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Craft Production and Landscape at the Early Bronze Age Settlement at al-Lajjūn, Jordan

Introduction

In 2003 the University of Minnesota Duluth — Early Urbanism Project (UMD–EUP) began a long-term research project to examine craft and agricultural production in the urban Early Bronze Age from a landscape perspective. The inaugural season focused on the Early Bronze Age settlement of al-Lajjūn located on the Karak Plateau in south-central Jordan. The 2003 crew counted pottery, chipped stone, and ground stone artifacts along transects in four surface areas to test whether evidence of craft production could be located and whether the final stages of production were nucleated or dispersed within the settlement. The distribution of chipped stone manufacturing debris provided the best evidence for the location of production, because little ceramic or ground stone production debris was present in the survey areas. Debitage was present in low numbers in all four areas sampled with a spike in one area suggesting that low intensity chipped stone tool production occurred across the site and higher intensity production occurred in at least one nucleated context. The paucity of ground stone or ceramic production debris indicated that off-site survey or excavation will be required to understand the organization of production for these items.

A Landscape Approach to Urbanism at al-Lajjūn

The population aggregation that led to the first urban society during the Early Bronze Age in the southern Levant was followed by a period of disaggregation and urban abandonment (Palumbo 2001; Philip 2001). Excavations (Amiran 1978; de Miroschedji 1999; Rast and Schaub 2003), synthetic analyses (Chesson 1999; Esse 1991; Joffe 1993), studies of craft production and exchange (Falconer 1987; Jones 1999; Schaub 1987; Watts *et al.* 2004), and survey data (Betts 1998; Broshi and Gophna 1984, 1986; Falconer and Savage 1995; Gophna 1995; Greenberg 2001; Harrison 1997; Ibrahim *et al.* 1976, 1988; Mabry and Palumbo 1988; Mattingly 1996; Miller 1991; Palumbo *et al.* 1990) have incrementally added to our understanding of the economic, political, and social organization of the urban period.

The broad goal of the University of Minnesota Duluth Early Urbanism Project (UMD – EUP) is to integrate economic and ideational approaches to archaeological data to underscore the complex interplay of meanings embedded in landscapes (Wilkinson 2003: 219). While making a living, people imbued their surroundings with cognitive dimensions of religiosity and ideology. In the Early Bronze Age, population aggregation and the construction of fortification walls around many larger settlements likely necessitated changes in the organization of labor and the scheduling of tasks. At the same time, people moved across the landscape to tend annual and orchard crops, to herd animals, to acquire raw materials for craft production, to exchange goods, and to visit other settlements. This pattern of intensive human investment in a localized area and land use at varying distances and intensities requires a landscape-based approach that integrates material and ideological factors.

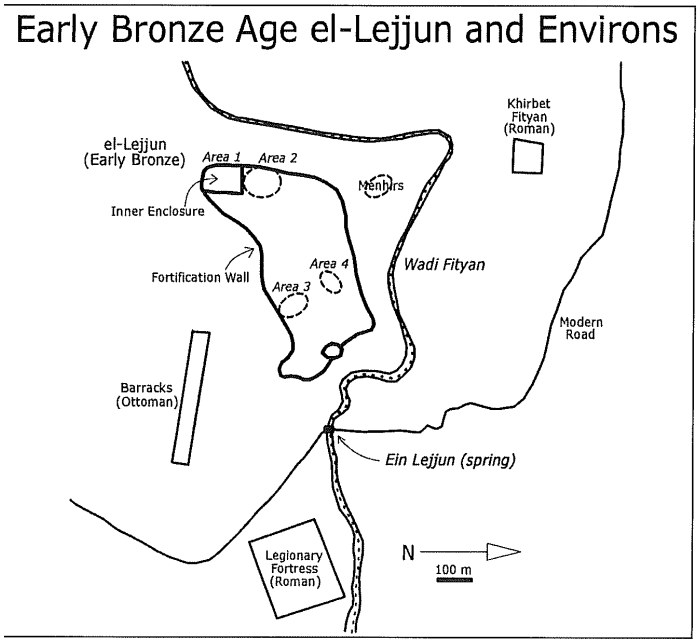
The inaugural season of the UMD-EUP tested, whether craft production occurred in dispersed or nucleated contexts within al-Lajjūn based on the premise that the concentration of production, the degree to which production was dispersed or nucleated, might differ among various crafts or for individual stages in the production of a craft item (Costin 1991). The sparse vegetation covering the site, single period of occupation, and high visibility of surface artifacts presented an opportunity to test whether production loci could be identified from

surface artifacts. The field methodology in 2003 included two components: a non-random inspection of the surface architecture across the site and counting pottery, chipped stone, and ground stone within the settlement to determine the density of artifacts and production debris. Although the larger goal of the project is to reconstruct where craft and agricultural production occurred across the landscape, we concentrated the bulk of our efforts during this first season inside the settlement.

