Archaeological Shell from CA-LAN-2630

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Abstract

Salvage excavations at CA-LAN-2630, the California State University Long Beach Parking Structure site, yielded a small collection of marine shell artifacts and 1.25 metric tons of ecofactual shell. Marine shell was collected and analyzed as part of a study of natural and cultural site formation processes in the area. The distribution of ecofactual shell is described. A variety of shell artifact types, including those of modified clamshell and of opportunistically utilized bivalves, are described and interpreted. A new category of shell tool is named (unguiform), and its possible functions are considered.

Introduction

CA-LAN-2630 is located on the campus of California State University, Long Beach (CSULB) (Figure 1). It was an ephemeral encampment on the banks of an ancient watercourse; the midden, which took centuries to form, was buried in the 1860s beneath overbank deposits accumulating from a series of floods. Radiometric dating suggests that LAN-2630 was utilized between AD 1150 and 1700 (Boxt and Dillon 2013).

This deeply buried site was exposed during the initial phase of construction for a tiered parking structure in May 1993; salvage operations commenced within hours of discovery. LAN-2630 covers an area estimated at 15,700 m^2 (Figure 2). A total of 121.3 m^3 of midden was excavated from 49 test excavation units, producing fish, bird, and land and sea mammal bones; campfire charcoal; stone, shell, and bone artifacts; and pottery. Marine shell comprised the largest class of cultural material. Food consumption resulted in the discard of roughly 1.25 metric tons of mollusk shells. The shell was grouped into subsistence-related materials and artifacts.

The section to follow discusses distribution of ecofactual shell. After that, we discuss the varied kinds of shell artifacts recovered from the site, giving extended consideration to an unusual type of clamshell artifact, one to which we have given the name "unguiform" owing to its finger bone-like shape. Another section compares the ratios of utilized shell classes between LAN-2630 and CA-LAN-705 and the ratios of utilized clamshell and unguiforms between the two neighboring sites. Our essay ends with some final remarks about the shell artifacts and ecofactual shell preserved in the LAN-2630 midden.

Subsistence Shell Distribution

Prior to excavation, four test areas were chosen for assessment. Of these, Locus 2 and Locus 4 (Figure 2) were identified as primary cultural deposits (Boxt and Dillon 2013). Locus 1 comprised the complete skeleton of a cow that had been mired in mud. Mechanical excavation at Locus 3 exposed an old watercourse, Bouton Creek, filled with flood sediments; sheep, cow, and horse bones; and prehistoric habitation refuse (Figure 3).[1] Locus 2 produced 1.1 metric tons of shell (Figure 4), Locus 3 produced 17,209 g of shell, and Locus 4 yielded .13 metric tons of shell. The horizontal distribution of shell at LAN-2630 may reflect an increased concentration of food processing, consumption, and discard toward the northeastern region of the site (Figure 5).[2] Miller and Boxt (2011:97–99; 2012) identified more than 20 species of bivalves and gastropods, reporting that shellfish, particularly clam, oyster, scallop, and slipper limpet, formed a significant part of the Native diet.

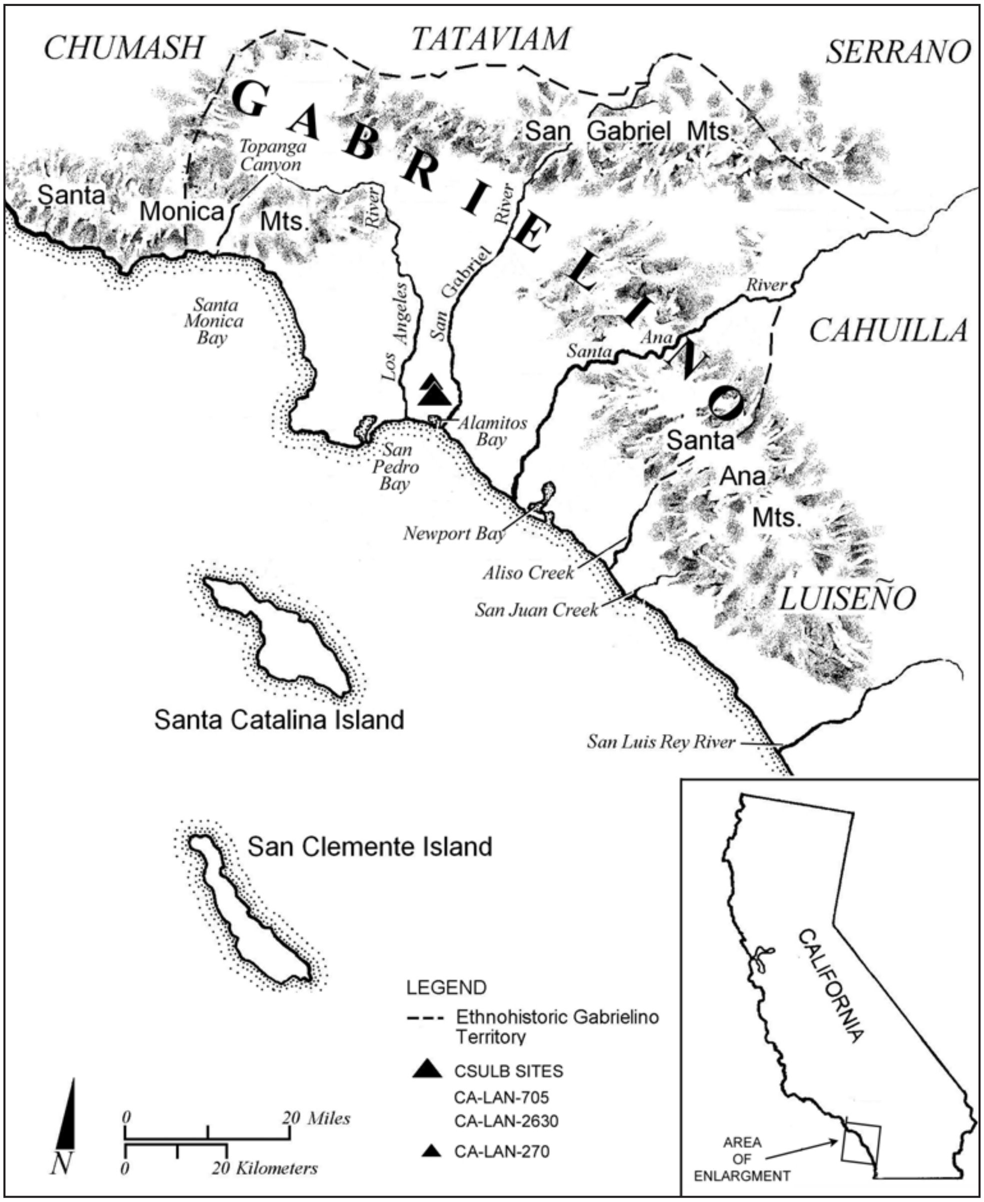

Figure 1. Site locations mentioned in text. Map by Rusty van Rossmann.

Shell Artifacts

Raw materials for the LAN-2630 artifacts were readily accessible along the Pacific coast and in Alamitos Bay about 2 km to the southeast and perhaps even closer in nearby estuaries. Excavations produced artifacts largely manufactured from giant egg cockles (*Laevicardium elatum* [Sowerby]), little egg cockles (*Laevicardium substriatum* [Sowerby]), chiones (*Chione californiensis* [Broderip], *Chione undatella* [Sowerby], and *Chione fluctifraga* [Sowerby]), and Pismo clams (*Tivela stultorum* [Mawe]). The site's beads were manufactured from purple olive shells (*Olivella biplicata)*, California mussels (*Mytilus californianus*), and red and black abalones (*Haliotis rufescens* and *Haliotis cracherodii*). Among the shell artifact assemblage are numerous nonmodified specimens that, based on technology and morphology, we identify as

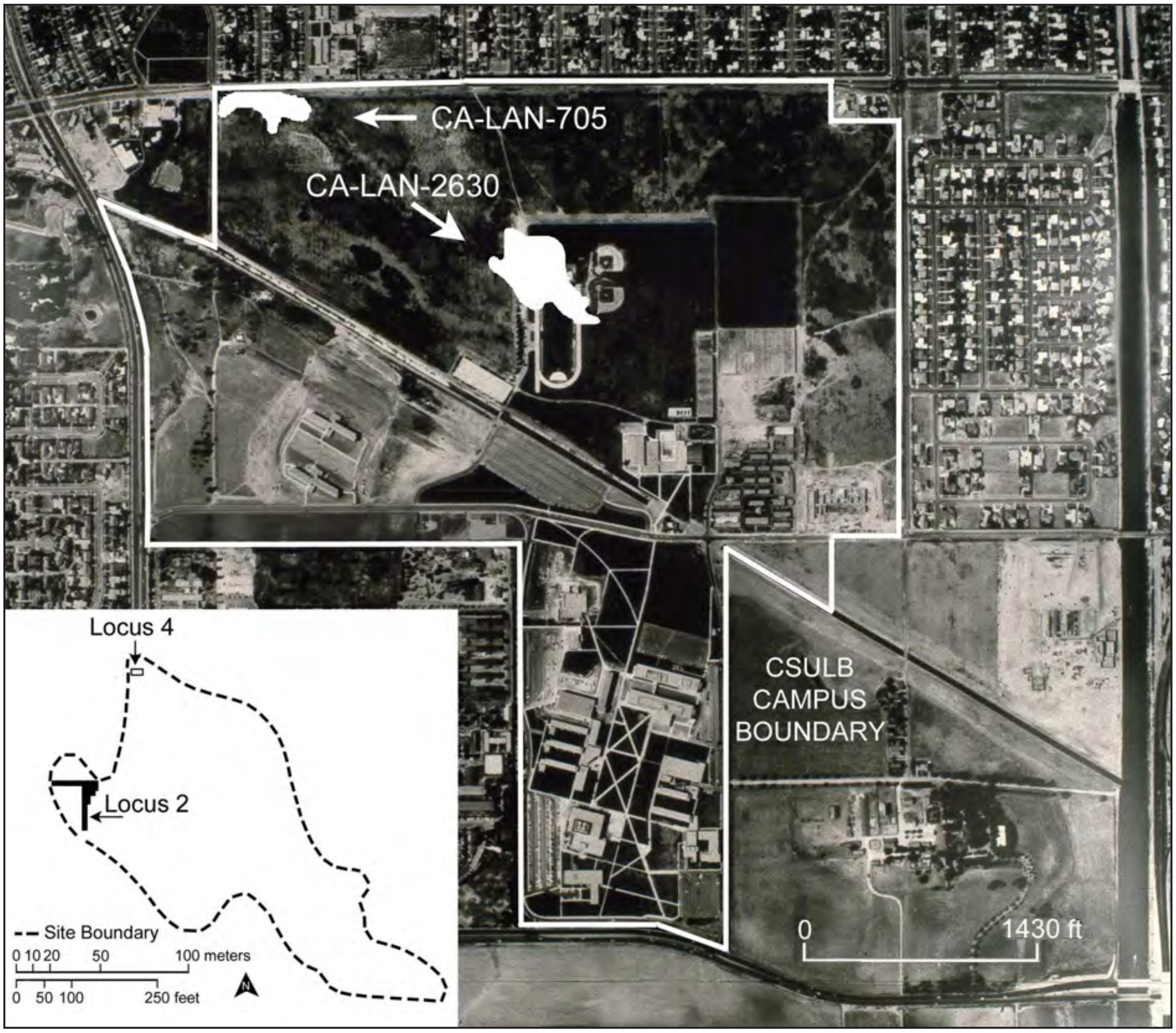

Figure 2. Locations of CA-LAN-705 and CA-LAN-2630 on the CSULB campus. Campus boundaries indicated by white line. Map by Matthew A. Boxt and Rusty van Rossmann overlaid on a 1959 air photo showing the site areas prior to major construction. Insert map at lower left shows excavated loci within CA-LAN-2630. Photo courtesy of the Fairchild Aerial Photography Collection, Whittier College.

scraping tools. Because of the site's location on the San Gabriel River floodplain where stone was scarce to nonexistent, enterprising individuals fashioned tools out of the toughest material accessible—marine shell.

