Studies on the Early Paleolithic site of Melka Kunture, Ethiopia - 2004: 599-635.

Prehistoric archaeology. The site of Garba IV

Spatial analysis of the lithic material from Level D

Rosalia Gallotti[1], Marcello Piperno[2]

Paleosurface D, the richest level in the Garba IV deposits, appears as a carpet of lithic artefacts and faunal remains embedded in sediments composed of sand and fine gravel and numerous unmodified pebbles. The area that was excavated systematically extends for about 100 square metres, and is divided into two sectors, a western (WS; Figs. 1, 2) and an eastern one (ES; Figs. 3, 4), since erosion caused by a tributary of the Awash River destroyed the central part of the deposit. The total number of finds is 19055, 2580 of which are faunal remains and a coprolite localized in square 1E/3N of the WS, 6654 are pebbles showing no traces of having been intentionally modified, and 9821 are lithic artefacts.

The finds were not equally distributed horizontally over the whole surface. Zones of high concentration alternated with zones where the lithic and faunal remains were sporadic, especially in the ES. The WS, with 11988 remains, amounting to 62.91% of the total, is richer than the ES (7067 finds, 37.09%). Square 9E/6N, in the ES, contained the highest frequency of remains (735), squares 5E/1S, 7E/1S, and 10E/2N, the lowest one (1). The average is 181.6 finds per square metre (Plates 1, 2).

Two especially dense areas were found in the northern part of the ES, one near its north-east border (squares 11-12E/5-6N), the other in a strip about 2 m long and 1 m wide extending SW/NE across squares 6-9E/5N, 7-10E/6N, and 8-9E/7N, with frequencies between 224 and 735 finds. These two areas, although very close, were separated by a small zone where finds were more sparse. In the central portion of the same sector (squares 8E/3N, 8-9E/4N), another concentration of finds, but with a lower density than the previous ones, forms a small, roughly semicircular strip, also oriented SW/NE. These last two concentrations, in their turn, surround almost the entire perimeter of a zone of ellipsoidal shape (ca. 2.7 x 0.9 m) that yielded practically no finds. The south-western margin of this zone is less clear-cut, probably due to the influence of post-depositional dispersal of material that affected the whole lower half of ES, and this is especially noticeable in squares 6E/2-4N and near the south-eastern edge of the excavation (Plate 3).

The spatial distribution of finds in the WS appears more homogeneous than in the ES. Its lower half contains an extensive area characterized by a high density of finds (squares 1W/5N, 2W-2E/4N, 2W-2E/3N), the highest frequency being in square 1W/4N (674 finds). Immediately adjoining the southern edge of the excavation was a surface of 1.2 square metre, approximately round in shape, that yielded no finds at all (squares 2W/2-3N and 1W/3N). It was completely surrounded by lithic and faunal remains accumulated along the perimeter (Plate 4).

1. Archaeological Mission Melka Kunture, Largo Tito Betuzio Barra 4, 71022 Ascoli Satriano (FG), Italy. rosaliagallotti@tin.it. 2. Dipartimento di Scienze Storiche, Archeologiche e Antropologiche dell'Antichità, University of Rome "La Sapienza", Piazzale A. Moro 5, Rome, Italy. m.piperno@tin.it.

Fig. 1. Garba IV D. General view from the south of the Western Sector.