Early Bronze Age al-Lajjūn

The Early Bronze Age site of al-Lajjūn (JADIS #2307-001) is located in south-central Jordan between the modern towns of al-Karak and al-Qaṭrāna (UTM East: 772300, UTM North: 3459600). The site sits along a ridge top with a precipitous drop on the northern and western sides to the Wādī al-Fityān and a perennial spring and small creek to the east (FIG. 1). The area has attracted settlement intermittently over the millennia: Paleolithic flints, a Roman/Byzantine legionary fortress, Ottoman period barracks, and modern era burials occur in the near vicinity. Site size estimates for Early Bronze Age al-Lajjūn vary from 10-11 hectares based on a GPS generated site map (Chesson 2001: 4) to 14 hectares based on previous survey estimates (JADIS).

Architectural elements visible on the surface included a fortification system, an inner enclosure wall in the southwestern corner of the settlement, discontinuous wall segments across the site, and a line of 17 menhirs of unknown date. The fortification system incorporated a one meter thick encircling wall with a series of projecting rectangular towers. Spaced at irregular distances along the wall, the towers varied in width, with two along the southern side of the wall measuring 7.70m and 10.40m wide. No gates were identifiable from the surface remains, although erosion gullies and soil deposition obscure the fortification wall near the spring. Visible on an aerial photo (Parker 1987: Fig 20, p. 189) and noted by successive archaeological teams (Albright 1934; Glueck 1934; Miller 1991; Musil 1907), the inner enclosure segregated a 0.5 hectare area within the southwestern corner of the fortification wall (FIG. 1). Although the inner enclosure wall has been cited as the boundary of an "acropolis" (Albright 1934: 14; Glueck 1934: 44; Miller 1991: 102), determining the function of this area will require further information on the sequence of construction. A number of discontinuous wall segments and rock alignments were visible along the ridgeline north of the inner enclosure wall. Construction details, namely the smaller stones used and the single stone width differentiates these segments from the fortification system and inner enclosure and suggests that they may be the remnants of domestic structures. The menhir line at al-Lajjūn consists of seventeen stones, 11 upright, arranged in a north-south line outside the fortification wall that has not been altered for at least eighty years (Glueck 1934: Fig. 19, p. 45).