Bowls or Scoops

The whole spiny cockle valve (*Cardium quadragenarium* [Conrad]) from Unit Z-13, with its deeply worn margin, is the most clearly recognizable artifact in this category (Figure 6a); it is the only spiny cockle, whole or fragmentary, found at LAN-2630. If the shell is grasped in the right hand with the length of the thumb pressed against the hinge, the deepest part of the wear pattern on the margin of the shell is directly opposite the thumb. The dorsal surface is scored along a line that falls between the first and second fingers. It appears to have served as a bowl, scoop, or spoon.

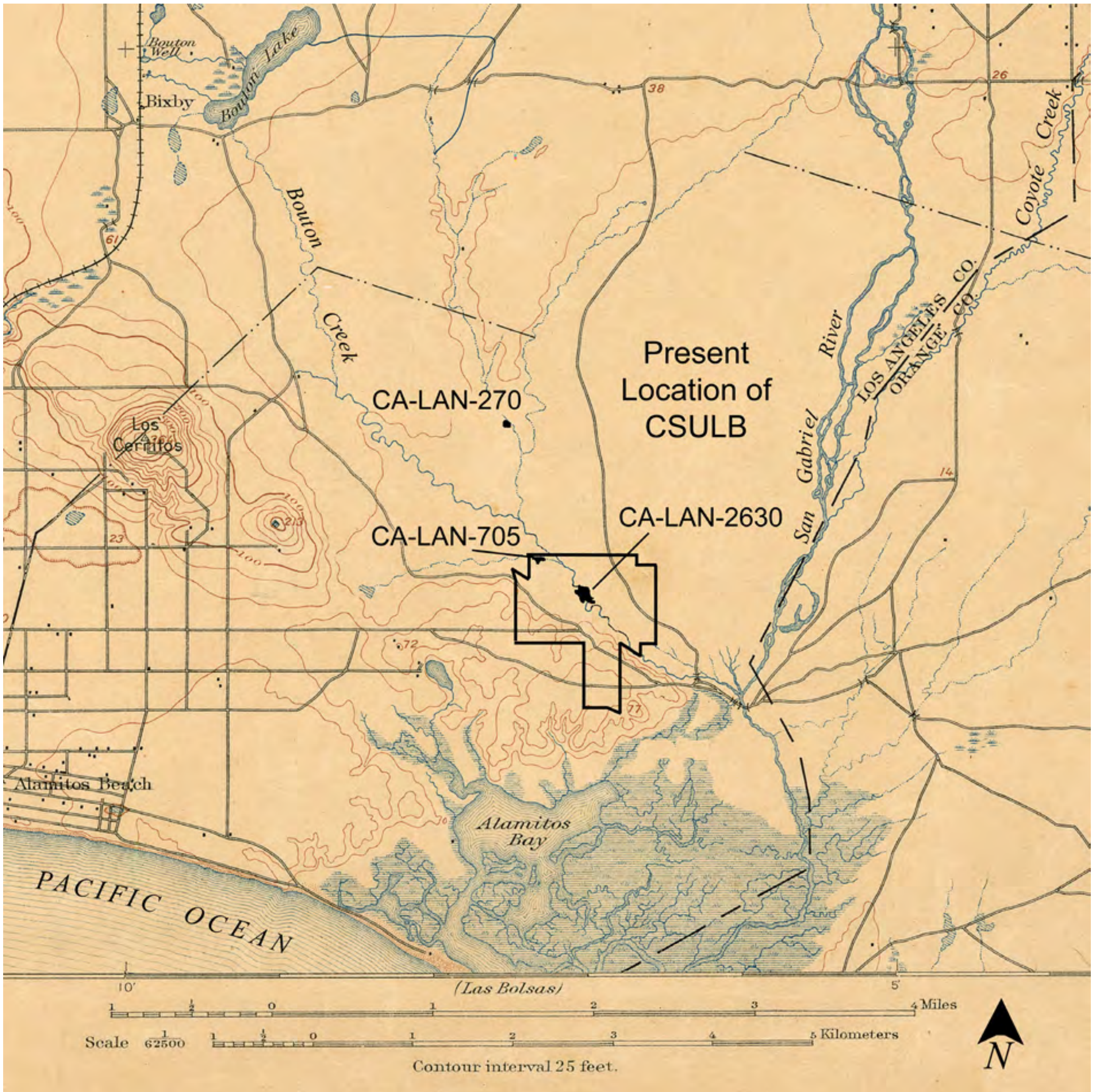

Figure 3. The relationship between sites mentioned in the text and local watercourses, including the original alignment of Bouton Creek. CA-LAN-705 and CA-LAN-2630 are situated along the banks of Bouton Creek, visible only as a "ghost channel" in the Figure 2, 1959 air photo. Base map is the USGS 1899 Downey 15' topographic sheet, compiled from ground surveys made in 1893–1894.

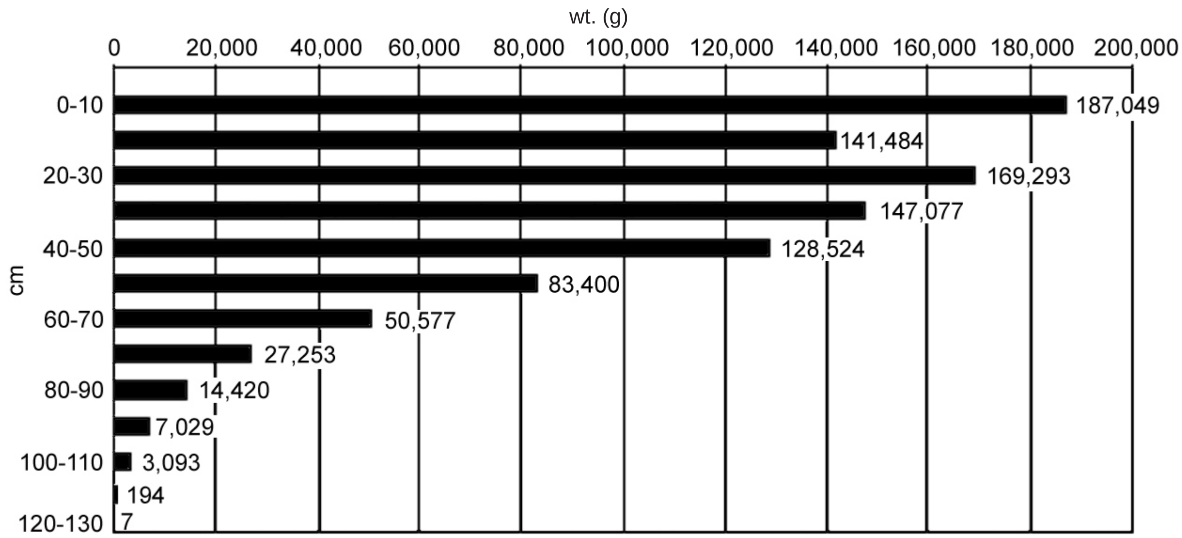

Figure 4. Weight distribution of CA-LAN-2630 subsistence shell by depth.

Of the 62 pieces of giant egg cockle recovered from LAN-2630, 11 could be fitted together to form large portions of three valves. Specimens 5205 to 5208, all from Unit Y-10, 90–100 cm, form a nearly complete valve with a hole in its dome (Figure 6b). Since no human remains, artifacts, or features associated with ritual activity were recovered from LAN-2630, it seems unlikely that this object was intentionally "killed" or destroyed as part of a mourning event (see Kroeber 1907:323). The remaining 51 fragments of giant egg cockle represent at least seven individual valves. The horizontal distribution of egg cockle artifacts and detritus indicate a concentration of discard in the central portion of the site (Figure 7). Of the 62 pieces only nine were recovered from the 100–110 cm level. No cockle artifacts or fragments were recovered from Locus 4.

Abalone Ornaments

Only a few traces of non-bead shell ornament manufacture were found at LAN-2630. Locus 2 produced 21 catalog entries for abalone shell; seven pieces weighed more than 1 g, and the rest were thin nacre flakes. At least three whole shells are represented, all identified as black abalone (*H. cracherodii*). Although no ornaments identifiable to type were found, two of the larger pieces (FN-4216 [A-13, 0–100 cm] and FN-4223 [A-1, 100–110 cm]) bear a single smooth, possibly ground, edge. The largest abalone specimen, which represents about one quarter of a whole shell, came from Unit C-4, 100–110 cm. Figure 8 indicates that abalone was concentrated in the center of the site, possibly representing detritus from bead production.

The Bead Assemblage

Two hundred seventy-four beads were found at LAN-2630 (Figure 9), most of which (224, or 82 percent) were made from the purple olive shell (*Olivella biplicata)*. The 274 LAN-2630 shell beads include: 95 (35 percent) *Olivella biplicata* wall disc; 90 (33 percent) *Olivella biplicata* callus cups; 45 (16 percent) *Mytilus californianus* discs; 18 (6 percent) *Olivella biplicata* full lips; 10 (4 percent) *Olivella biplicata* rough discs; 10 (4 percent) *Olivella biplicata* thin lips; five (2 percent) abalone (*Haliotis rufescens* and *Haliotis cracherodii*) discs, and 1 (< 1 percent) *Olivella biplicata* cylinder.

