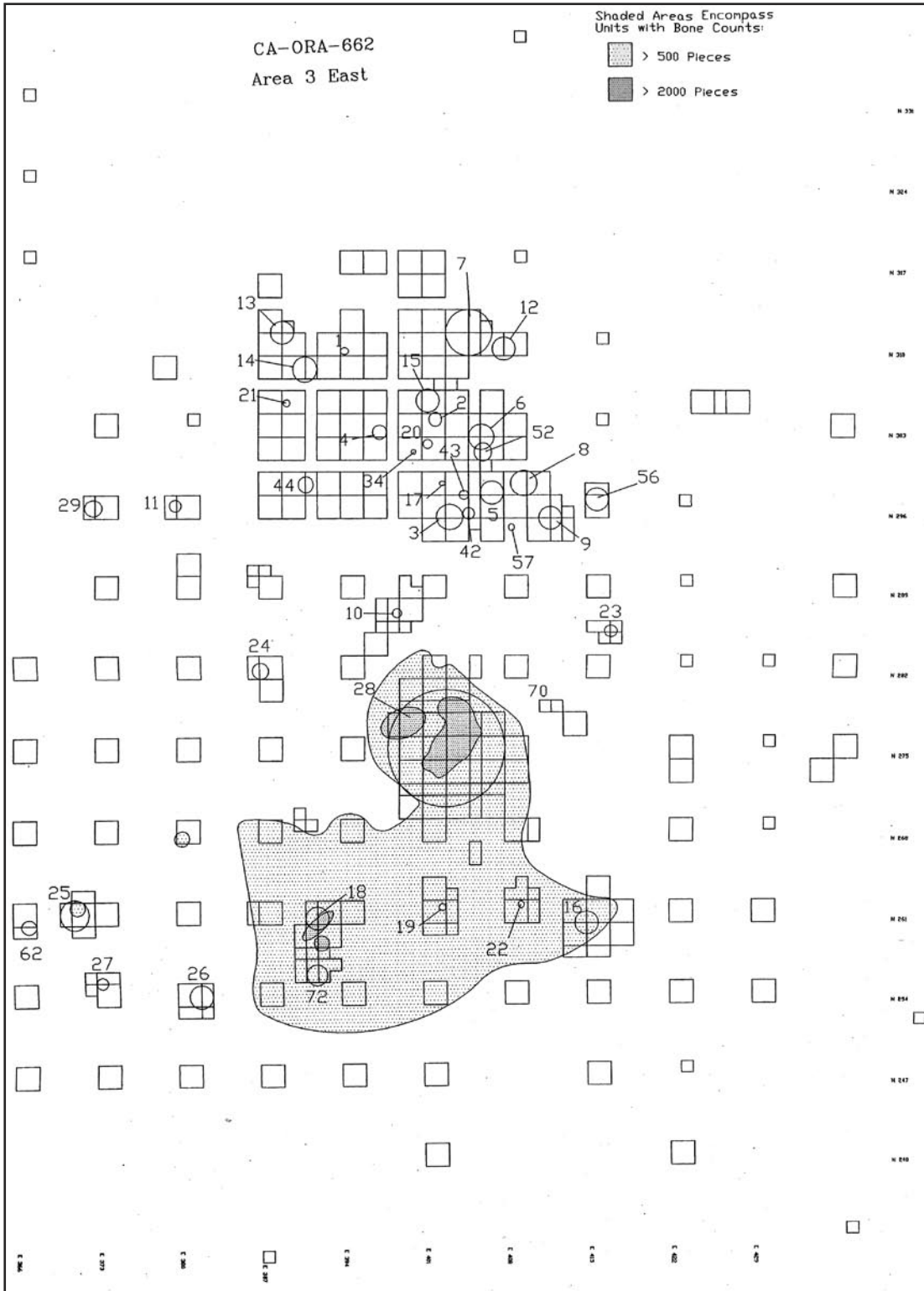


Figure 6. Spatial distribution of animal bone, Area 3 East.