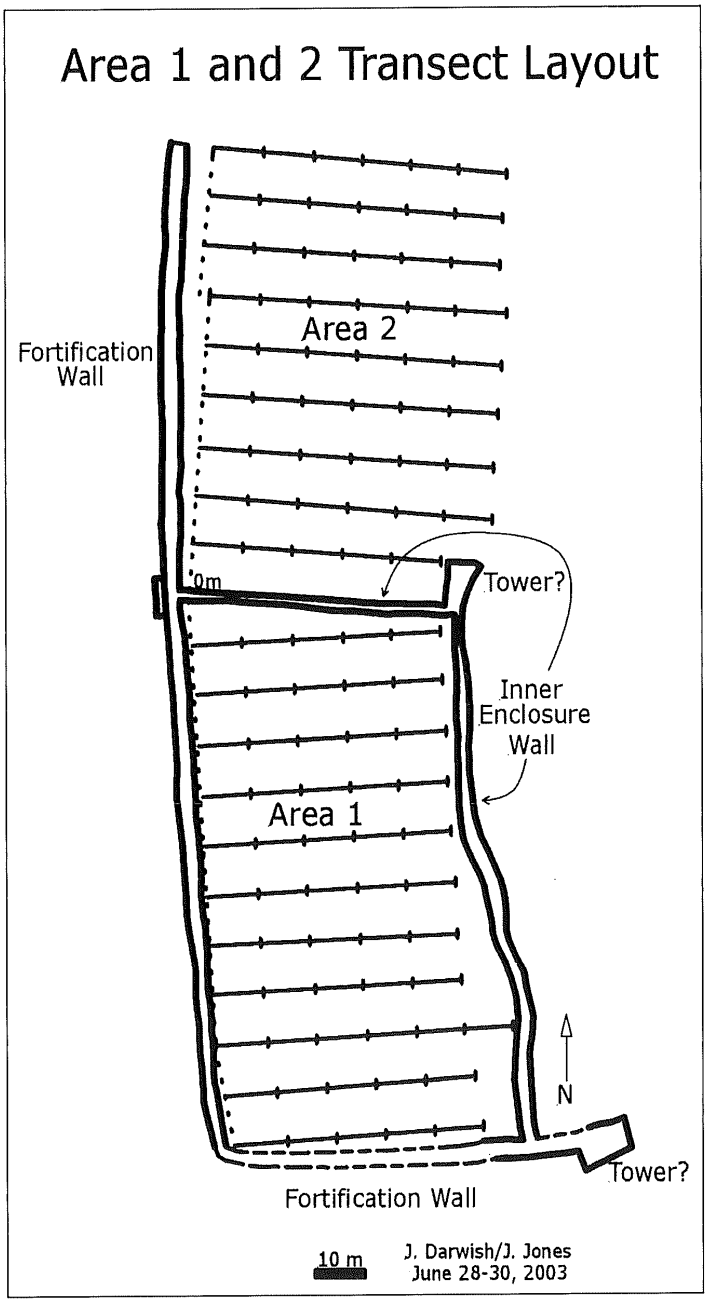
. Map showing the area around Early Bronze Age al-Lajjūn and the location of transect survey Areas 1-4 inside the fortification wall.

Published records of Early Bronze Age al-Lajjūn date back at least to 1896 and 1897 when Simeone Vailhe and Germer-Durand noted the menhir line and the similarity of the stones to nearby geological strata (cited in Brunnow and Domaszewski 1905: 38). Musil visited the menhirs in August 1896 and collected folklore from local residents that explained the origin of the stones as either the children of a mother who would not feed them bread or as the companions of a bride (1907: 36). Subsequent archaeological survey teams dated the site to the Early Bronze Age based on surface pottery, and noted the size of the settlement, the presence of the fortification wall and towers, and the inner enclosure wall (Albright 1934; Glueck 1934; Miller 1991). The first excavation at al-Lajjūn occurred in 2000 and in three test units suggested the archaeological deposits at al-Lajjūn were relatively shallow at approximately 0.40-0.60 meters deep (Chesson 2001).

Survey Methods

Determining whether craft production was dispersed or nucleated at Early Bronze Age al-Lajjūn required us to calculate the density of production debris across the settlement. The low quantity of surface material allowed us to count artifacts to calculate these densities. Arguably on a site with higher artifact densities this procedure would have been impractical. The 2003 survey team identified and counted pottery sherds, ground stone, and chipped stone artifacts in four transect areas, numbered 1-4, inside the fortification wall of al-Lajjūn (FIG. 1). The two person planning team of myself and Department of Antiquities Representative Jihad Darwish, counted artifacts along each side of transects spaced 10m apart, restarting our tallies at 10m intervals along the transect line (FIGS. 2-3). Approximately 2.5m of ground was visible on either side of a transect line, yielding 50m^2 of coverage per each 10m interval. Artifact counts on each side of a transect line were combined per each ten meter segment of a transect line for the data analysis portion of this study.

The square meters covered in each area, the number and length of each transect, and an assessment of transect visibility are listed in TABLE 1. A total of 9,050m^2 of surface area was examined during the survey which represents 6.5% - 9.1% of the surface area of a 10-14 hectare site. The transect areas were selected judgmentally to sample different portions of the site: Area 1 within the inner enclosure, Area 2 extending northeast from the inner enclosure, and Areas 3 and 4 in the eastern portion of the site where little surface architecture was visible (FIG. 1). The size of each area was determined by the time allotted to the survey work. Transects were laid out over the entire area inside the inner enclosure and a similar sized area was surveyed in Area 2. Surveying additional transects in Areas 3 and 4 would have been desirable but the time allotted for the fieldwork had expired.