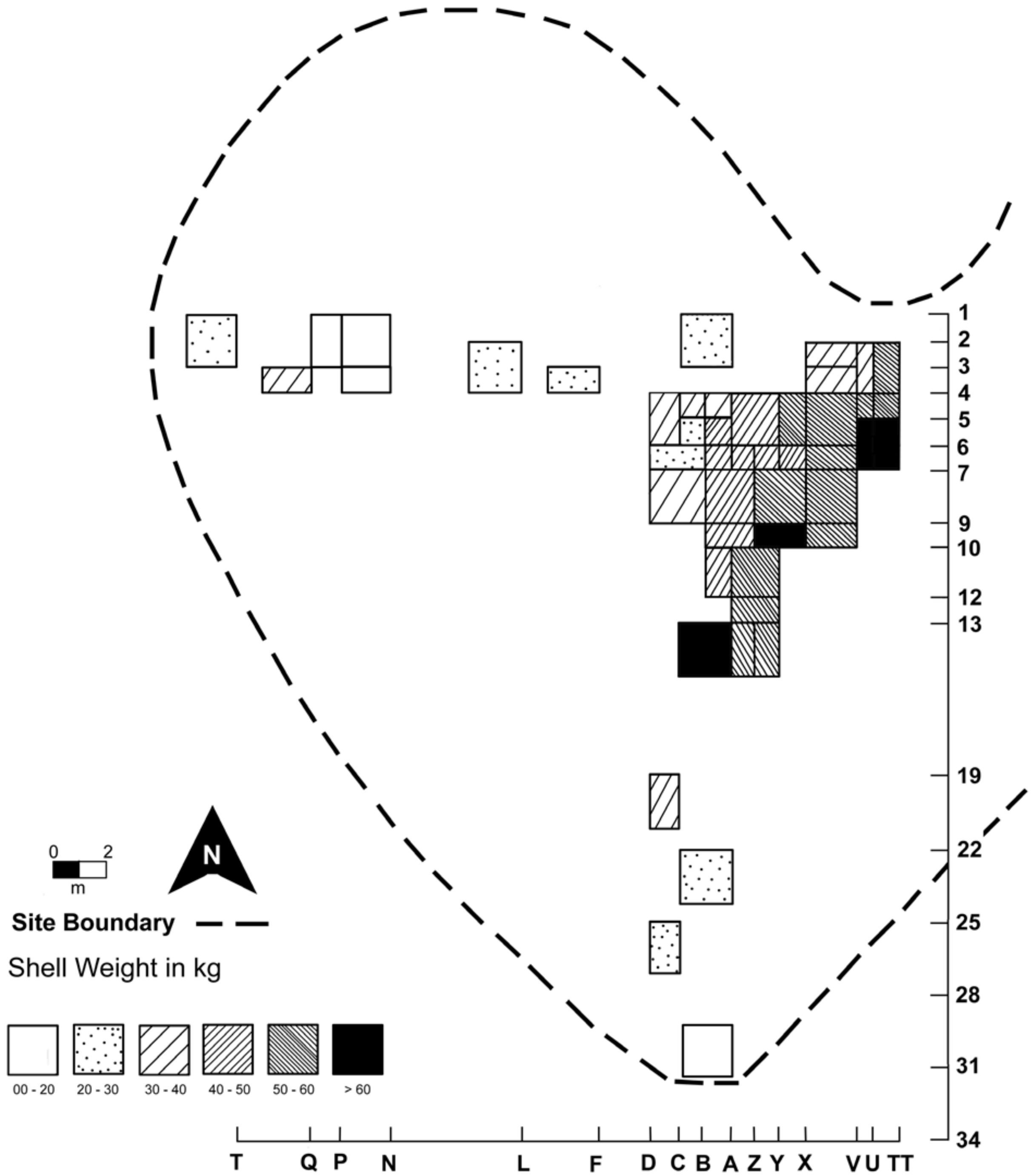

Figure 5. Horizontal distribution of CA-LAN-2630 excavated shell by weight. Drawing by Rusty van Rossmann and Matthew A. Boxt.

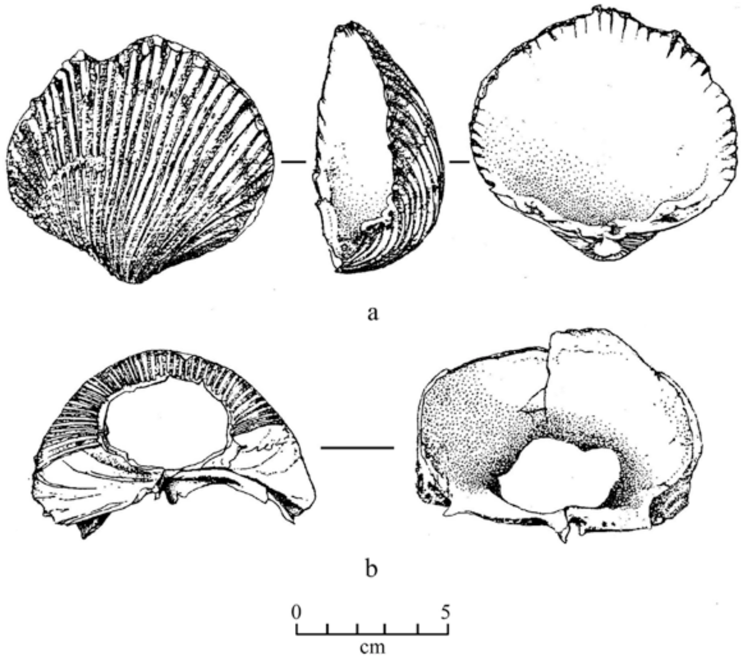

Figure 6. Shell tools. (a) spiny cockle valve; (b) giant egg cockle. Drawing by Alice Hale and Rusty van Rossmann.

Purple olive shell beads range in size from 3.4 mm to 8.6 mm in diameter. The larger rough disc beads averaged 7.5 mm in diameter with an average perforation of 1.7 mm. None of the wall discs showed any indication of edge incision or dorsal/ventral grinding. Nineteen were burned, and three had traces of asphaltum (Specimens 3444, 2645, and 3110). Callus cup beads are made from the callus or thicker portion of the *Olivella biplicata* shell; the ventral side is more convex than the dorsal side, giving it a "cup-like appearance" in cross section (Gibson 1992:28). The maximum diameter of callus cup beads ranged from 1.4 mm to 6.1 mm. None of the beads from this group had edge incisions. Six were burned (all from Locus 2), and one (from Locus 4) had traces of asphaltum. The *Olivella biplicata* cylinder bead is similar to the callus cup, having been made from the callus portion of the shell. It differs from the cup bead in its larger perforation, which is roughly 2.0 mm in diameter (King 1990:155). The singular *Olivella biplicata* cylinder bead recovered from LAN-2630 displayed no edge incising, traces of asphaltum, or evidence of burning. The *Olivella biplicata* thin lip bead is also manufactured from the callus portion of the shell. Unlike the purple olive cup bead, this bead type incorporates a portion of the wall (Brock 1986; King 1990; Gibson 1992). This use of callus and wall makes the thin lip bead appear thicker at one end when viewed in cross section (Gibson 1992:28). Thin-lipped and cupped beads often grade into each other, making visual distinctions difficult (Brock 1986; Gibson 1992). Brock (1986:1) offers a geometric formula to distinguish thin lips from cups, suggesting that beads with a minimum thickness less than half of its maximum thickness are *Olivella* thin lip beads. No thin lip beads exhibited edge incising; one was burned and another, Specimen 2010, had traces of asphaltum. Both were from Locus 2.

Olivella biplicata full lip beads incorporate the callus and wall portions of the shell (Gibson 1992:28). Although the full lip and the thin lip bead may typologically grade into each other, the full lip uses substantially more wall than the thin lip, often showing only a small portion of the callus, and is generally easily distinguished from the thin lip. The mean diameter

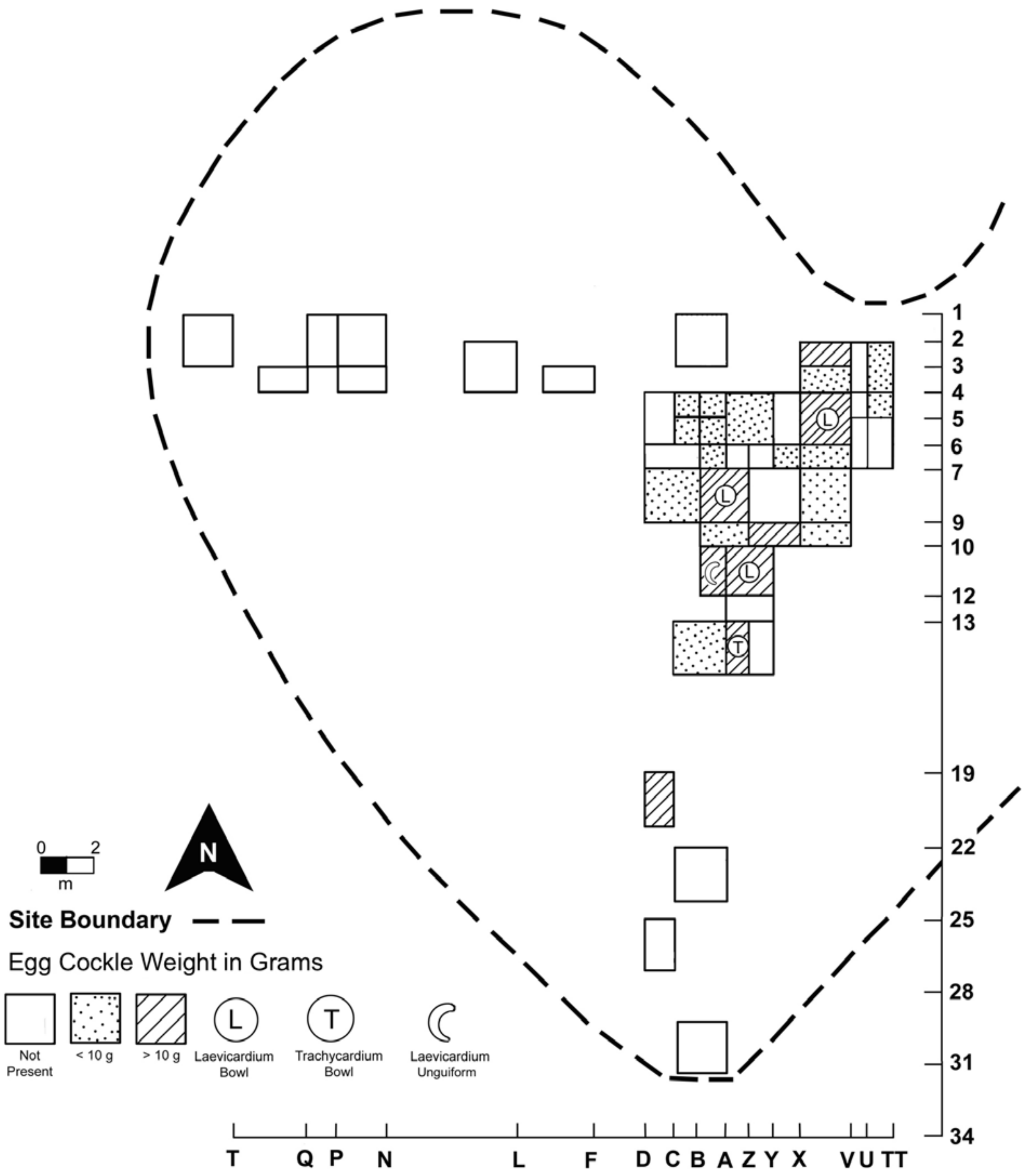

Figure 7. Horizontal distribution of egg cockle shell and egg cockle artifacts by unit (weight in grams). Drawing by Rusty van Rossmann and Matthew A. Boxt.