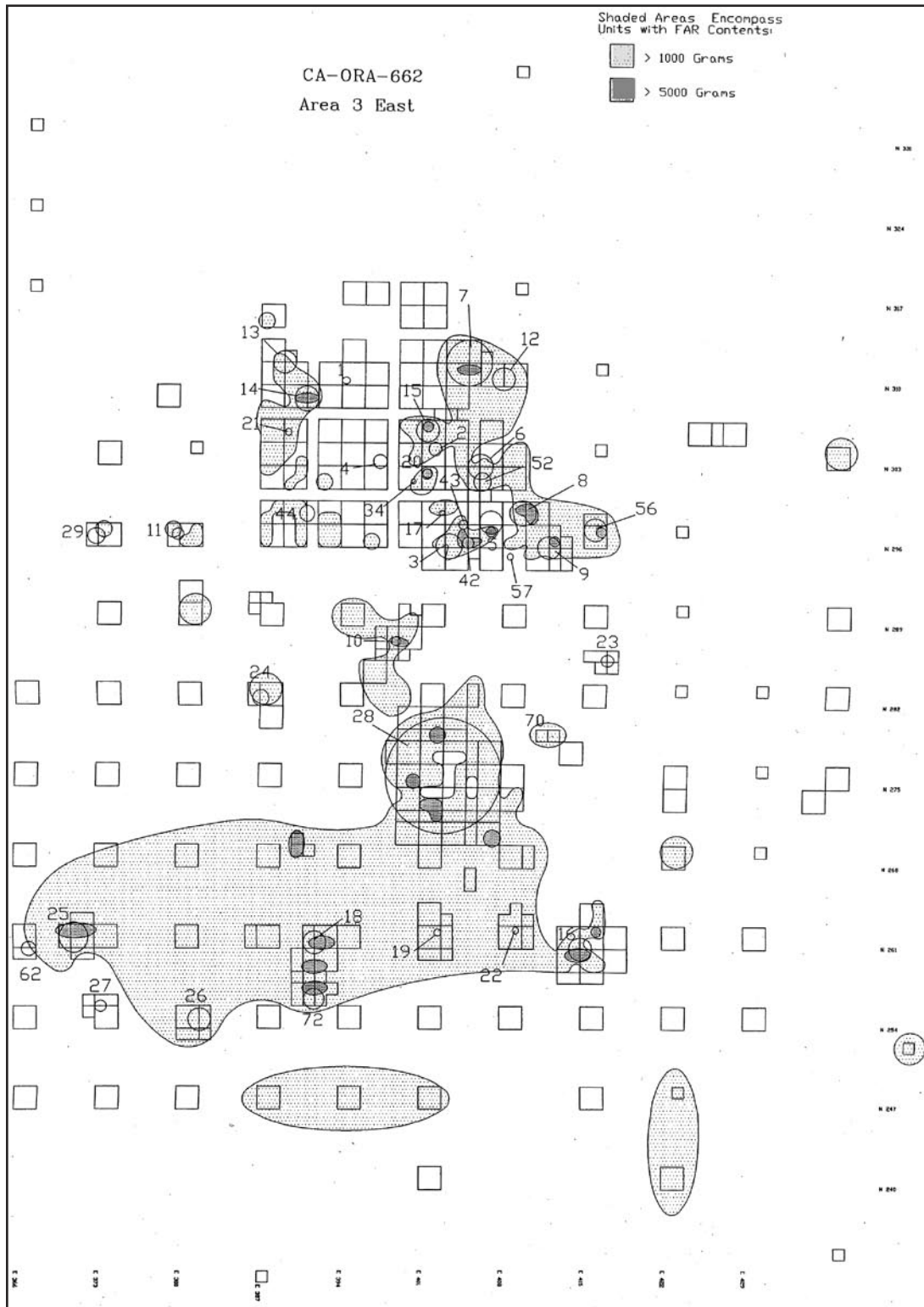


Figure 7. Spatial distribution of fire-affected rock, Area 3 East.

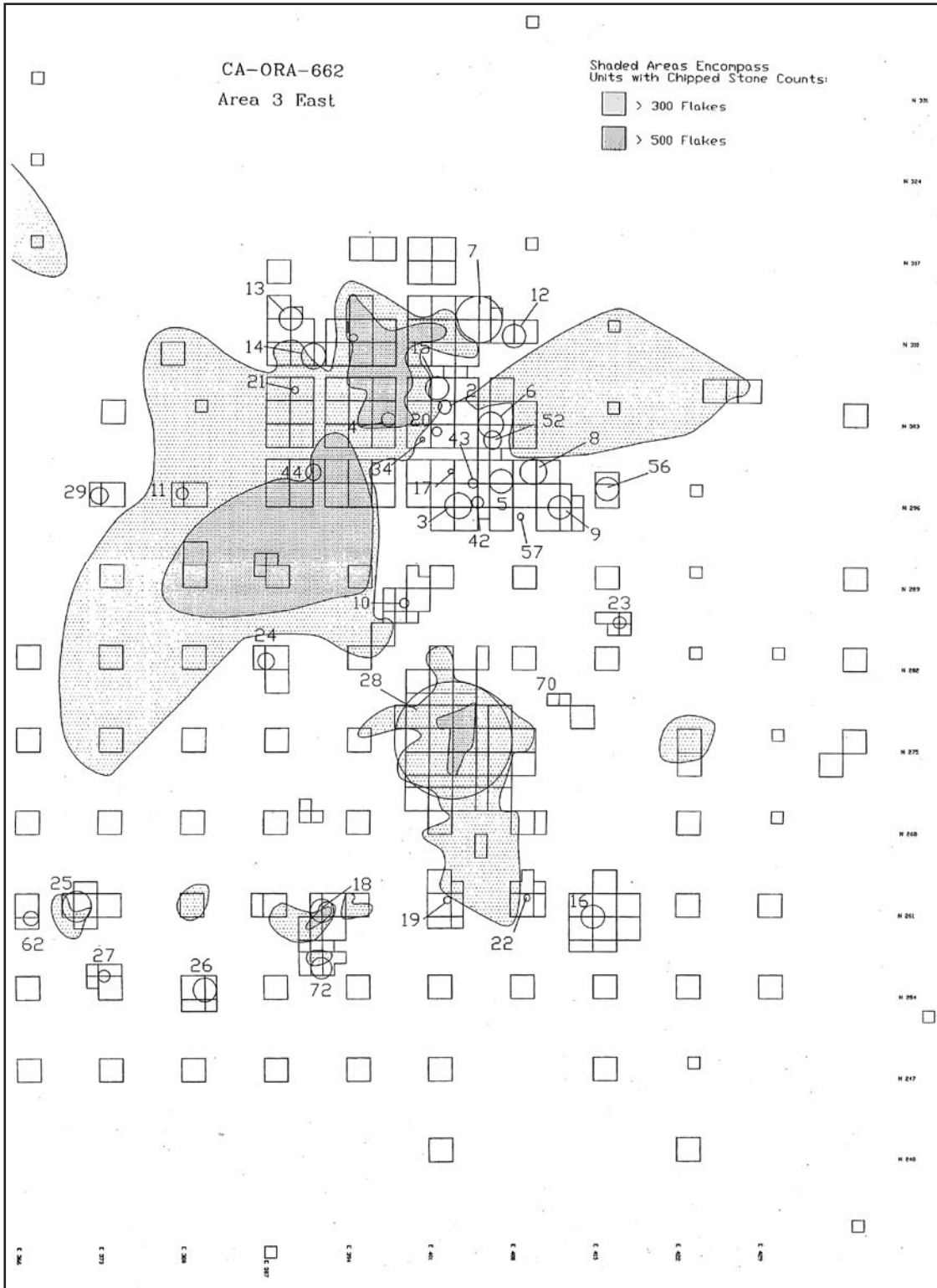


Figure 8. Spatial distribution of chipped stone, Area 3 East.