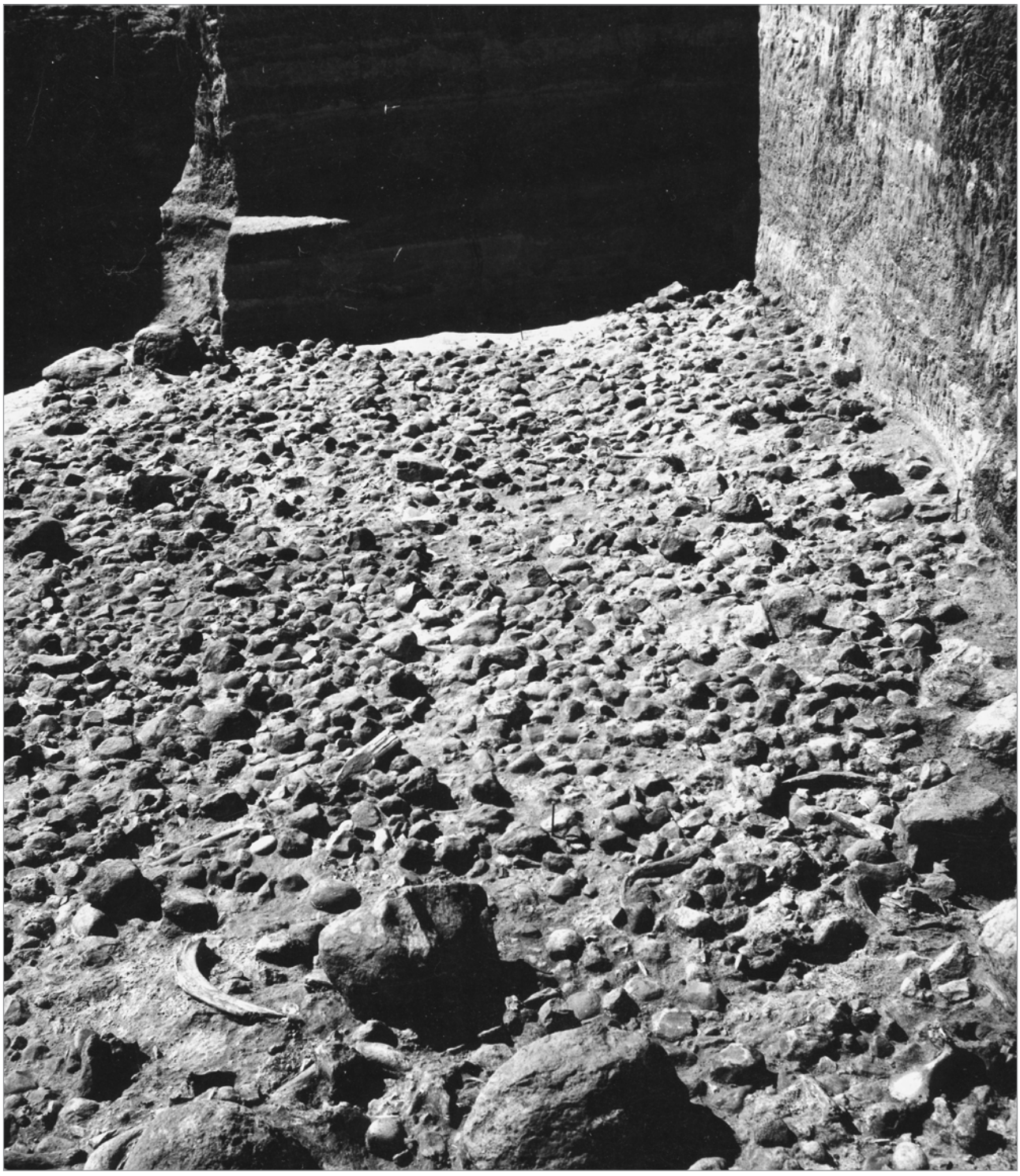

Fig. 2. Garba IV D. General view from the north of the Western Sector.

Fig. 3. Garba IV D. The Eastern Sector during excavation in 1974.