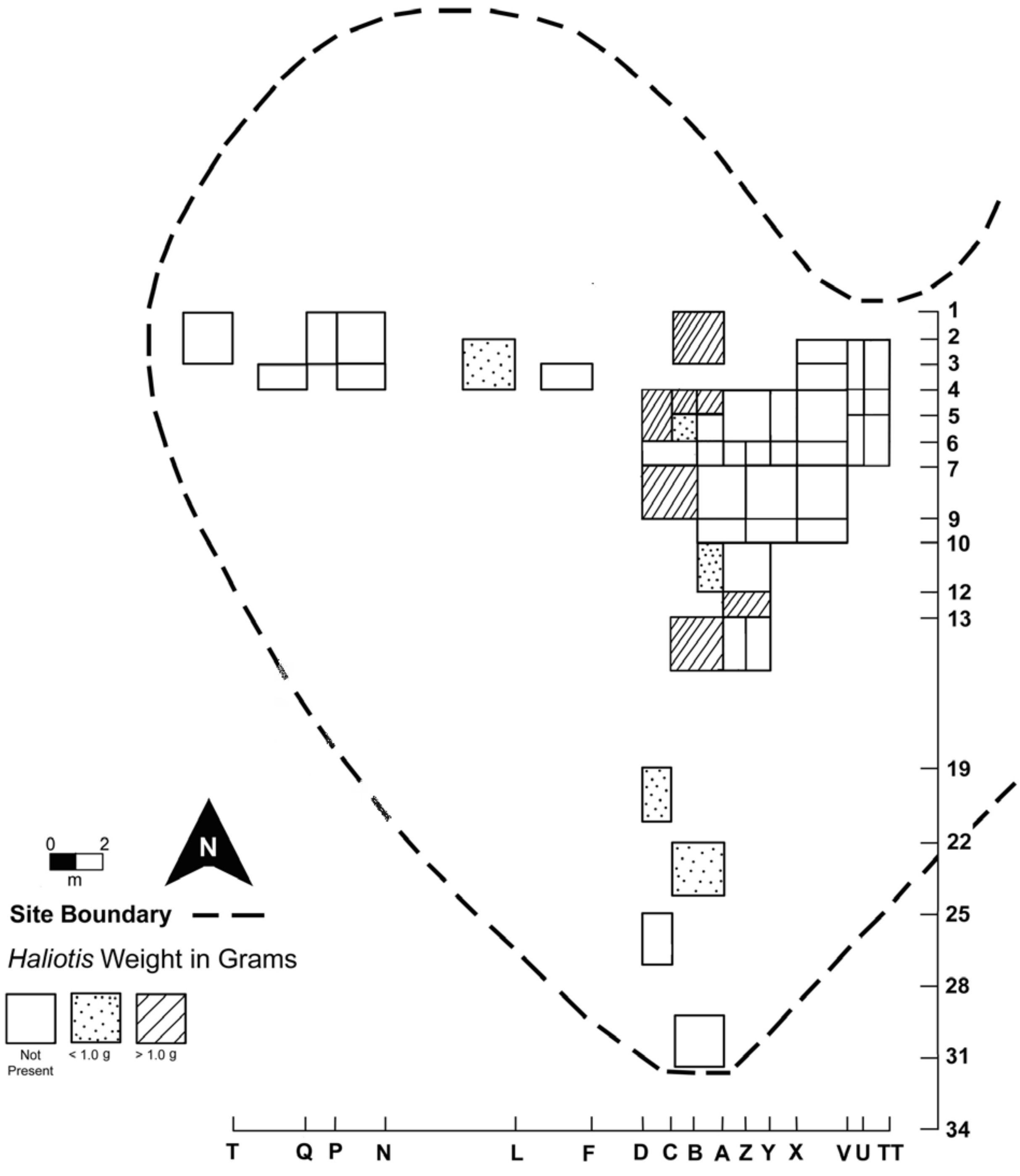

Figure 8. Horizontal distribution of *Haliotis* shell by unit (weight in grams). Drawing by Rusty van Rossmann and Matthew A. Boxt.

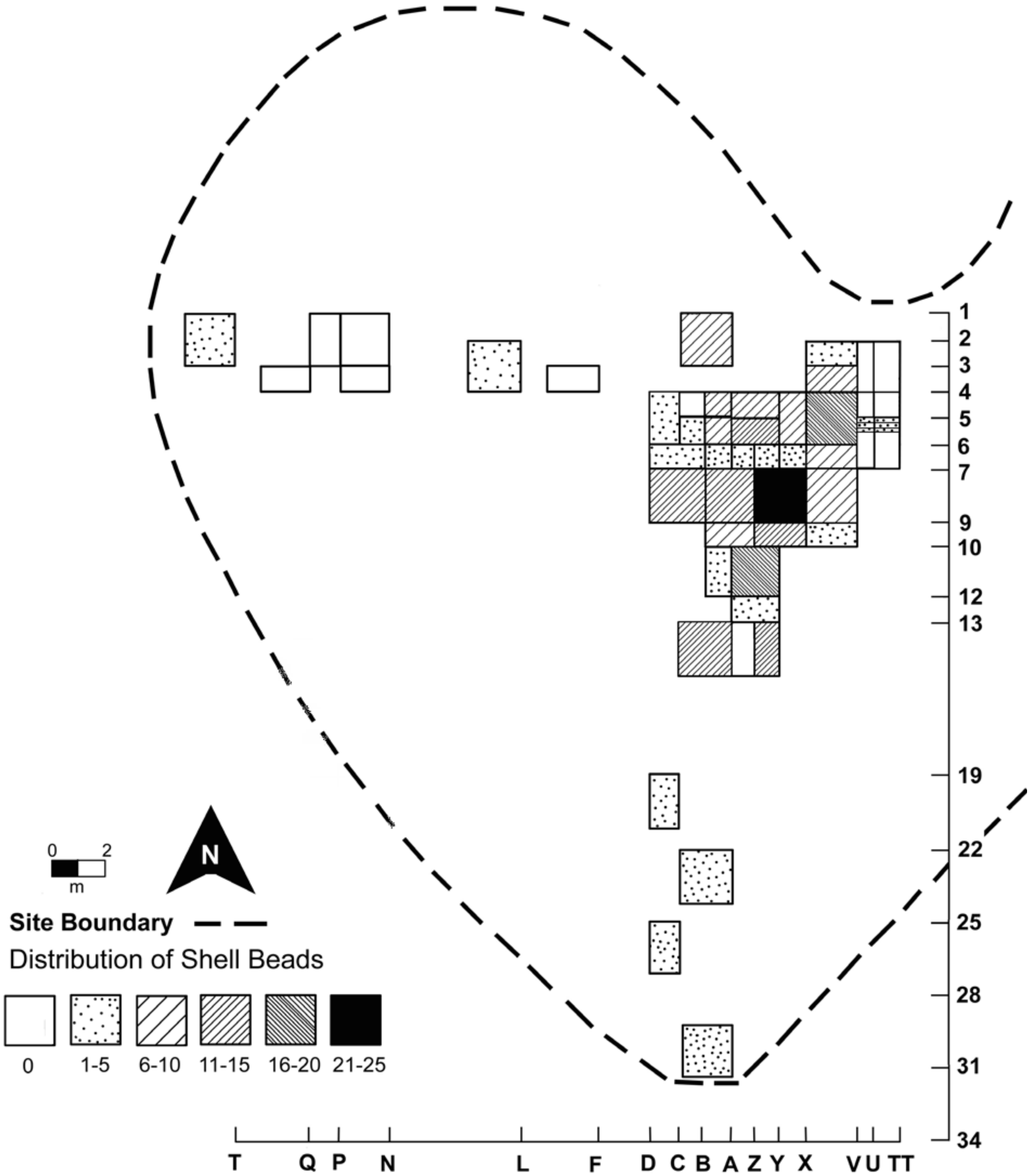

Figure 9. Frequency distribution of shell beads by unit at CA-LAN-2630. Drawing by Rusty van Rossmann and Matthew A. Boxt.

is 7.9 mm with a perforation of 1.6 mm. Several of the beads fall into the category of unlipped variants. None of the *Olivella biplicata* full lip beads had edge incision or traces of asphaltum, and two were burned.

Mytilus californianus disc beads are made from the California mussel (*Mytilus californianus*). The form varies from unground (retaining its natural curvature) to ground on both ventral and dorsal surfaces, appearing flat in cross section (Gibson 1992:33).The color may vary from dark blue-black to white (Gibson 1992:9). Of the 45 *Mytilus californianus* disc beads in the LAN-2630 collection, only Specimen 3508 exhibits traces of asphaltum.

Haliotis disc beads are made from the nacre and/or epidermis of *Haliotis rufescens* and *Haliotis cracherodii* and are similar in form to the *Mytilus* disc. In most cases only the epidermis (cortex) portion of the shell is used, but in some cases the nacre (iridescent lining) is also present. Since *Haliotis* beads were manufactured throughout much of California prehistory (King 1990), they have limited use as temporal markers. Excavations at LAN-2630 produced five *Haliotis* disc beads. None was burned or exhibited traces of asphaltum.

Applying shell bead chronologies published by Bennyhoff and Hughes (1987:127–129) and Groza et al. (2011:148–150), most LAN-2630 beads fall within the Late Period 1C and Late Period 2 phases of California prehistory (ca. AD 1390 to 1770), a time span supported by LAN-2630 radiometric data (Boxt and Dillon 2013:59).

Scraping Tools

Scrapers made from bivalve shells are common at LAN-2630. Archaeological examples of scraping tools, including modified and expedient shell, have been reported throughout coastal southern California and beyond; "expedient" shell was accessible, required minimal modification, was used, and was discarded. Walker (1951:Plate X, 39, 41[Malaga Cove, CA-LAN-138]), Curtis (1959:78 [Arroyo Sequit, CA-LAN-52]), Bates (1972:43 [Los Altos, CA-LAN-270]), Butler (1974:63 [San Pedro Harbor site, CA-LAN-283]), Zahniser (1974:18–21, CA-LAN-306), and Troncone and Altschul (1992:268–272 [the Admiralty site, CA-LAN-47]) provide comparable specimens from Los Angeles County. Winterbourne (1967:87, 95, 101, 128 [Goff's Island site, CA-ORA-8]), Ross (1970:29 [CA-ORA-190]), and Craib (1982:37–38 [CA-ORA-197]) identify examples from Orange County. Massey (1955:286–287), Alvarez (1975:4–5), Ritter et al. (1994:14–15), Ritter (1998:22), Tyree (1998), and Des Lauriers (2006:267) published on shell scrapers from Baja California.

Scraping implements manufactured from shell were put to a wide variety of household and community tasks, such as animal and plant processing, basket weaving, woodworking, or fish scaling. Of the 182 pieces of Pismo clam, 41 display edge chipping, striation marks from abrasion, and/or cortex-wear (Figure 10). Pismo shell and scraping tools were concentrated within the northern perimeter of the site (Figure 11). Distinctive patterns of intentional modification along the lateral edges of several tools indicate that pressure flaking was utilized for final shaping, maintenance, and sharpening; the light degree of fracturing on the margins of some of these specimens indicates that no hard materials were worked with them. It is uncertain whether any of these simple tools were hafted. Ancient Bouton Creek abutted LAN-2630, and a stream bank would have been a likely place to collect, split, clean, and soak junco (*Juncus* spp.) stems in preparation for making baskets.