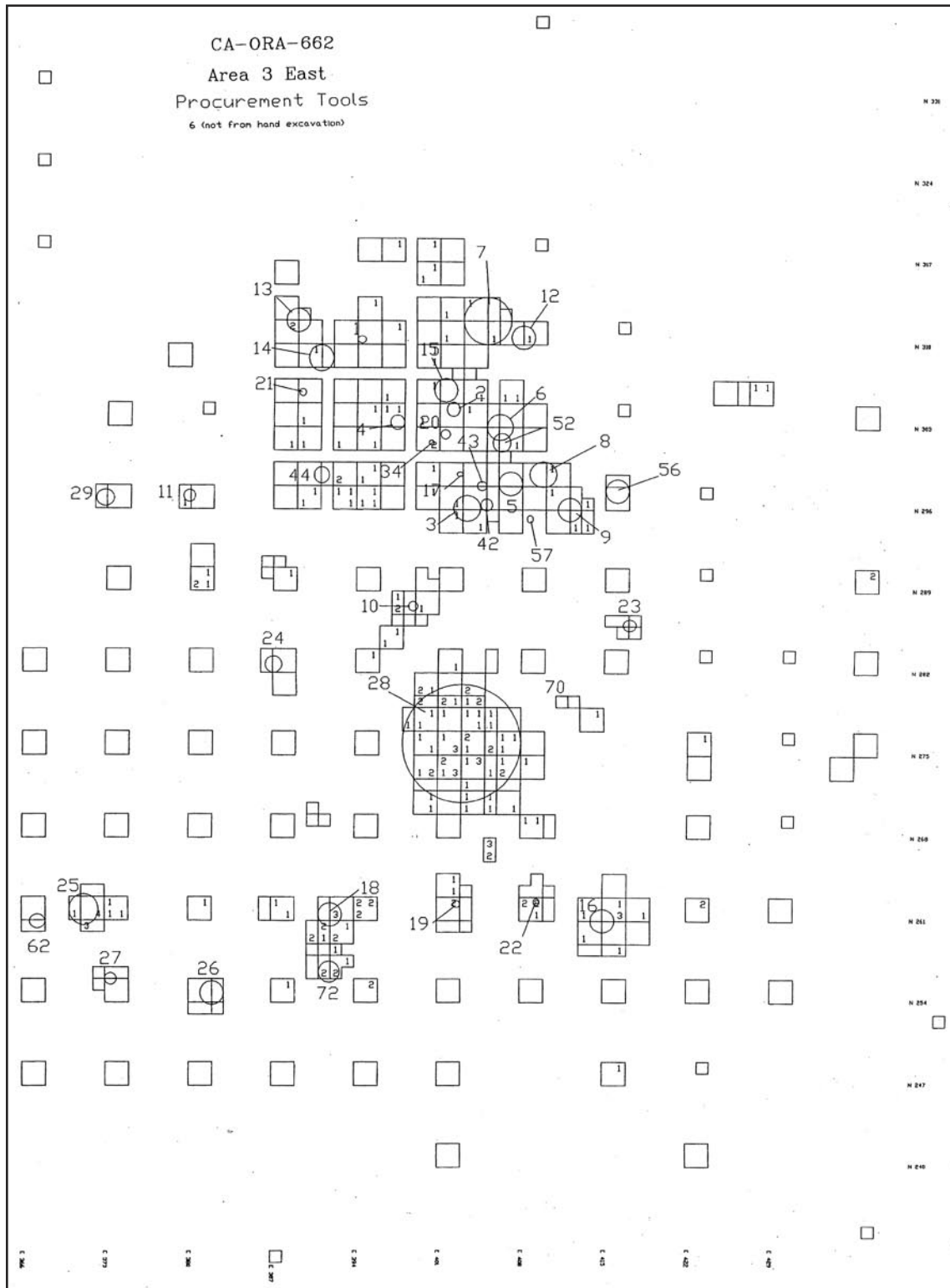


Figure 9. Spatial distribution of procurement tools, Area 3 East.

Manufacturing tools such as reamers, awls, angular hammers, and tarring pebbles were associated with almost all features in Area 3 East (Figure 11). They were especially concentrated in Features 4 and 12, located north of Feature 28, and in Features 18 and 25, located south of Feature 28. Feature 28 also contained large numbers of manufacturing tools. Cores, indicative of the manufacture of chipped stone tools, were not as prevalent as manufacturing tools. In Area 3 East there were more cores north of Feature 28 than south of Feature 28 (Figure 12). Most cores were associated with features.

General utility tools, including scrapers, knives, and blades, were not as numerous and had a more restricted distribution compared to manufacturing tools. In Area 3 East they were found throughout the area north of Feature 10, in Feature 10, in Feature 23, in parts of Feature 28, and in Features 16, 18, 19, 22, and 62 (Figure 13). The absence of general utility tools in some features is surprising, given the wide variety of tasks in which they can be employed.

Social/ceremonial and exchange artifacts, which include beads, ornaments, patterned incised stones, coggled stones, and effigies, occurred almost entirely in the features with dense midden (large amounts of shell and animal bone). These artifacts were found in Features 10, 16, 19, 22, and 25, and especially high counts occurred in Features 18 and 28 (Figure 14). They also occurred around Feature 44 and elsewhere in the area north of Feature 10. A few of these artifacts were scattered west of Feature 28.

A few of the beads and ornaments have been identified by Robert Gibson as being used in political exchanges between high status leaders (Mason et al. 1993:202-203). These artifacts include *Olivella* incised wall disc beads (n=3), *Mytilus* disc beads (n=90), and abalone ornaments (n=3). These artifacts occurred only in Area 3 East. Most of the *Mytilus* discs occurred in Features 18 and 28. The rest were in Features 16, 19, and 22

south of Feature 28 and in Features 3, 24, 17 and 44 north of Feature 28. The three *Olivella* incised wall discs were from Feature 16. Two of the abalone ornaments were from Feature 18, and the other was from Unit 143 adjacent to Feature 18.

Feature Analysis

Most features were fire-affected rock representing hearths and scattered hearths. However, the upper levels of Feature 28 (0-40 cm below surface) comprised a dump containing large amounts of secondary refuse. The lower levels contained cremated human remains. Two radiocarbon dates are available from the 50 to 60 cm level of Feature 28. A charcoal sample produced a calibrated date of 671 +/- 95 years B.P., while an abalone shell sample yielded a date of 486 +/- 76 B.P. If it is assumed that the charcoal came from fuel used in the cremation process and the abalone shell was moved down from the refuse deposit in the upper levels of Feature 28, then the cremation may represent the earliest use of Pelican Hill in the Late Prehistoric period. Two similar dates (666 +/- 85 B.P. and 692 +/- 76 B.P.) come from Feature 10, located just north of Feature 28. Feature 10 may have been used to prepare food for the people participating in the ceremonies for the dead. Based on 53 radiocarbon dates (Mason et al. 1993:Table 5), almost all the rest of the cultural material in Area 3 East dates to after 650 B.P. during the second half of the Late Prehistoric period (LP2), as defined by Mason and Peterson (1994:59; see also Koerper, Mason, and Peterson 2002:68).

In Area 3 East, Feature 28 was a central dump containing large quantities of all classes of cultural material. Feature 28 probably received secondary refuse generated from activities around fire-affected rock features located north and south of Feature 28. South of Feature 28 there was an east-west line of fire-affected rock features which had large quantities of associated shell and animal bone. Feature 10, which also had radiocarbon dates from the LP2, was directly north of

Feature 28, and moderate amounts of most classes of material were associated with it. Features 23 and 24 were located northeast and northwest of Feature 28. Unfortunately, the cultural material associated with these two features was not analyzed. Many features were exposed during the block excavation of the area north of Feature 10. Only sparse amounts of shell and animal bone were associated with these features, although high counts of debitage occur here.