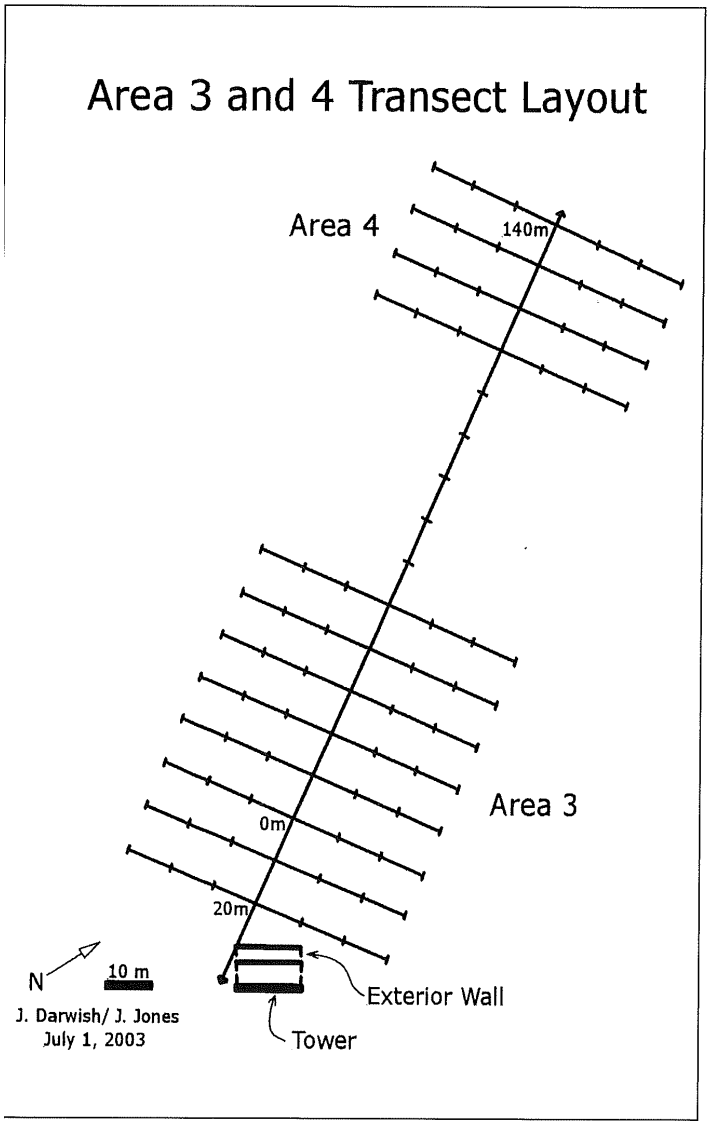
2. Location and layout of survey Areas 1 and 2.

Survey Data and Artifact Descriptions

The presence of ceramic, ground stone and chipped stone artifacts at al-Lajjūn allude to the expected suite of Early Bronze Age activities including the harvesting of crops, and food preparation and consumption. Chipped stone debitage provided the best evidence for the location of craft production at al-Lajjūn because no evidence for ceramic or ground stone production was identified in the surveyed transects. Ceramic counts and densities were used to evaluate whether artifact distributions in the four surveyed areas resulted from where crafts were produced or where garbage was disposed, a topic that is discussed in greater detail in a subsequent section.

Pottery

Nearly all of the ceramics enumerated at al-Lajjūn in 2003 were Early Bronze Age in date. No Early Bronze IV sherds were identified contrary to previous claims (Miller 1991) although we examined only part of the site and Early Bronze IV material may be present elsewhere. The sherds in the transect areas were heavily eroded and consisted



3. Location and layout of survey Areas 3 and 4.

mainly of undiagnostic body pieces. Ceramic collection by previous survey teams undoubtedly has impacted the presence of diagnostic pieces in the surface assemblage. The survey team counted all sherds larger than 1cm in size. The density of ceramics in the survey areas varied from a low of 0.22 sherds per m^2 in Area 2 to a high of 0.30 per m^2 in Area 3 (TABLE 2). Areas 1 and 4 contained similar densities of ceramics at 0.28 per m^2 and 0.27 per m^2 respectively.