Nonmodified Scraping Tools

While sorting shells from Locus 4, a single scallop (*Aequipecten aequisulcatus*), burned and edge-worn, was flagged as a potential artifact (Figure 12c). As

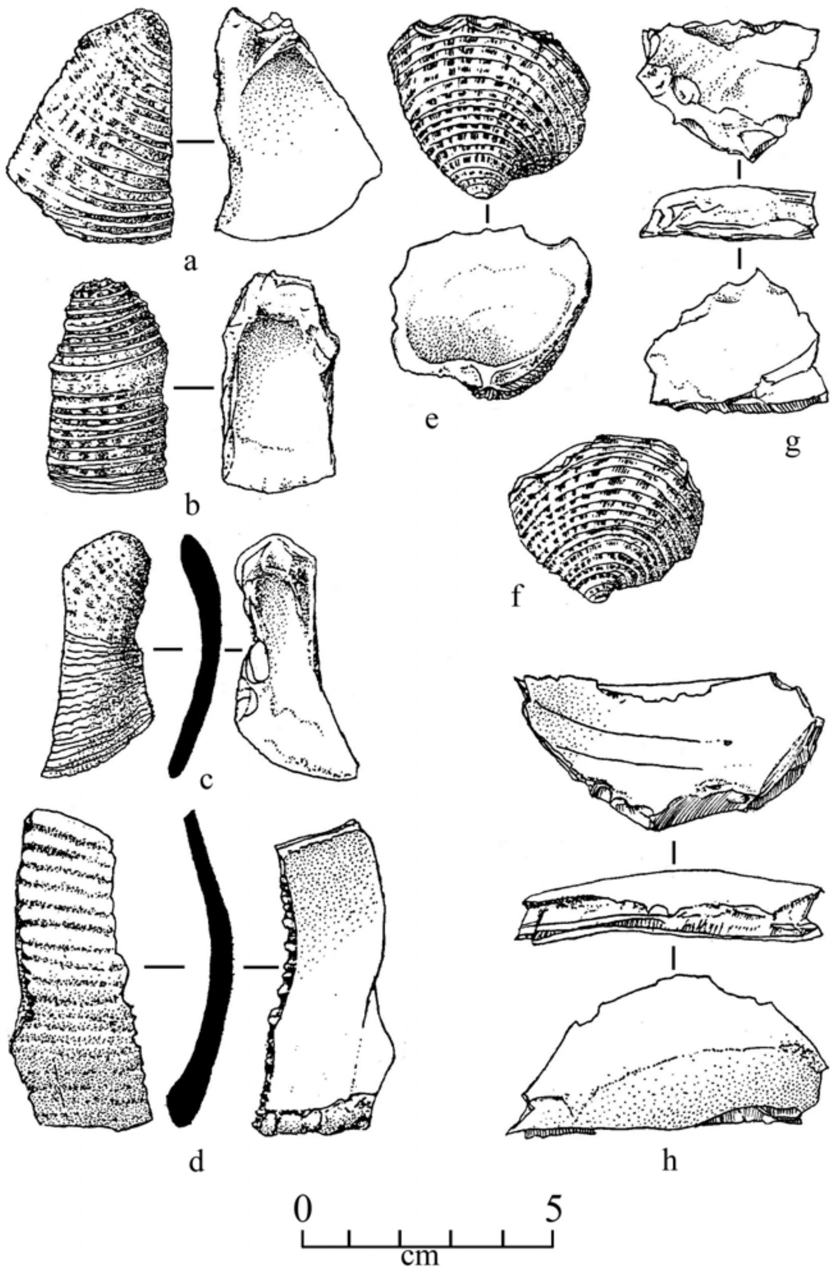

Figure 10. Modified shell artifacts from CA-LAN-2630. Four specimens (a–d) have been highly modified to create a working edge. Specimens e and f are expedient clamshell scrapers; artifacts g and h are egg cockle fragments that exhibit pressure flaking and edge-damage. Drawings by Alice Hale and Rusty van Rossmann.

work progressed, it became increasingly apparent that scores of clam and scallop shells exhibited similar edge working, a characteristic of scraping tools (Figures 12–14). Unlike the intentional modification observed among the pismo clam specimens, many scallop valves exhibited damage along margins, suggesting opportunistic utilization.

Harvested primarily as food, scallops and clams served secondary functional tasks. The robust cockles (*C. fluctifraga* and *C. undatella*) held up to casual modification, including percussive and pressure flaking. Even the brittle scallop had practical value as a handy scraping tool. Although no experimental tests were carried out, we are confident that abrasion

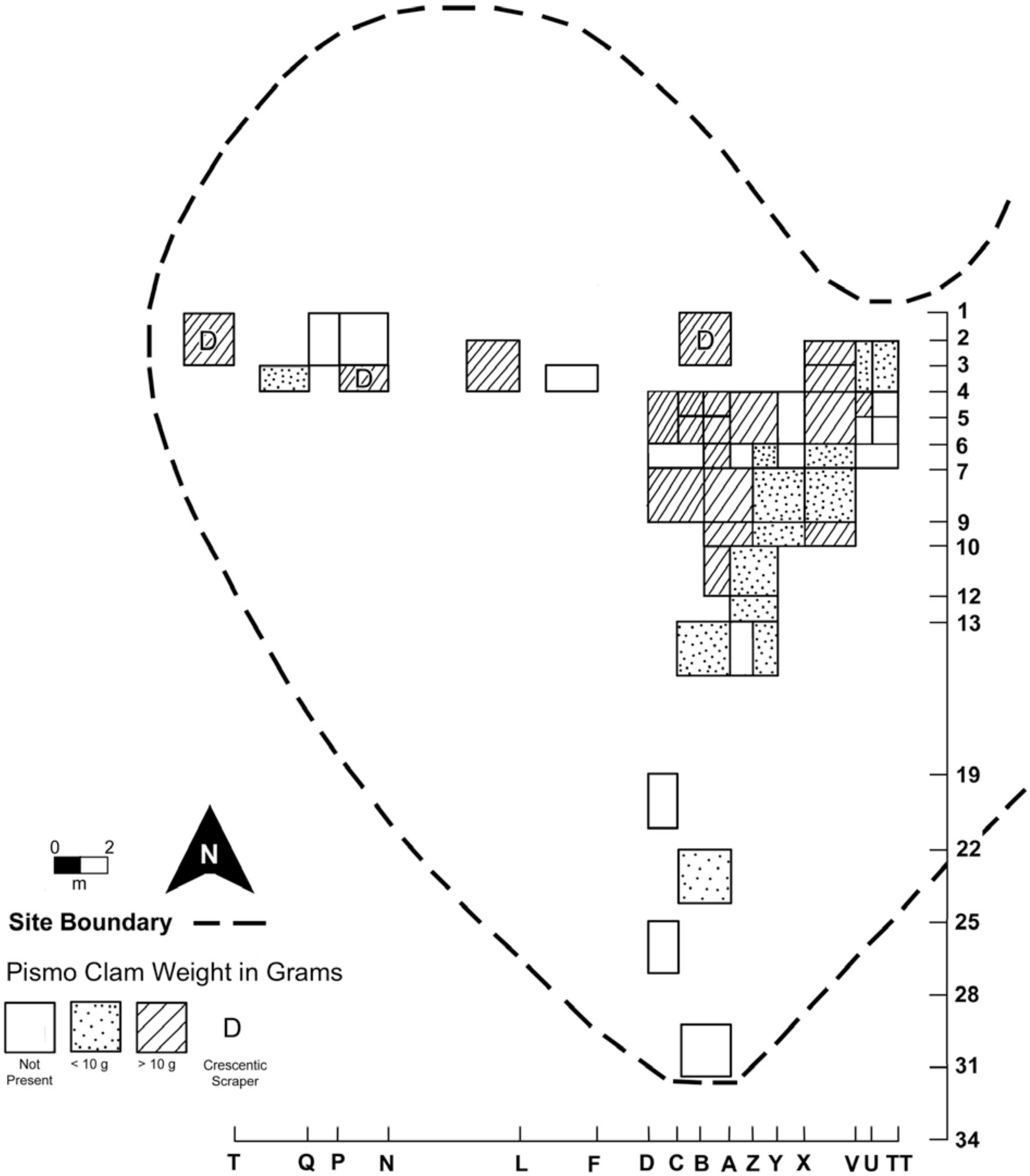

Figure 11. Horizontal distribution of pismo clams (weight in grams) and pismo clam scrapers by unit at CA-LAN-2630. Drawing by Rusty van Rossmann and Matthew A. Boxt.

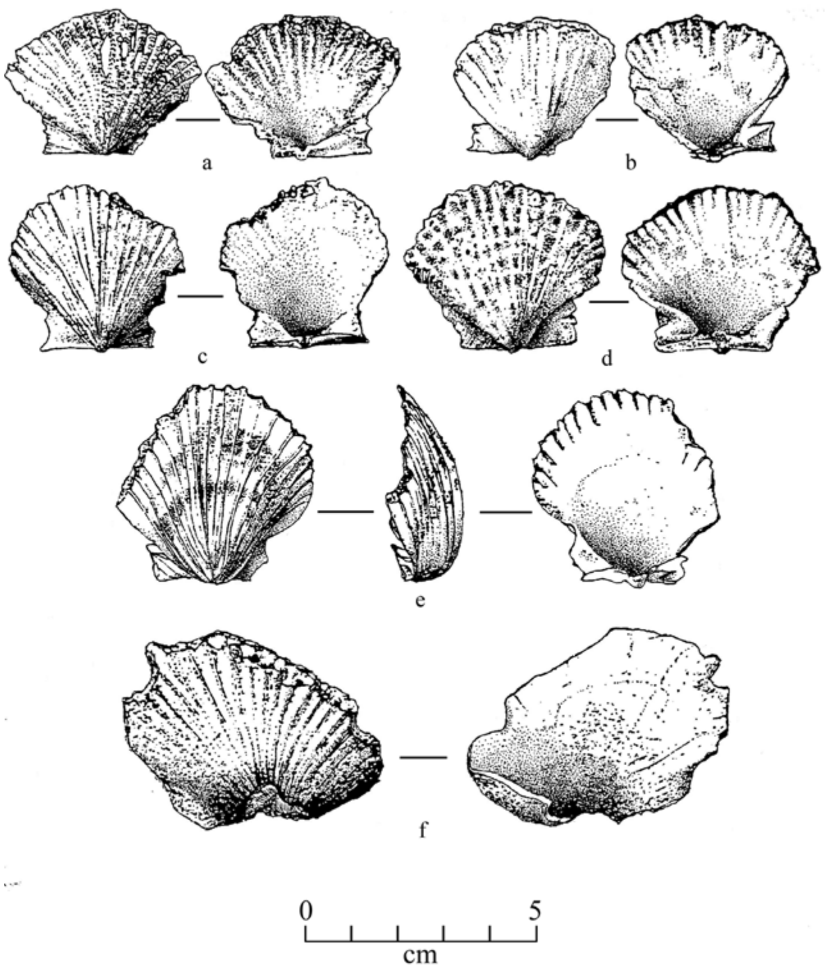

Figure 12. Examples of expedient scallop shell scrapers from CA-LAN-2630 (a–e) and CA- LAN-270 (f). Drawings by Alice Hale and Rusty van Rossmann.

along the margins of the LAN-2630 nonmodified shell specimens denotes use-wear.