While many features had associated artifacts from all five utilitarian categories (procurement tools, plant food processing tools, manufacturing tools, and general utility tools), some lacked artifacts from one or more categories. Two (25 percent) of the eight analyzed features in Area 3 East lacked one or two categories. Features in which all five utilitarian functional categories were present probably represent areas where the full range of residential activities were carried out. The category most often lacking was general utility tools consisting of scrapers, knives and blades. The lack of scrapers is surprising given the multiple tasks in which they can be employed, including processing of hides and fibers for making clothing, nets, and snares, and in animal food processing.

Another measure of intensity of use of the area around features is the amount of fire-affected rock (FAR). Feature areas used for a short period of time should

have less FAR than areas where FAR was used and reused throughout many occupations. The clusters of FAR which appeared to be hearths probably represented the last use of the feature area. In feature areas where most of the FAR was contained in a hearth-like cluster, the last use may have been the only use. However, where much more FAR was recovered than was contained in the hearth cluster, multiple occupations are indicated by reuse and scattering of FAR. One way to measure this is to compare the number of FARs drawn and "itemized" by the excavators of the features with the total number of FARs in clusters or fairly dense scatters in the same excavation level. Thus, non-itemized FARs would represent widely scattered rock not a part of the most recent hearth defined by the excavators. The total number of FARs divided by the number of itemized FARs provides a measure of reoccupation and reuse of feature areas. If this FAR reuse index is less than 2, a single occupation is indicated, since most of the FAR is in the observed feature. If the FAR index is greater than 2, reuse of the area is indicated.

In Area 3 East, seven of the eight fire-affected rock features have indices greater than 2, and several are greater than 3 (Table 1). Only Feature 5 has an index less than 2. The two secondary refuse dumps have the highest indices of all. Feature 28 in Area 3 East has an index of 8.5. This suggests that the areas around these

Area/Feature	Count of Itemized FAR	Total Count of FAR	Ratio of FAR/Itemized
4	15	41	2.7
5	53	87	1.6
8	108	252	2.3
9	80+	280	3.5
10	63	133	2.1
16	88	283	3.2
18	177	799	4.5
25	116	248	2.1
28	229	1939	8.5

Table 1. Ratio of total fire-affected rock (FAR) to itemized FAR from analyzed features at CA-ORA-662.

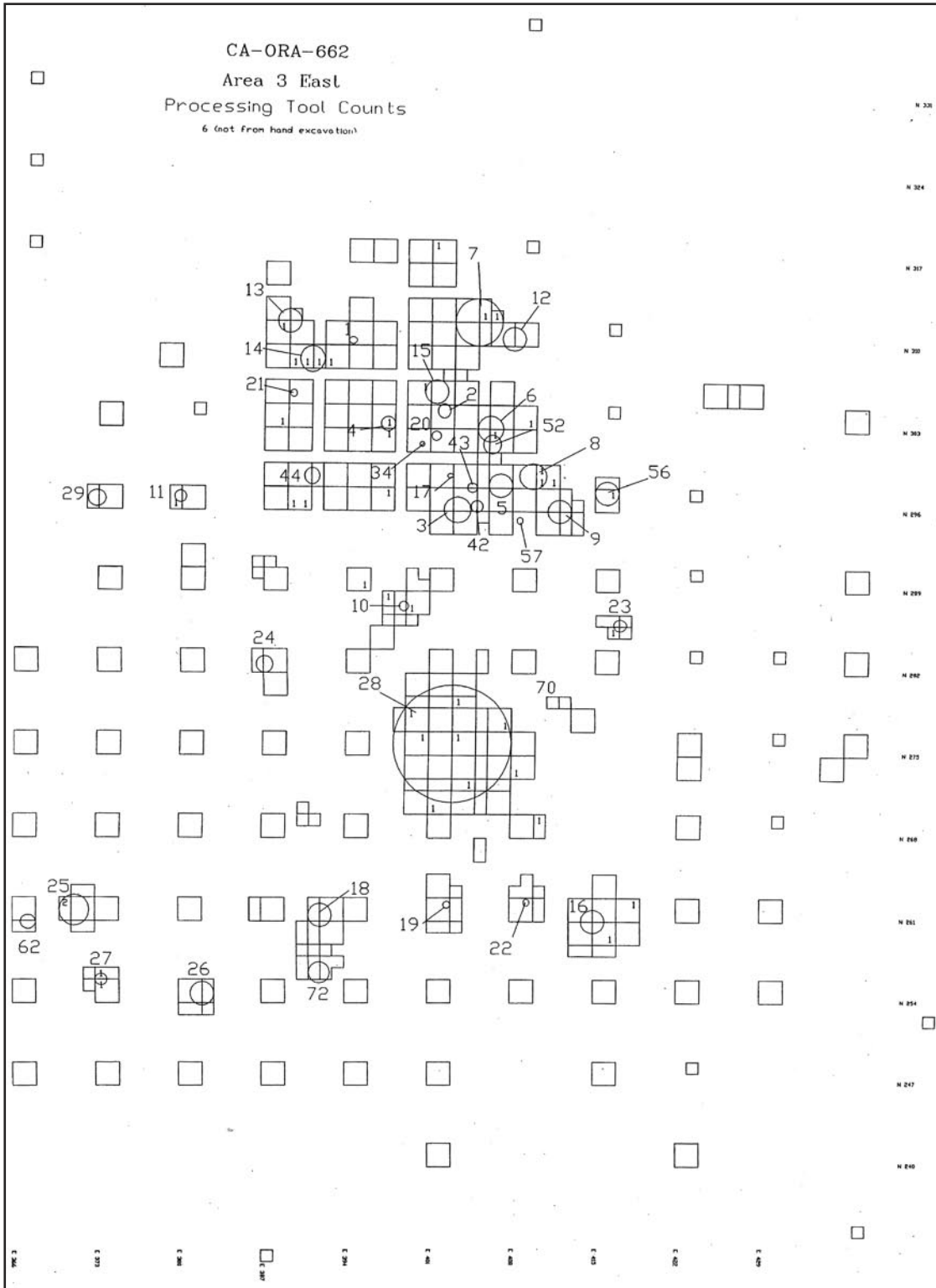


Figure 10. Spatial distribution of processing tools, Area 3 East.