Ground Stone

Ground stone tools at al-Lajjūn were produced from black vesicular and non-vesicular basalt. Known local sources of basalt include an area near Jad'a on the King's Highway approximately 19 kilometers northwest of al-Lajjūn (Koucky 1987: 38) and basalt flows 3.5-12 kilometers west of al-Lajjūn (Shawabkeh 1991: see map insert). The size of al-Lajjūn and location near a spring would suggest an agricultural subsistence economy, yet the surface ground stone assemblage was sparse and fragmentary. The only complete tools among the 120 ground stone artifacts were a hand stone and one small quern. The ground stone counts from each survey area are shown in TABLE 3 with the densities transformed by multiplying by 400 to yield more comprehensible quantities. The transformed densities range from lows of 1 and 1.32 fragments per $400m^2$ in Areas 4 and 3, to highs of 4 and 12 fragments per $400m^2$ in Areas 2 and 1, respectively (TABLE 3).

TABLE 1. Transect Areas, Square Meters Covered, and Transect Visibility.

Area	Square meters covered	Visibility
Area 1	2,750m^2 (11 transects of 50 meters each * 5m of visible area)	Moderate. Ground heavily covered with stones 0.10-0.20m in size. Possible domestic architecture visible.
Area 2	2,700m^2 (9 transects of 60 meters each * 5m of visible area)	Good. Some coverage of stones 0.10m in size but less densely than Area 1. Possible domestic architecture visible.
Area 3	2,400m^2 (8 transects of 60 meters each * 5m of visible area)	Good. Some coverage of stones 0.10m in size, especially in southern half of transects. Little domestic architecture visible.
Area 4	1,200m^2 (4 transects of 60 meters each * 5m of visible area)	Very good. Light coverage of naturally occurring chert gravel but few larger stones. Little domestic architecture visible.

TABLE 2. Count and Density of Ceramics by Area.

Area	Ceramic Count	Ceramic Density	Ceramic Density per 100m^2
Area 1	770	0.28/m^2	28
Area 2	581	0.22/m^2	22
Area 3	711	0.30/m^2	30
Area 4	326	0.27/m^2	27
Total	2388		

TABLE 3. Count and Density of Ground Stone Artifacts by Area.

Area	Ground Stone Count	Ground Stone Density	Ground Stone Density per 400m^2
Area 1	81	0.29/m^2	12
Area 2	28	0.10/m^2	4
Area 3	8	0.033/m^2	1.32
Area 4	3	0.025/m^2	1
Total	120		

Chipped Stone

The chipped stone artifacts at al-Lajjūn included flake and blade tools and debitage. Flakes, utilized flakes, flake tools, blades, and debitage larger than 1cm were counted during the survey. Utilized flakes were counted separately from flake tools because a large number of flakes observed in the initial field walkover had few or no retouch scars. For this analysis, utilized flakes exhibited three or fewer retouch scars while a tool had more than three scars. Utilized flakes and flake tools were likely used for similar suites of activities that included cutting and scraping and the greater number of retouch scars may have resulted from either longer use, the need for a sharper tool, or from cutting harder substances. Triangular in cross section, 150 out of 381 utilized lithics were blades, representing 39% of the items in this category. Debitage included a range of pieces from flakes missing a bulb of percussion to shatter.

The following analysis focuses on the density and distribution of debitage as a key indicator of the location of production. Debitage accounted for the vast majority of chipped stone artifacts and comprised between 76% - 85% of the assemblage in Areas 1-4 (TABLE 4). The density of debitage was lowest in Area 1 with a transformed equivalent of 8 pieces per 100m^2 and highest in Areas 3 and 4 with 31 and 21 pieces per 100m^2 respectively (TABLE 4). Isopleth maps of the density of debitage in each survey area show the higher artifact densities in Areas 3 and 4 (FIG. 4). The density of utilized flakes, blades and tools was low in all transect areas, equivalent to 3-7 pieces per 100m^2 (T 4).