Edge-Worn Pecten and Clam Valves

Laboratory sorters identified 105 edge-worn clam valves (*Chione* spp. and *Tivela stultorum*) (Figures 10c, 10f, 13 c–h, 14 c–h). These are whole or nearly whole unworked specimens that through use have acquired chipping or other edge damage along their dorsal and ventral margins. Figure 15 indicates their concentration in units Z-6, X-6, A-5, V-3, V-4 and V-7. These units, which produced edge-worn clamshells at a rate of 10 or more per 2 m x 2 m unit, display a roughly semicircular dispersion pattern approximately 2 m in diameter, facing Locus 3. This configuration does not match the density pattern of the overall shell deposit. If the units that produced edge-worn clam shells at a rate of eight or more per 2 m x 2 m unit are added to the group, the semicircle becomes more pronounced, and a concentric arc, approximately 1 m behind the first, takes form. If this distribution pattern is not accidental, it could indicate an area where people made baskets, scaled fish, or processed plants.

Sorters also identified 175 edge-worn pecten valves (*Aequipecten aequisulcatus*) (Figure 12 a–c). The horizontal distribution of the 175 edge-worn pecten valves (Figure 16) shows a semicircular discard pattern similar

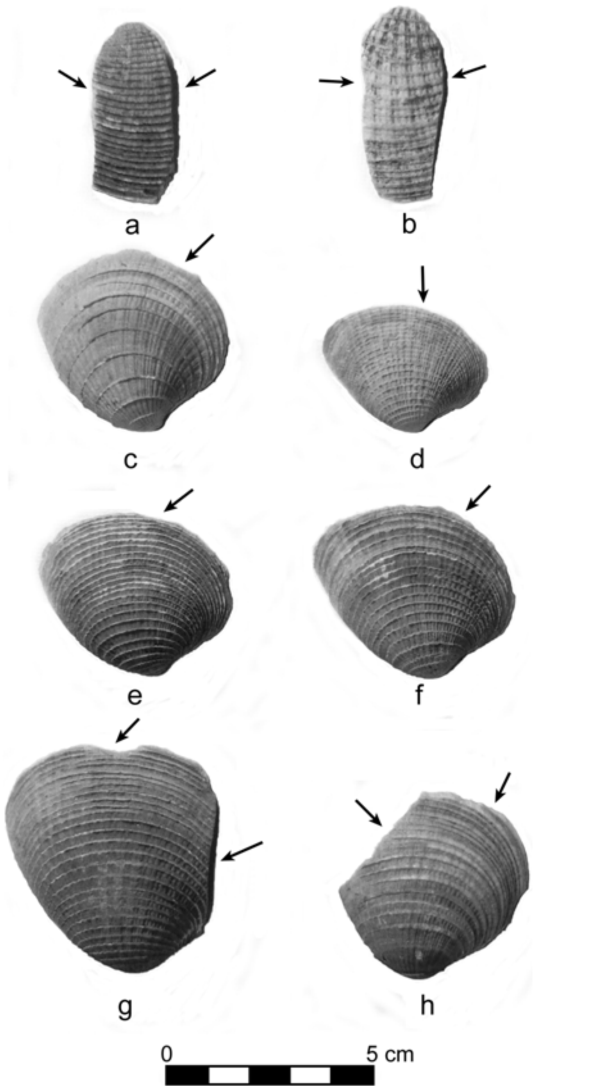

Figure 13. Exterior views of *Chione* shell tools. Specimen a and specimen b are unguiforms; c–h are expedient scrapers. Arrows indicate edge damage. Photograph by Rusty Van Rossmann.

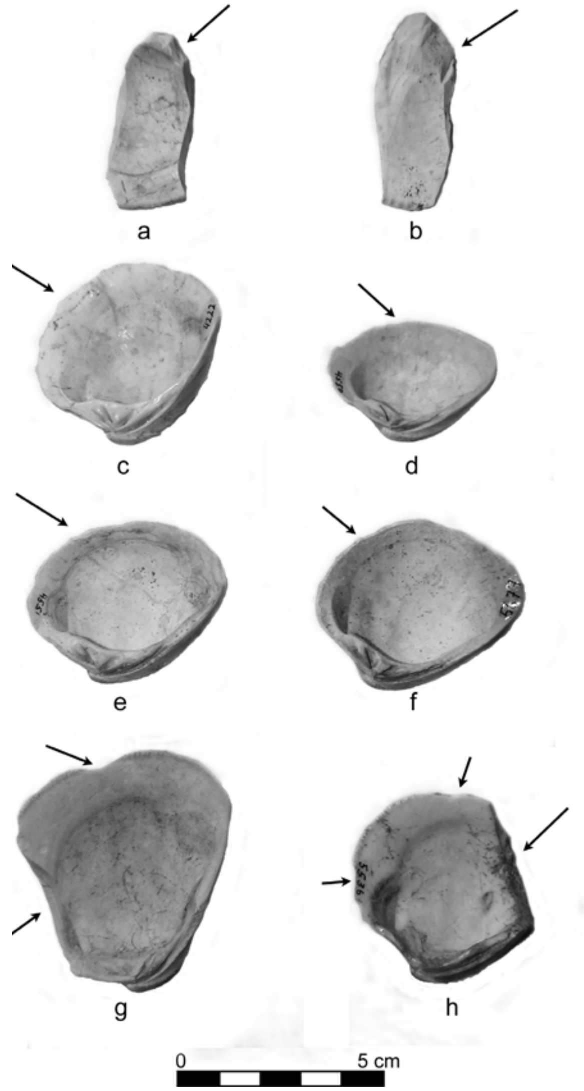

Figure 14. Interior views of *Chione* shell tools. Specimen a and specimen b are unguiforms; c-h are expedient scrapers. Arrows indicate edge damage. Photograph by Rusty Van Rossmann.

to that of the edge-worn clam valves. The recurrence of an observable semicircular pattern reinforces the notion that these artifacts were utilized for a specific task and that the distribution pattern is meaningful.

Unguiforms

During the laboratory sorting of thousands of shells, it became apparent to one of us (AH) that there was an unusual kind of clamshell object manufactured by both percussion and pressure flaking. We named this artifact "unguiform" because it is roughly shaped like the phalanx of a human hand. Alerted to this particular form of *Chione* spp. shell artifact, 1–2 cm in width, 3–5 cm in length, formed from the central portion of the valve, and exhibiting an apparently chipped or worn dorsal end (e.g., Figures 10b, 13a, 13b, 14a, 14b), laboratory workers separated out 335 of these specimens.

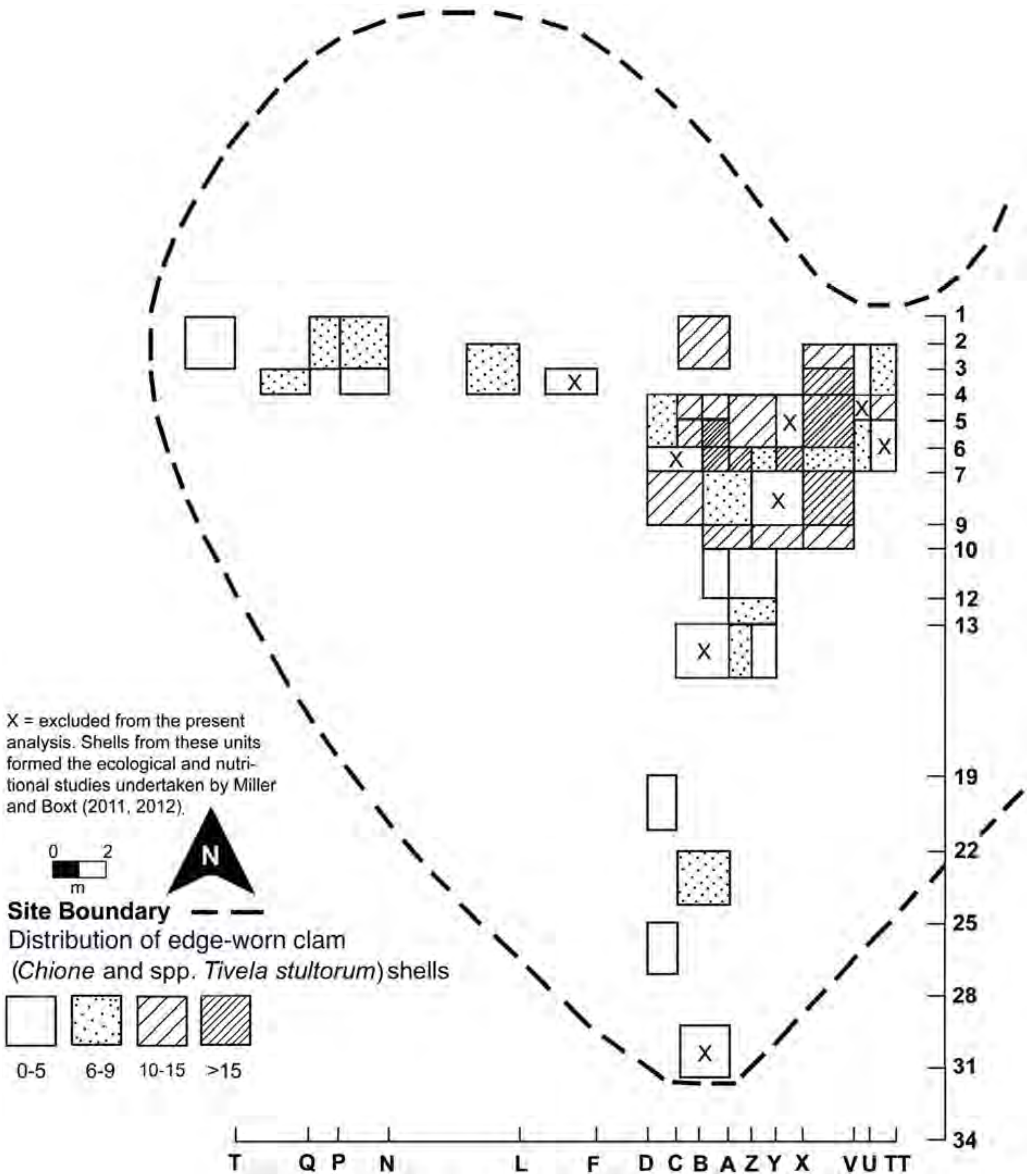

Figure 15. Frequency distribution of CA-LAN-2630 edge-worn clam (*Chione* spp. and *Tivela stultorum*) valves by unit. Drawing by Rusty van Rossmann and Matthew A. Boxt.

In all instances the LAN-2630 unguiform was formed by a combination of percussion and pressure flaking. At the outset the clam was struck to detach the anterior and/or posterior edges, after which the umbo was pressure flaked or beveled to achieve its ultimate form. Figure 17 plots the density and horizontal distribution of unguiforms, which cluster in units V-7, Y-12, U.5-5, X-9, TT.5-4 and V-3. The descending order of density for overall shell volume for the 10 most dense units (omitting those units not included in this analysis) is U.5-5, X-9, Y-12, TT.5-2, V-6, Y-13, TT.5-4, V-9, V-7 and Y-10. Seven units produced unguiforms at the rate of 30 or more per 2 m x 2 m unit, while 22 units produced them at a rate of 10 or fewer per 2 m x 2 m unit.