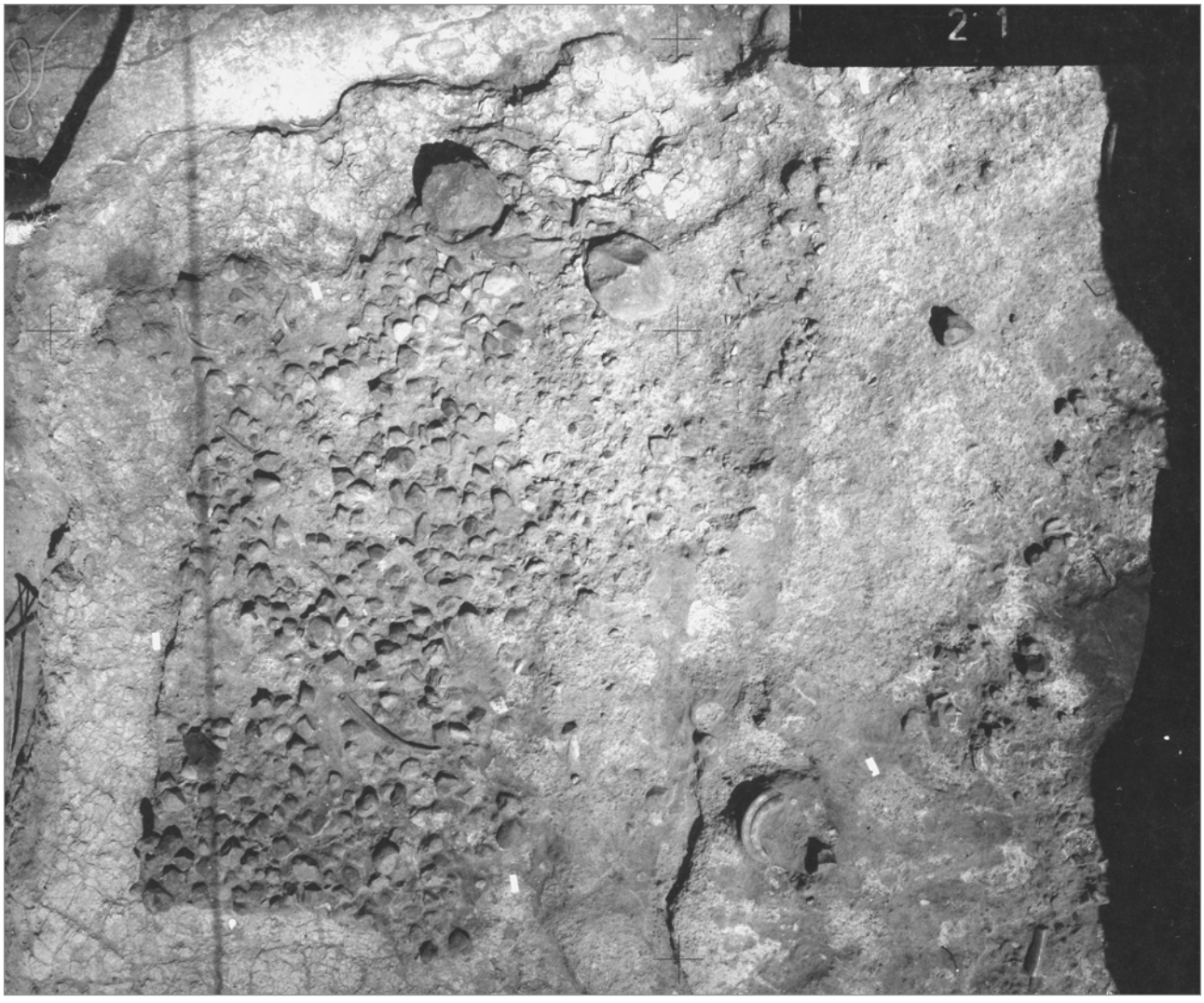

Fig. 4. Garba IV D. Photogrammetry of the Eastern Sector in 1973.