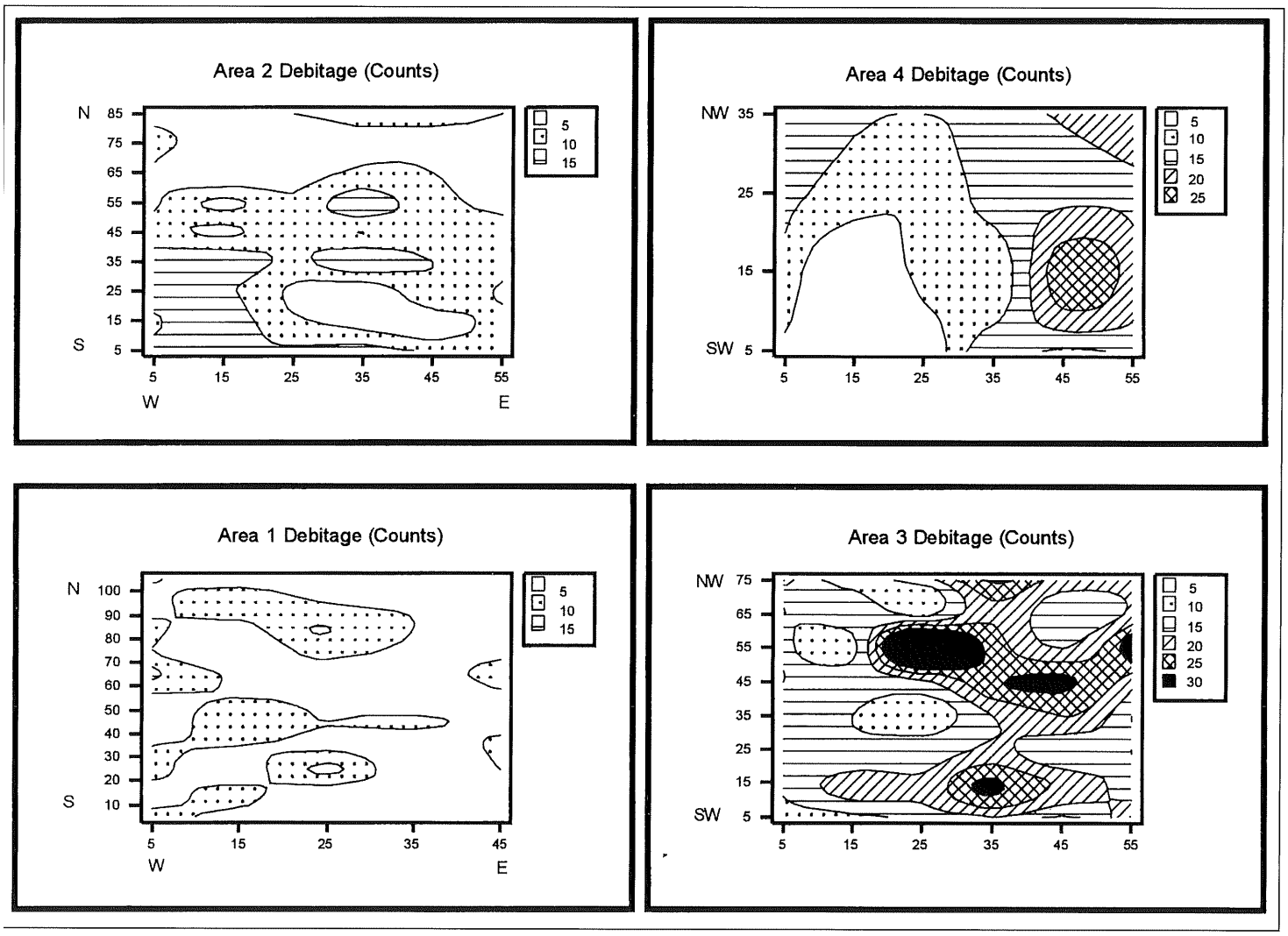
The Concentration of Craft Production

The deposition of ceramic, chipped stone, and ground stone artifacts at al-Lajjūn likely resulted

TABLE 4. Count and Density of Chipped Stone Artifacts by Area.

Area	Count of Utilized Flakes, Blades and Flake Tools(1)	Debitage(2) Count	Total Lithic Count	Density of Utilized Flakes, Blades and Tools per 100 m^2	Density of Debitage per 100m^2	Density of Total Lithics per 100m^2
Area 1	73	226	299	3	8	11
Area 2	87	369	456	3	14	17
Area 3	176	749	925	7	31	38
Area 4	45	255	300	4	21	25
Total	381	1599	1980			