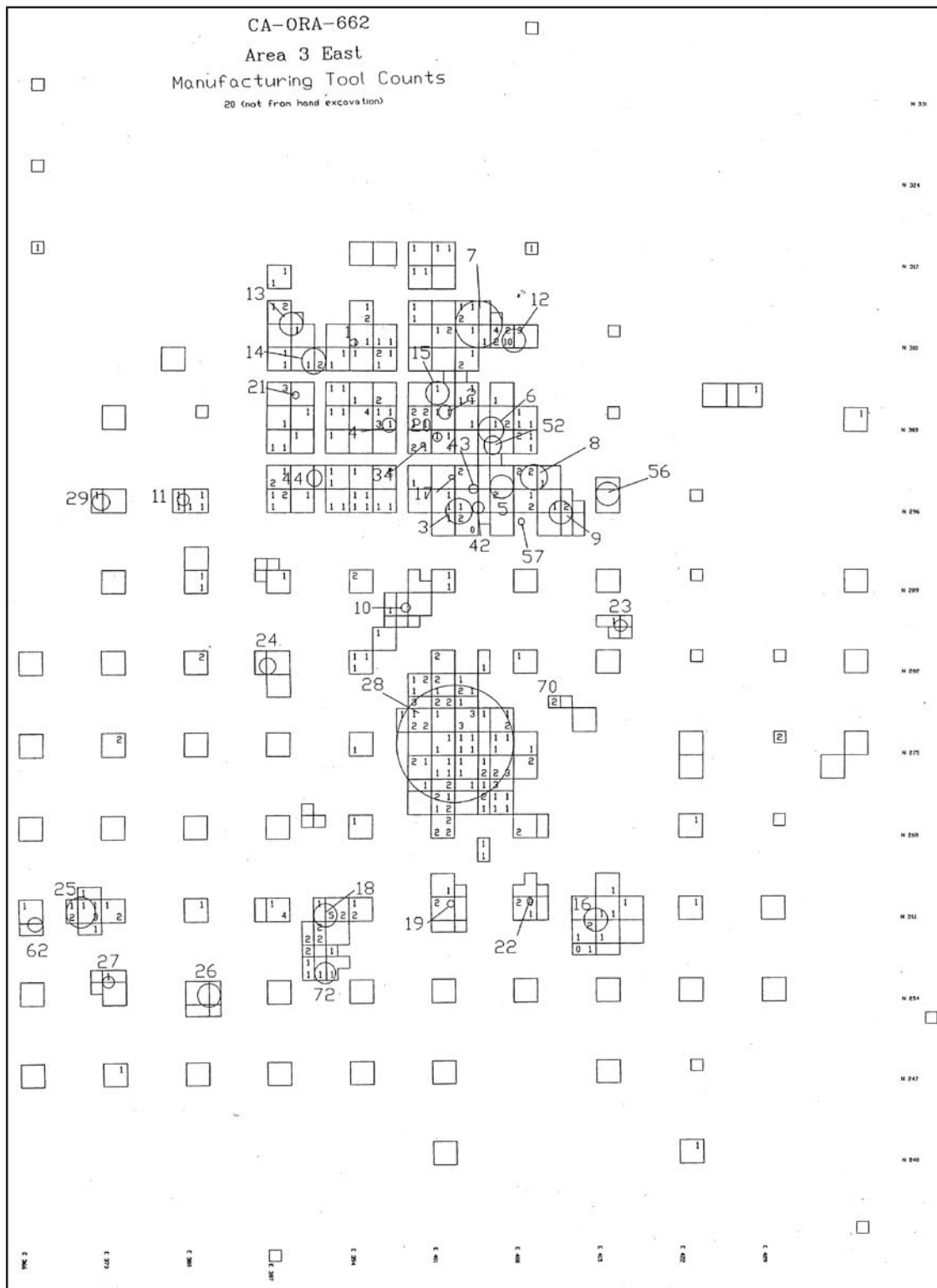


Figure 11. Spatial distribution of manufacturing tools, Area 3 East.