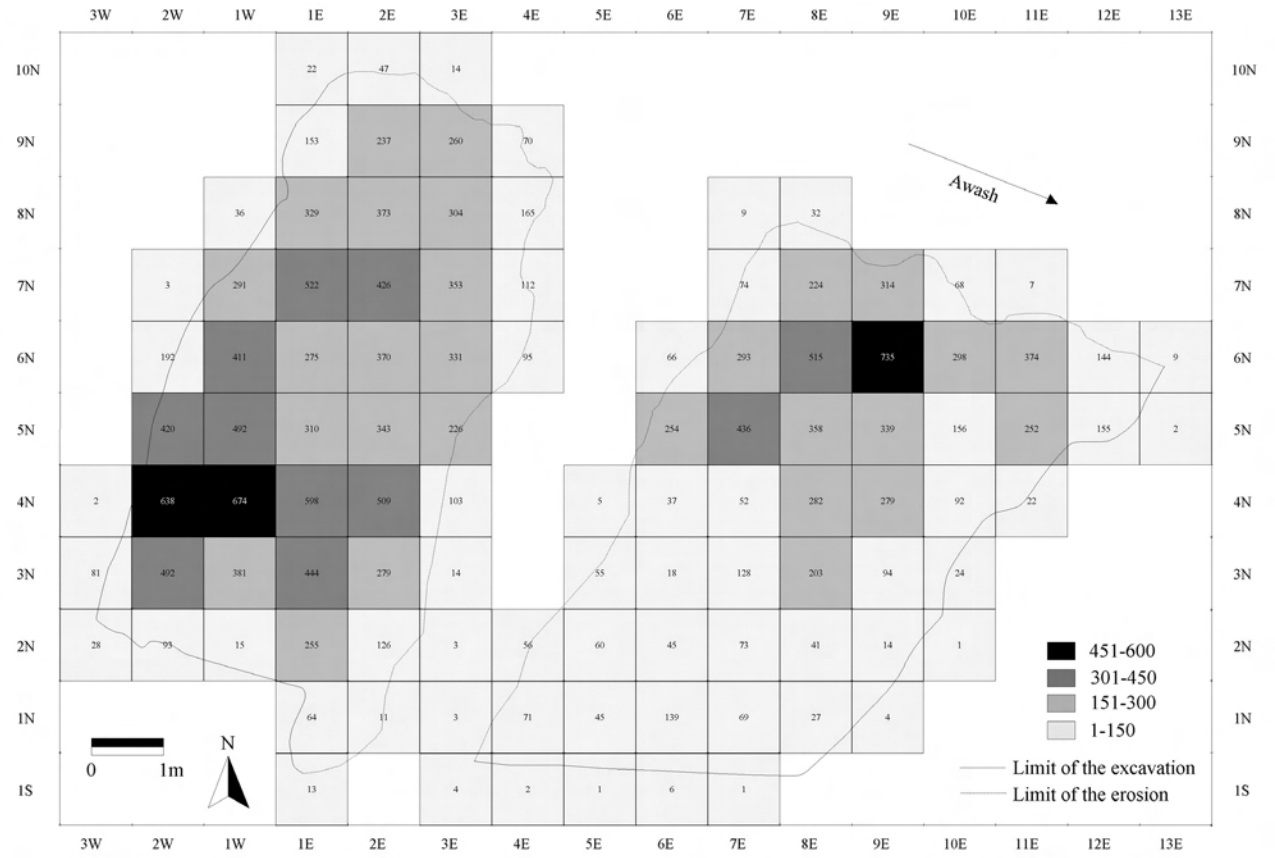

Plate 1. Garba IV D. Frequency of all the remains.