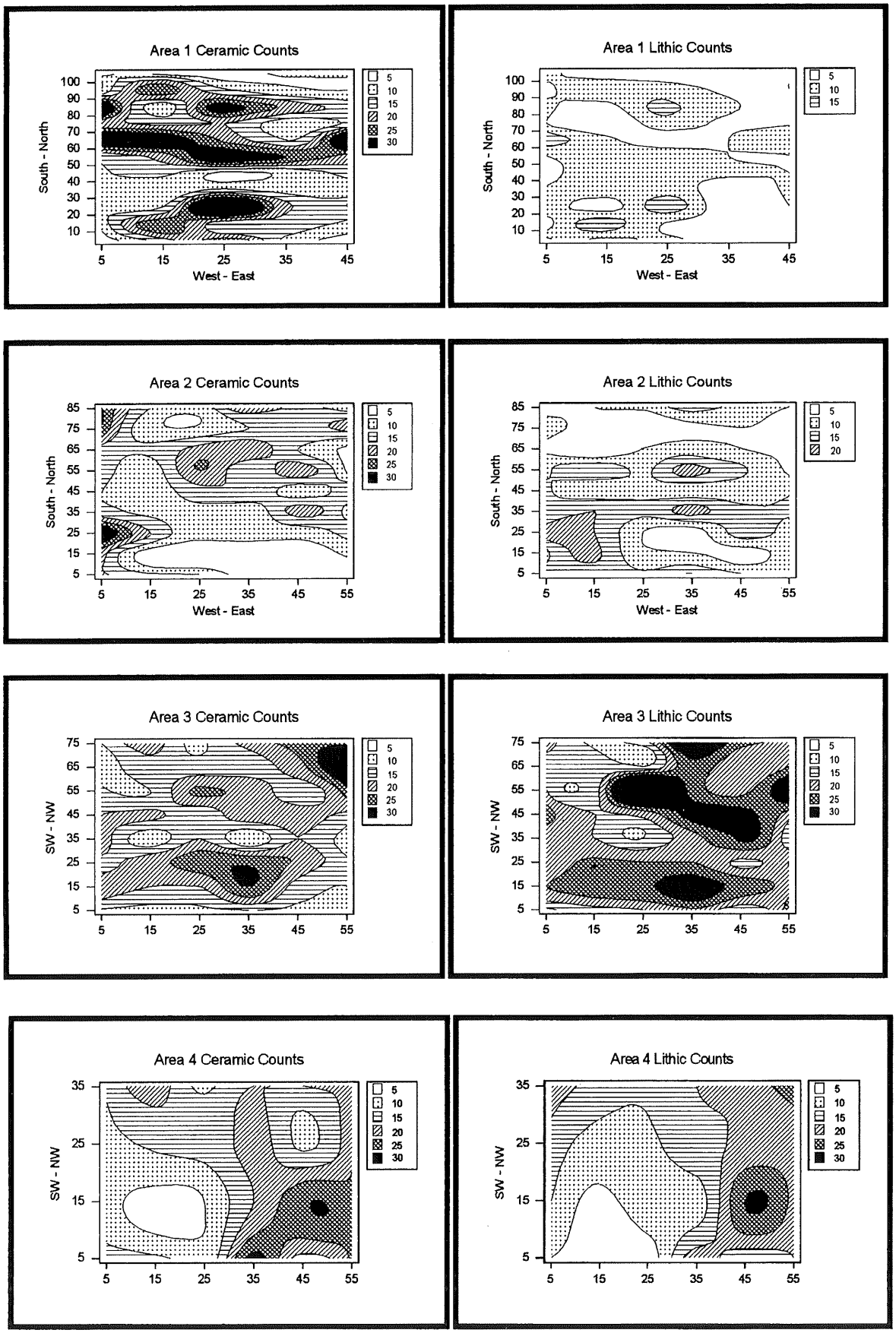
(1) Blades, flake tools and utilized flakes were combined into a single category for this analysis since their distribution represents use and disposal contexts rather than production contexts.
(2) Unutilized flakes and all other debitage combined.