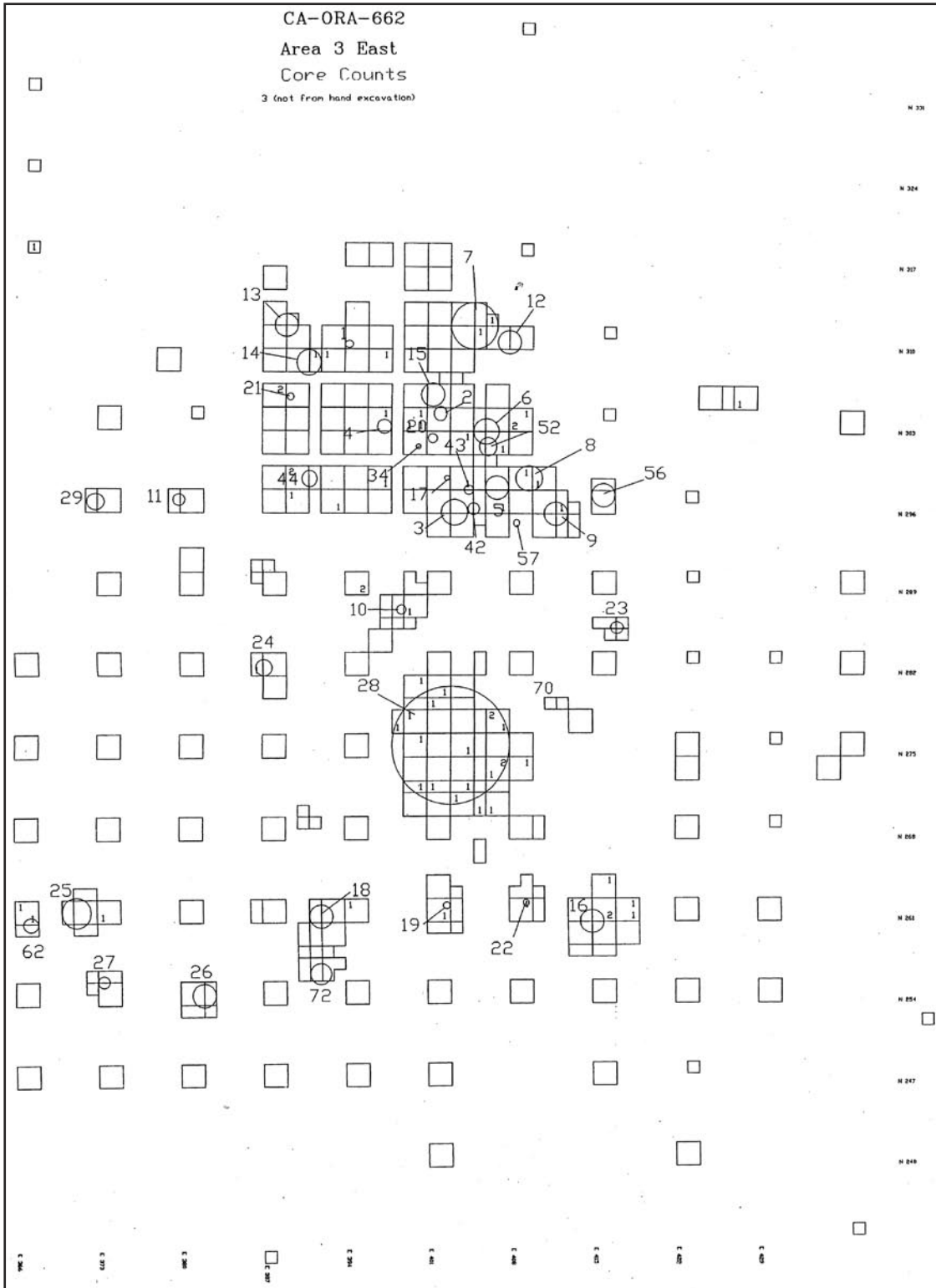


Figure 12. Spatial distribution of cores, Area 3 East.

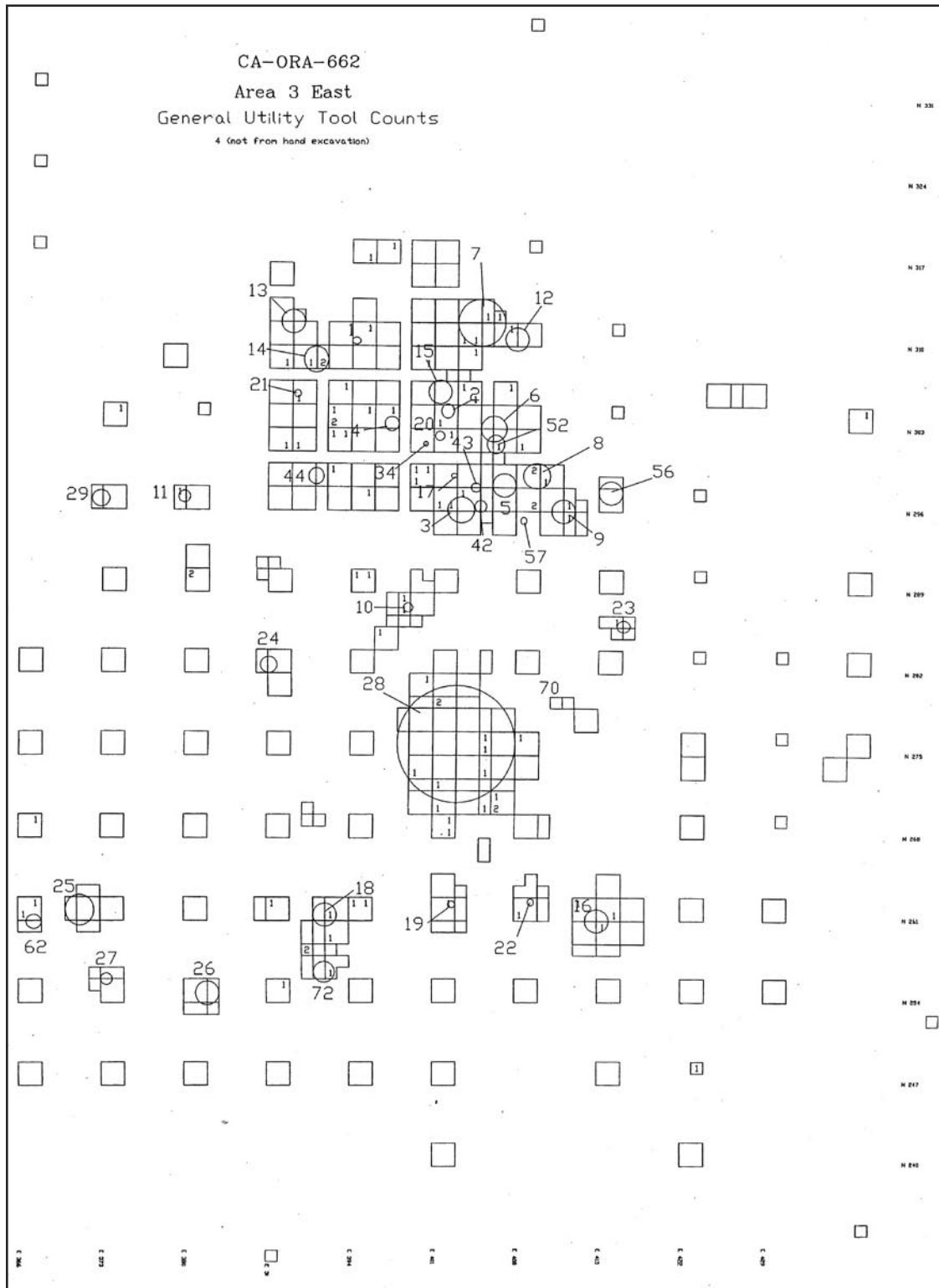


Figure 13. Spatial distribution of general utility tools, Area 3 East.