Although the density pattern for these objects generally follows the trend for gross shell density, it does not maintain a direct correlation. The 66 pieces from Unit V-7 accounted for 20 percent of the objects of interest, but only 6 percent of the gross shell from the site. It seems unlikely that unguiforms were formed by trampling or fortuitous breakage; rather, the standardized shape and length of these distinctive implements suggests they had a specific application or were used for a limited number of tasks. Their precise function remains unknown, but they could have been used: (1) to pry open bivalves to remove meat; (2) as basket or net spacers (see Hudson and Blackburn 1987:204); or (3) as alignment guides for basketry stitching (see Craig 1967:91; Hector 2006).[3] No comparable specimens are reported in E. W. Gifford's (1947) seminal work on California shell tools.

Ethnographic data aided in our interpretation of archaeological evidence. J. P. Harrington's Ventureño Chumash informant, Fernando Librado, indicated how shell was used to trim fibers in Native basket production:

> … Indians here never used any shell but ‘alaqučum (clam sp.) for scraping junco. Call the instrument tikewewene'es, or tikewewene'es ‘icuwas ‘i ‘alaqucum … I bite or break by biting the clamshell here at the edge. I make it a blade. I bite so it will be o.k. at a place where you think it will leave the best edge. I break a piece off by biting. I look at the grain or nature of the shell, and bite a hunk off. I wrap it up in a handkerchief or buckskin and break a hunk off by biting. The good edge is even, and slants (or lies) beginning at the outside of the shell (has cutting edge at inside edge of the break) … To trim edges, they tilt the junco a little. FL says they had separate, smaller shells for that purpose [Hudson and Blackburn 1987:218].

Another of J.P. Harrington's Ventureño informants, Simplicio Pico, stated:

> When I see one strip is crooked (uneven width), I trim off the unstraight using my fingernail. But Indians all the time had their clam shell handy and used it. Always use raw clam shells; boiling would make them brittle…When I sew I wet my fingers every little while. I sit on ground and stretch out my feet straight. I always put a dish of water side of me [Hudson and Blackburn 1987:230, 231].

Hudson and Blackburn (1987:60–61, 68–69, 218, 241–242) cite John P. Harrington's notes on the use of clam, mussel, and abalone shell scrapers for splitting rush (*Juncus* spp.) stems for basket making, and shell chisel blades for woodworking. They also provide photographs of two clamshell scrapers from the Santa Barbara Museum of Natural History collection (Hudson and Blackburn 1987:69, Figures 406-1 and 406-2). Given the proximity of LAN-2630 to a stream, we presume that sedge, grass, or rush plants used for nets and baskets or tule used for matting were collected locally. More than a half-dozen bone awls that were likely used to stitch coiled baskets, dozens of shell scrapers, unguiforms, and shell bowls suitable for

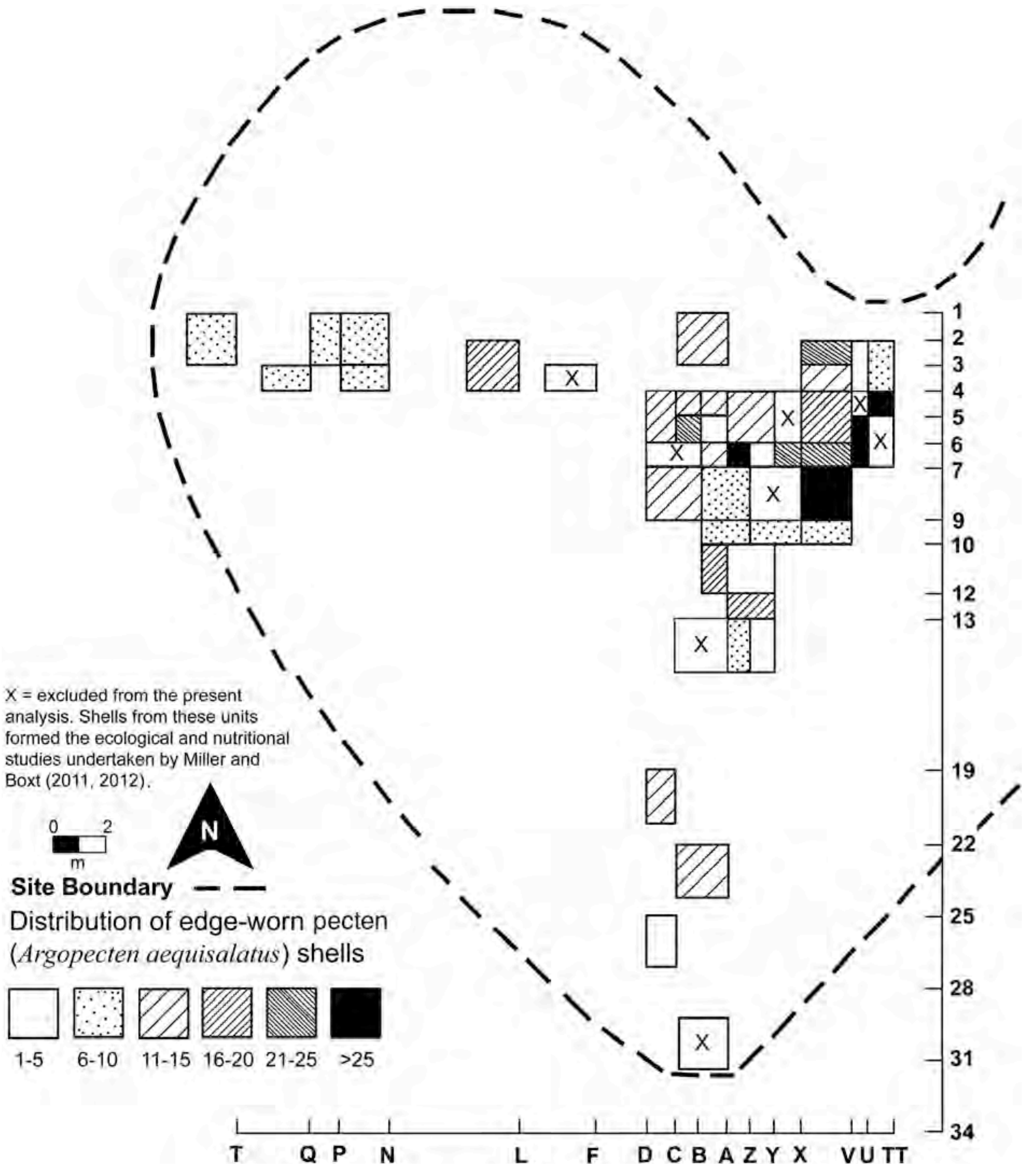

Figure 16. Frequency distribution of CA-LAN-2630 edge-worn pecten shells by unit. Drawing by Rusty van Rossmann and Matthew A. Boxt.

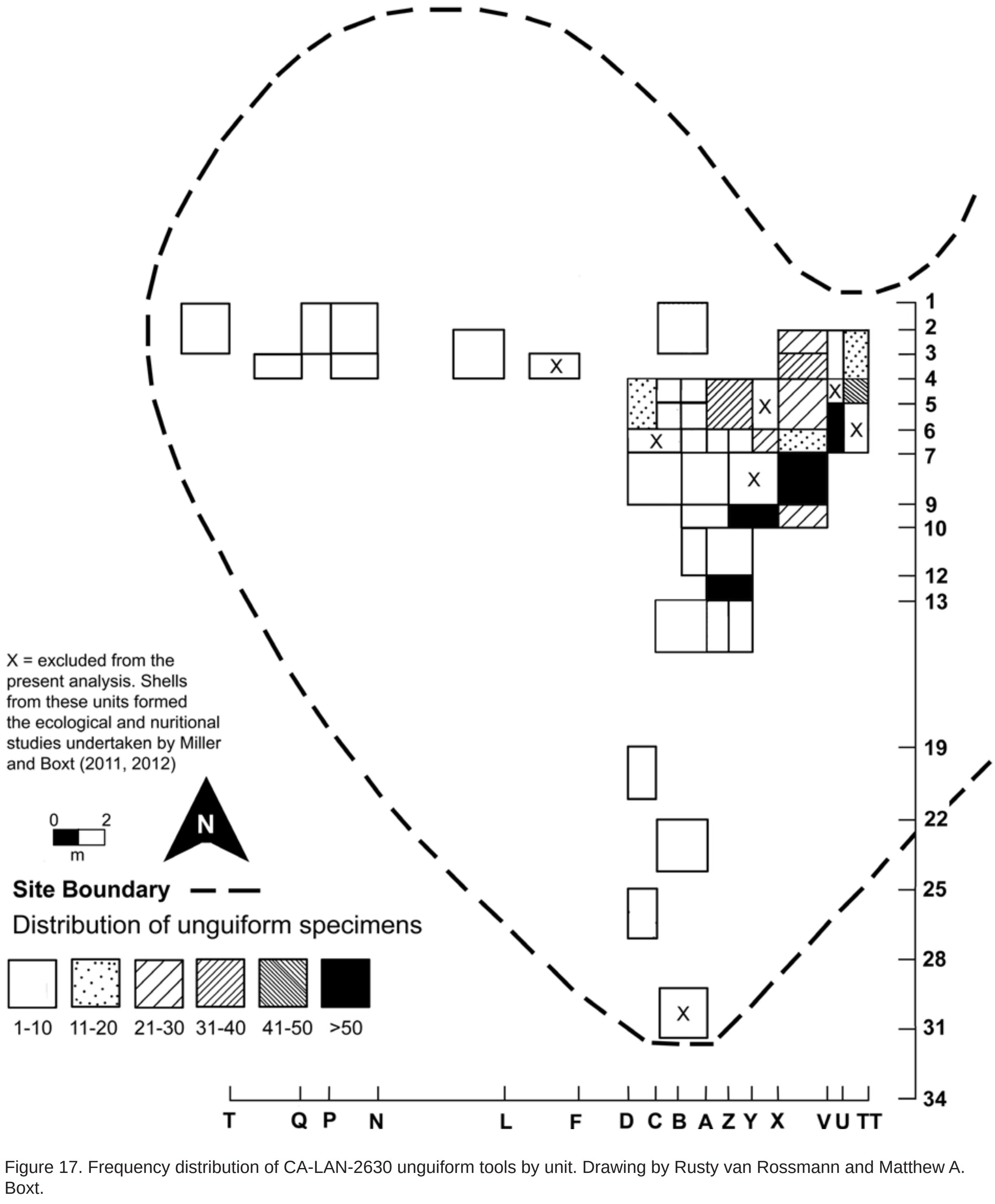

Figure 17. Frequency distribution of CA-LAN-2630 unguiform tools by unit. Drawing by Rusty van Rossmann and Matthew A. Boxt.

keeping one's fingers moist, all support the notion of a vibrant fiber industry.

Utilized Shell: Comparisons Between CA-LAN-705 and CA-LAN-2630

Utilized shell from CA-LAN-705, roughly 1 km upstream from LAN-2630 (Figures 2 and 3), enhances our discussion of regional shell tool technology.[4] LAN-705 yielded 18 utilized clam valves, 52 unguiforms, and 23 utilized pecten valves. Table 1 presents a comparison of the ratios of utilized shell classes between LAN-705 and LAN-2630. Of the 104 shell objects identified at LAN-705, 11 were pieces of nonestuarine species, including five *Tivela* fragments, four *Laevicardium* fragments, one *Mytilus* fragment, and a *Megathura crenulata* central ring, which was probably a bead. The higher incidence of nonestuarine shell at LAN-2630 is accounted for by a higher incidence of *Tivela* pieces and by the presence of abalone, which was absent from LAN-705. The ratios of utilized pecten are nearly equal at both sites. The differences in the ratios of utilized clamshell and unguiforms between the two sites are presented in Table 2 and Table 3.