4. Distribution of Debitage in Transect Areas. The transect are laid out in their geographic relative to one another.

rom a combination of use, disposal, and produc- ion contexts. Disentangling these contexts is chal- enging based on surface collected material but he artifact counts indicate that certain parameters an be narrowed. For example, the lack of ceramic roduction debris and ground stone shaping flakes uggests that these items were not produced in the ransect areas and that the distribution of ceram- cs and ground stone fragments reflects a combi- ation of use and/or disposal activities rather than roduction. In contrast, the location of chipped tone debitage likely represents a mix of disposal nd production contexts rather than use contexts. he mix of depositional contexts represented in the urface artifacts at al-Lajjūn is inferred here based n a judgmental assessment of the degree to which he peak counts of ceramic and lithic artifacts over- ap in each of the four survey areas. If ceramic and ithic distributions were primarily the result of dis- osal patterns and the inhabitants disposed of gar- age from a variety of activities in a given midden, then we would expect the peak counts of ceramics and lithic debitage to overlap in the same locations within transect areas.

Isopleth plots illustrate the ceramic and lithic counts within each transect area (FIG. 5: a-h). Total lithic counts are plotted rather than debitage alone. Comparing the ceramic and lithic plots for each area shows that the peak counts for the two artifact types do not consistently overlap in a given survey area. High ceramic counts in the bottom center of Area 1 overlap with peak counts of lithics, but three other locations with high ceramic counts do not overlap with correspondingly high lithic counts (FIG. 5:a-b). Peak counts of ceramics in the lower left portion of Area 2 occur in the same location as high lithic counts, but one area of high ceramic counts in the upper left portion of Area 2 and high lithic counts in the center of Area 2 do not correspondingly overlap (FIG. 5:c-d). In Area 3, high ceramic and lithic counts in the lower center and upper right portions of the plots overlap, while a



5. Distribution of artifacts within transect areas showing the location of peak counts for ceramics and chipped stone lithics: a) Area 11 Ceramic Counts; b) Area 1 Lithic Counts; c) Area 2 Ceramic Counts; d) Area 2 Lithic Counts; e) Area 3 Ceramic Counts; f) Area 3 Lithic Counts; g) Area 4 Ceramic Counts; h) Area 4 Lithic Counts.

arge area with high lithic counts in the center of the ırea does not correspond with high ceramic counts FIG. 5:e-f). In Area 4, peak ceramic counts in the ower right portion of the plot overlap with peak ithic counts (FIG. 5:g-h). The contrast in the loca- ion of peak counts for ceramics and lithics in Ar- :as 1-3 hints that the distribution of these artifacts nay not be solely related to disposal patterns.

Based on the current data, the location of pro- luction for chipped stone tools is inferred at al- Lajjūn where peak counts of debitage occurred in he survey areas. Debitage was found in all four ransect areas with notable concentrations in Areas 3 and 4. Debitage counts for Areas 1 and 2 range rom 0-14 pieces with the bulk of these two areas ıaving 10 or fewer pieces of debitage per 10 meter ransect section (FIG. 4). Areas 3 and 4 present a tark contrast with three peak counts above 24 and ɔne count above 40 in Area 3 and one peak concen- ration of 25 pieces in Area 4 (FIG. 4).

The distribution of lithic debitage at al-Lajjūn uggests a largely dispersed pattern of lithic pro- luction across the settlement with greater intensity ɔr duration of production in portions of Areas 3 ınd 4. This pattern supports a model in which both lispersed and nucleated production occurred at the ite. Alternative possibilities include functional lifferences in the activities carried out within the urveyed portions of the site or chronological dif- erences in the occupation of these areas but testing hese alternatives will require broad-scale excava- ions. The possibility that chipped stone tool pro- luction occurred in both nucleated and dispersed ocations at al-Lajjūn caution against a linear as- ociation between the development of urban soci- ties and specialized craft production. The timing ınd pace of the adoption of specialized production n the urban Early Bronze Age and the variability n the degree of specialized production across a va- iety of crafts will require excavation at al-Lajjūn ınd material resource surveys around the site.

Conclusions

Early Bronze Age al-Lajjūn holds great promise or illuminating issues related to craft production n early urban societies. A landscape approach is equired to understand work and craft production ɔecause tasks occurred across the landscape based ɔn the location of raw materials and the location ɔf different stages of production. Different strate- ;ies will be required to elucidate the location of the stages of production for different crafts. For example, excavation at al-Lajjūn may provide information on the location(s) of production based on lithic micro-debitage and ceramic production debris. Off-site survey and compositional sourcing of temper and clay will likely be required to address the issue of dispersed or nucleated production of ceramics. Compositional testing and survey of basalt flows on the plateau will be required to determine how precisely the source materials can be located and the location of initial ground stone shaping.

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