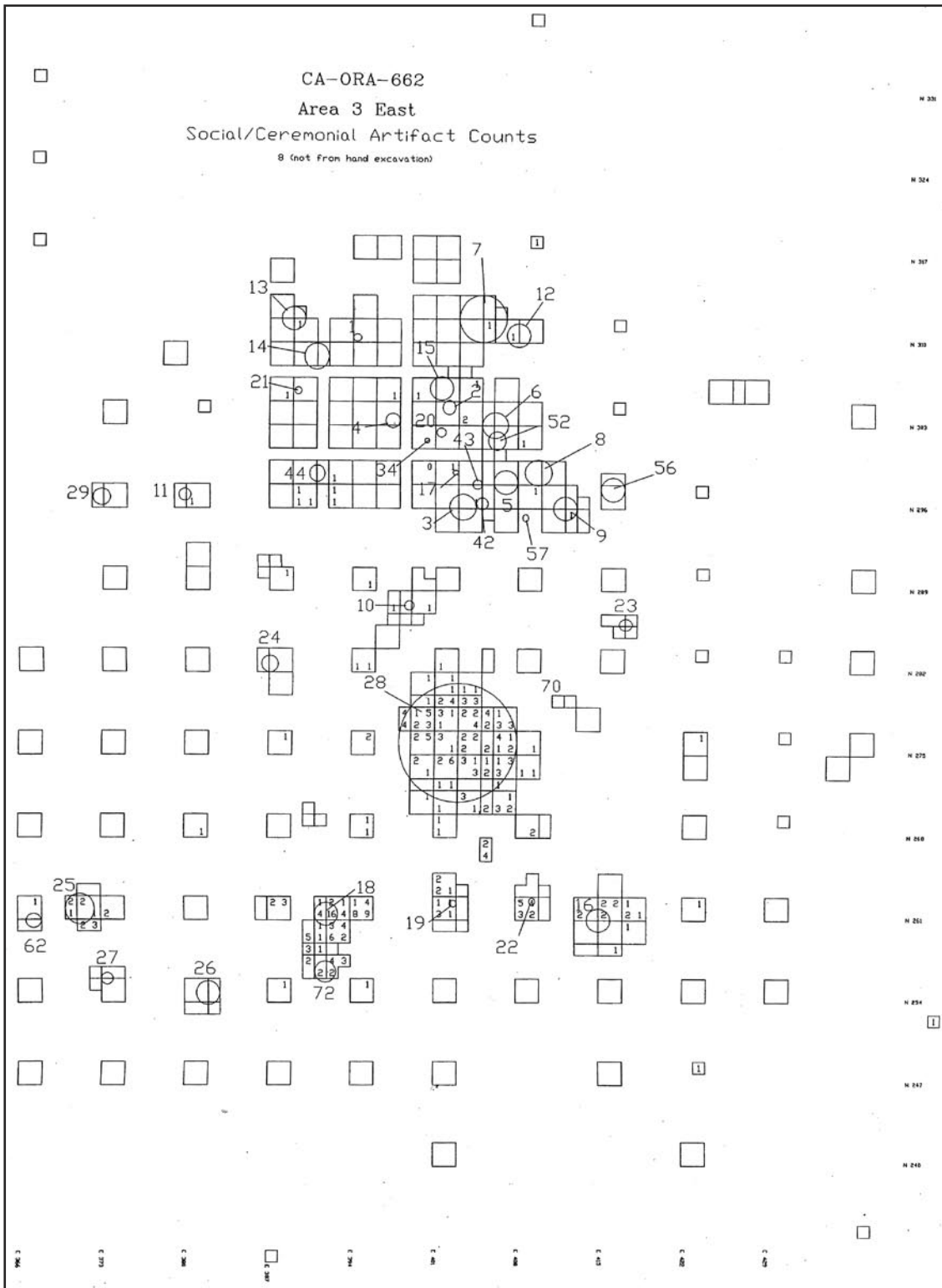


Figure 14. Spatial distribution of social/ceremonial artifacts, Area 3 East.

seven features were used as hearths and activity areas throughout LP 2 from 650 to 200 B.P. Waste generated from these activities was deposited in a centrally located refuse dump with hearth and activity areas to the north and south.

Discussion

The greatest density and diversity of cultural material at ORA-662 were in Area 3 East. Large amounts of food waste consisting of animal bone and shell were distributed around fire-affected rock features in the southern part of Area 3 East and in what appears to be a dump for secondary refuse (Feature 28) located in the central part of Area 3 East. Feature 18 in the southern part of Area 3 East also yielded the highest counts of seeds per liter sediment. The northern part of Area 3 East contained numerous fire-affected rock features, but lacked dense food waste. High counts per 1 m by 1 m units of lithic debitage and manufacturing tools and artifacts, such as reamers and biface preforms, occurred here, however. This spatial distribution suggests that food processing and general residential activities were carried out in the southern part of Area 3 East and that the northern part of Area 3 East may have been a men's work area where projectile points, other chipped stone tools, and shell fishhooks were made (Figure 15). However, all but one of the analyzed features in Area 3 East had representatives of all five utilitarian functional artifact categories, and there was evidence for recycling and reuse of fire-affected rock around almost all features.

Conclusions

In Area 3 East of ORA-662, the abundant food waste and secondary refuse, the wide variety of tools and social/ceremonial artifacts, and the spatial segregation of some male manufacturing activities in the northern part of the area suggest a long term residential occupation. Much of the fire-affected rock occurred as refuse indicating reuse of hearth areas, and almost

all fire-affected rock features yielded representatives of all functional categories. The residential area located just west of Area 3 East (Area 3 West) had a similar spatial pattern to Area 3 East (hearths around a central dump), but the hearths in Area 3 West had less evidence of reuse and smaller amounts of subsistence remains (Figure 15). Area 3 West could be the result of seasonal residential use by a small family group, with each hearth representing one or a few seasons' use (see Mason et al. 1993 for a discussion of Area 3 West). In Area 3 East the possibilities are that a larger group (compared to that which occupied Area 3 West) returned to the same area each summer, reusing fire-affected rock and depositing secondary refuse in the same areas, or that Area 3 East was occupied year-round by a permanent resident group.

Seasonality data are ambiguous in choosing between these two alternatives. Otoliths indicate summer and fall nearshore fishing. However, only 45 otoliths were available for analysis, and all were from nearshore ocean fish. No information is available about the seasonality of bay/estuary fishing (bat rays and guitarfish) or about the seasonality of kelp bed fishing (sheephead, blacksmith, and seniorita). Most of the carbonized plant remains are seeds available in the late spring, summer, and early fall. Fall indicators include a few acorn fragments (indicating October collection) and toyon seeds (indicating November or December). The lack of winter indicators in the macrobotanical remains is mostly due to a lack of availability of plant foods during this season and does not necessarily prove that ORA-662 was not occupied during the winter.