It appears that *Chione fluctifraga* was used more at LAN-705 than at LAN-2630, that *Chione undatella* was more plentiful at LAN-2630, and that more *Chione californiensis* and *Chione undatella* were utilized at LAN-2630 than at LAN-705. Also, *Chione fluctifraga* was the preferred material for unguiforms at LAN-705. The relatively high ratio of exotics and low ratio of unguiforms at LAN-2630 might suggest a difference in tool use between these sites. However, the differences between the two collections may reflect differences in sample size. Not only did LAN-2630 produce more utilized shell objects (n = 960) than reported for LAN-705 (n = 104), but LAN-705 is not comparable in area and artifact density. The LAN-705 artifact count is 293 specimens, including 137 examples of lightly utilized shell, 61 beads, and 79 pieces of debitage.

Final Remarks

A number of cultural and ecological inferences can be drawn from the presence of shell at an archaeological site. Shell informs us about technology, food processing, seasons of occupation, dietary constituents, food harvesting patterns, and the natural environment. Shell is generally a tough, durable material. In coastal and estuarine settings it is abundant and easily worked into tools or ornaments. In marshy or deltaic regions stone of usable quality often is not readily available, so shell frequently serves in its place. Prehistoric coastal peoples seldom expended effort to secure scarce or

Table 1. Comparisons of the Ratios of Utilized Shell Between CA-LAN-705 and CA-LAN-2630.

Class	CA-LAN-705	CA-LAN-2630
Nonestuarine	.11	.28
Utilized clam	.17	.18
Clam unguiform	.50	.36
Utilized scallop	.22	.18

Table 2. Comparisons of the Ratios of Utilized Clam Valves Between CA-LAN-705 and CA-LAN-2630.

Species	CA-LAN-705	CA-LAN-2630
Chione californiensis	.33	. 41
Chione fluctifraga	.33	.12
Chione undatella	.34	.42
Protothaca staminea	–	.03
Tivela stultorum	–	.02

Table 3.Comparisons of the Ratios of Unguiforms Between CA-LAN-705 and CA-LAN-2630.

Species	CA-LAN-705	CA-LAN-2630
Chione californiensis	.19	.29
Chione fluctifraga	.60	.23
Chione undatella	.21	.47
Protothaca staminea	–	.01

distant stone for certain mundane tasks, such as the processing of plants, when the raw material for shell tools was plentiful and accessible.

The abundance of shell scraping tools at LAN-2630 is logical, given the near absence of stone cobbles in the lower San Gabriel drainage. Practicality predisposes people to select shell for certain tasks that normally might be relegated to chert or chalcedony tools. Further work on the shell material from other regional coastal sites should reveal more examples of unguiforms and underreported shell scrapers, amplifying our current understanding of Gabrielino technology.

Endnotes

1. On October 21, 1784, California Governor Pedro Fages gave a provisional grant of land to Manuel Nieto, a retired "leather-jacket" soldier who had served Gaspar de Portolá during the expedition to Alta California. Nieto died in 1805 at age 85, the wealthiest man in Alta California, his land supporting herds of horses and cattle. At his death Nieto's enormous holdings were divided into five separate ranchos: Los Alamitos, Las Bolsas, Los Cerritos, Los Coyotes, and Santa Gertrudes (Figure 18). The grant passed to a son, Juan Nieto,who later sold it to José Figueroa, the governor of California. After Figueroa's death, the property was sold in 1842 to Abel Stearns, a prominent local merchant. Stearns made Rancho Los Alamitos the center of a huge empire, containing at its peak more than 230,000 acres of the choicest land in the Los Angeles-San Bernardino area (Cleland 1951:198). CSULB is located within the area encompassed by Abel Stearns' Rancho Los Alamitos. The cattle, sheep, and horse bones recovered at LAN-2630 relate to southern California's Rancho period, a pastoral era punctuated by periods of extreme drought and floods. The catastrophic deluges of 1867–1868 coincided with the end of the Rancho period.

2. Excavation Units A-28.73, B-6, F-3, TT.5-5, X-4, X-7 (Locus 2) and Units 1 and 7 in Locus 4 were omitted from this examination because they comprised the sample selected for ecological analysis and were no longer complete (Miller and Boxt 2011, 2012). As well, Units A-13 and U.5-4 were excluded from this analysis; non tested units are marked "X" in Figures 15–17.

3. Rosenthal (1977) reported on a percussion-flaked shell tradition in the Sierra Pincate region of northwest Sonora, Mexico. Typical are unifacially and bifacially reduced valves, serrated margin fragments, and retouched hinges of *Laevicardium elatum* and *Dosinia ponderosa*. Rosenthal's replication experiments suggest that the Sierra Pincate examples were deliberately produced artifacts.

4. From March to September 1993, Boxt supervised investigations at LAN-705, adjacent to the Isabel Patterson Child Development Center. This study was designed to assess whether the deposits of marine shell and lithic flakes visible on the surface at this location were formed by cultural or natural processes. Previous investigations on the CSULB campus revealed the controversial nature of the origins of similar deposits. Accordingly, a goal of the LAN-705 inquiry was to reliably differentiate archaeological deposits from those of natural origin or resulting from historic land modification.

Research consisted of surface collection, soil augering, and test excavation. Site testing was initiated with 47 auger bores. Based on the results of this program, 14 test units, totaling approximately 31 m^3, were hand-excavated employing metrical stratigraphy. During these test excavations, a variety of cultural and environmental data were collected, including artifacts, ecofactual shell, animal bone, and shell and charcoal radiocarbon samples. With the assistance of Native American monitors and technical specialists, an additional 120 m^3 from mechanically excavated trenches

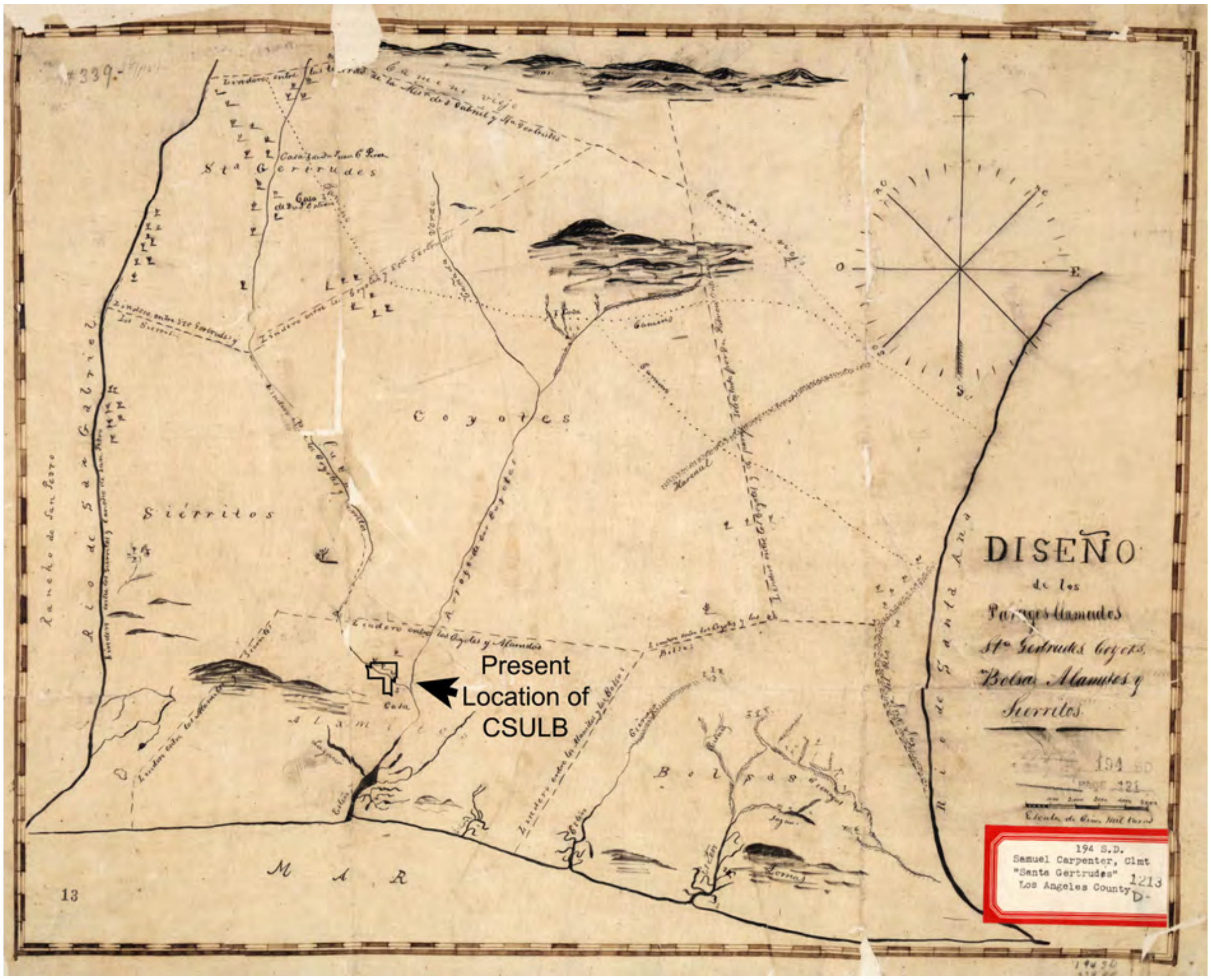

Figure 18. Diseño de los parages llamados Sta. Gertrudes, Coyotes, Bolsas, Alamitos y Sierritos. Pen-and-ink and watercolor on tracing paper from the United States District Court (California, Southern District) Land case 194, page 121; land case map D-1213, showing drainages, boundaries, roads, etc. that comprised the Nietos land grant (1834?). Courtesy, Bancroft Library, University of California, Berkeley.

was examined. The LAN-705 artifact assemblage constitutes 293 specimens (approximately 1.5 artifacts per cubic meter), reflecting a relatively low intensity of human occupation consistent with a transitory pattern of site use.

Our investigations produced several significant results. The structure and artifact content of LAN-705 suggest that this site was formed by a series of low-intensity depositional episodes related to hunting and gathering activities along ancient Bouton Creek, a tributary of the San Gabriel River (Boxt et al. 1999). Eighteen radiocarbon dates from the archaeological site span an interval from AD 1245 to 1580. The ^{14}C ages of LAN-2630 (AD 1150 to 1700) and LAN-705 reveal an overlap in site utilization of roughly 300 years.

Also, archaeological and environmental data suggest that LAN-705's role in the regional settlement-subsistence pattern was oriented toward exploitation of a major estuary system that once existed in the vicinity of what is now the CSULB campus. The local marsh environment, owing to its close proximity to the coast, offered a productive combination of terrestrial and marine food resources for the region's ancient inhabitants. Sites such as LAN-705 and LAN-2630 appear to have functioned as temporary use camps involved in the exploitation of available estuarine resources.

And finally, our investigations at LAN-705 developed a means of differentiating cultural from noncultural deposits on the CSULB campus. Studies at LAN-705 demonstrate that small sites contain ample data for addressing topical scientific questions of importance.

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