A seasonal occupation of Pelican Hill may be indicated by the kind of tools present. Although all functional categories are represented in Area 3 East, most manufacturing tools are associated with making food procurement tools and processing tools. Manufacturing tools consisted mostly of reamers (most of which were stout reamers), angular hammers,

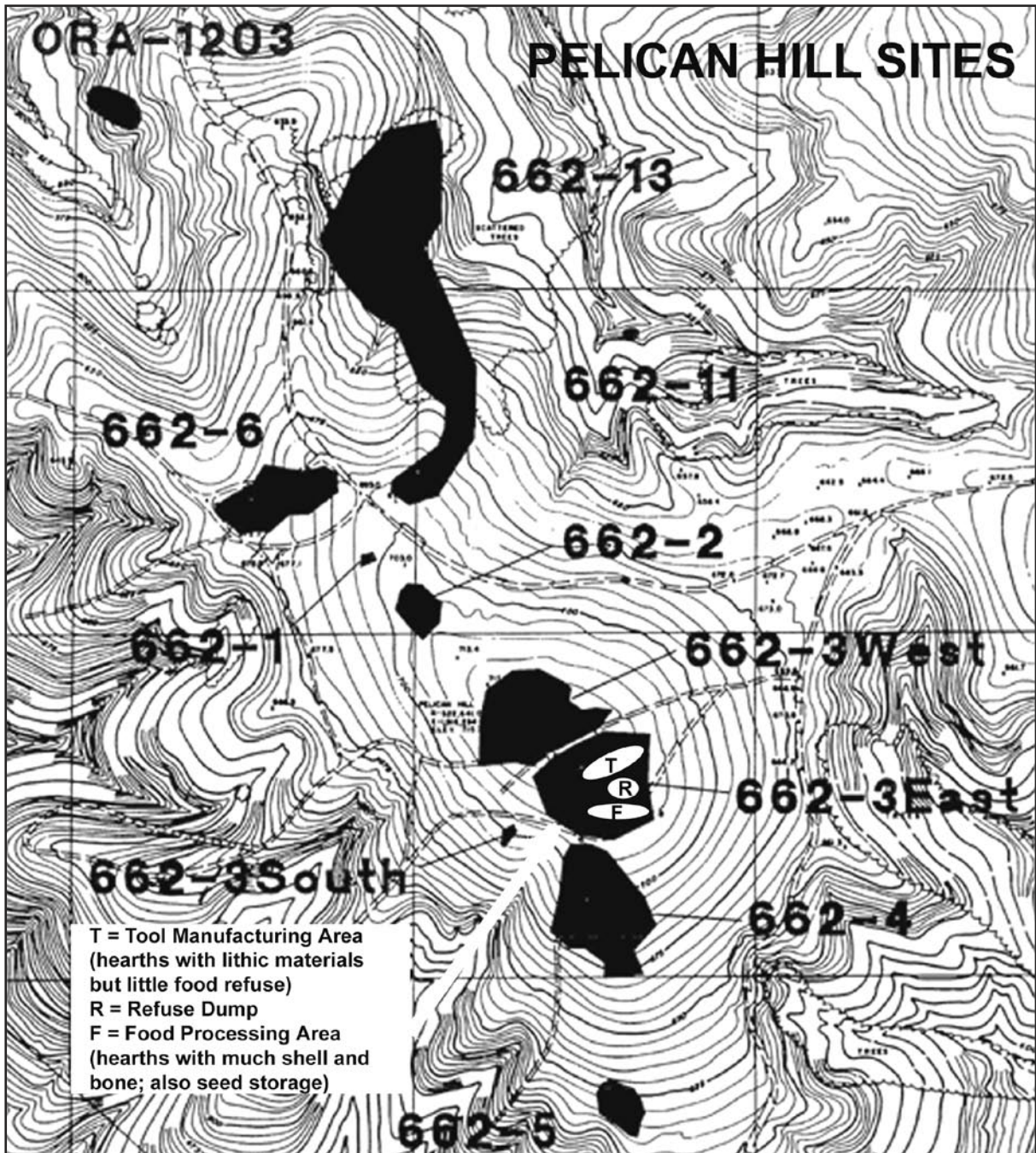


Figure 15. Specific activity areas for 662-3W in relation to other Pelican Hill sites.

awls, and tarring pebbles. Stout reamers were used in making shell fishhooks; angular hammers were used to shape ground stone tools employed in plant food processing; and awls and tarring pebbles were used in making baskets for collecting and storing plant foods and water. Most of the chipped stone tool manufacturing may have been for the production of bifaces; there were more biface preforms than cores. The number of general utility tools such as scrapers, knives, and blades, which could be used in tasks other than food procurement and processing, such as processing hides and fibers for clothing and shelter, was low. If a functional category was not represented in a particular feature, it was usually general utility tools that were absent. It is significant that there were more reamers than scrapers in both Area 3 East and Area 3 West. It may be inferred then that most of the activities carried out on the top of Pelican Hill were directly associated with food procurement and that other tasks were more frequently accomplished elsewhere.

The density of tools is a measure of the intensity of occupation. A study of tool density in Intermediate period and Late Prehistoric period residential bases in the Newport Bay region showed that these kinds of sites had at least 3.5 tools per cubic meter (Mason 1991). Area 3 West had 3.5 tools per cubic meter, but Area 3 East did not. This may be evidence against a permanent year-round residential occupation. However, the low tool density was partly a function of the large area sampled in Area 3 East. Areas outside the dense midden and feature areas that were included in the analyzed volume reduced the tool density per cubic meter. The tool density in eight of the nine analyzed features in Area 3 East ranges from 3.9 to 10.0.

The location and exposure of Pelican Hill also may be evidence against a year round occupation. The lack of shelter on the hilltop exposes occupants to the full force of Santa Ana winds in the fall and to cold winds from the ocean during winter storms. The hilltop

location also made access to water difficult. Water was probably available in Buck Gully and Los Trancos Canyon. However, continual uphill transport of water would have made year-round occupation quite labor intensive.

Comparison of ORA-662 with other Late Prehistoric sites in the region suggests it was a major residential base occupied from late spring through fall during the LP 2 period from 650 to 200 B.P. There were other major and minor seasonal residential bases, as well as gender-specific specialized activity areas elsewhere on Pelican Hill and in the San Joaquin Hills (Figure 15) during LP 1 and LP 2. On Pelican Hill, Areas 3 East, 3 West, and 13 were major residential bases, and Area 5 was a minor residential base. Areas 2 and 6 at ORA-662 contained almost exclusively ground stone tools (manos, metates, mortars) and tools to maintain them (angular hammers). Areas 2 and 6 were single gender activity areas primarily used by women. Male-oriented work areas for biface manufacture (containing mostly projectile points, biface preforms, and cores) and shell fishhook manufacture (reamers) were located elsewhere in the San Joaquin Hills (Mason and Peterson 1994:317-324).

The San Joaquin Hills sites were in the territory of the village of Genga (CA-ORA-58) located on the east bank of the lower Santa Ana River (Mason and Peterson 1994; Koerper et al. 1996). It has been hypothesized that the population of the Genga polity spent the winter in the village on the Santa Ana River and dispersed into the San Joaquin Hills sites in the late spring. When returning to the village in the fall, subsistence was based on resources collected during the summer in the hills (Mason and Peterson 1994; Koerper, Mason, and Peterson 2002).

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