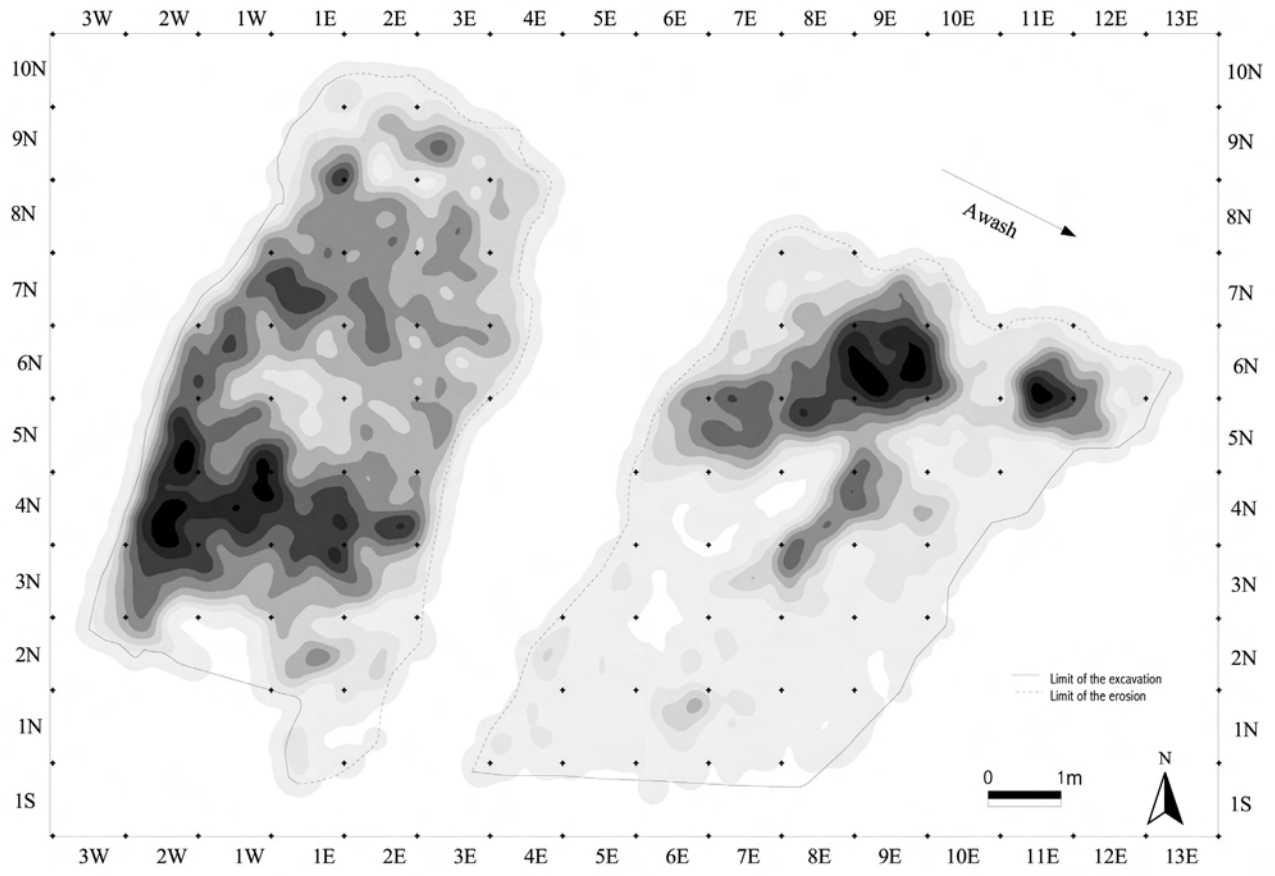

Plate 2. Garba IV D. Density areas of all the remains.

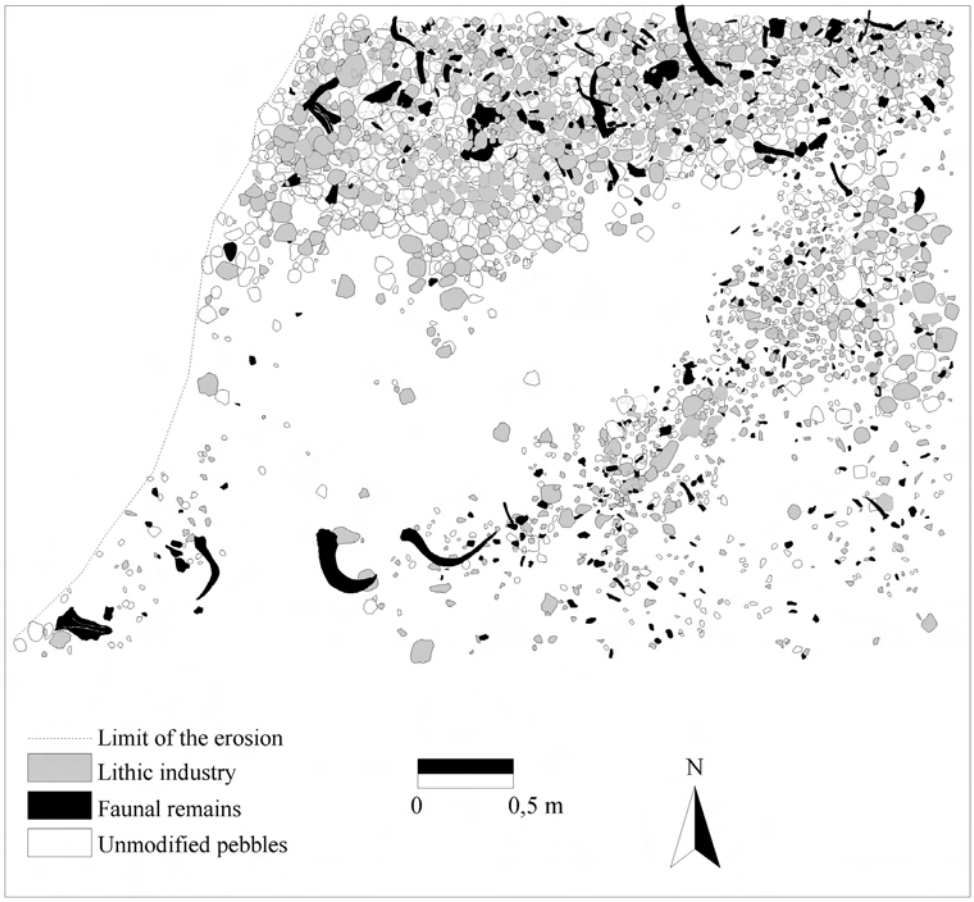

Plate 3. Garba IV D. Detail of an area without remains in the central part of the Eastern Sector.
(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)

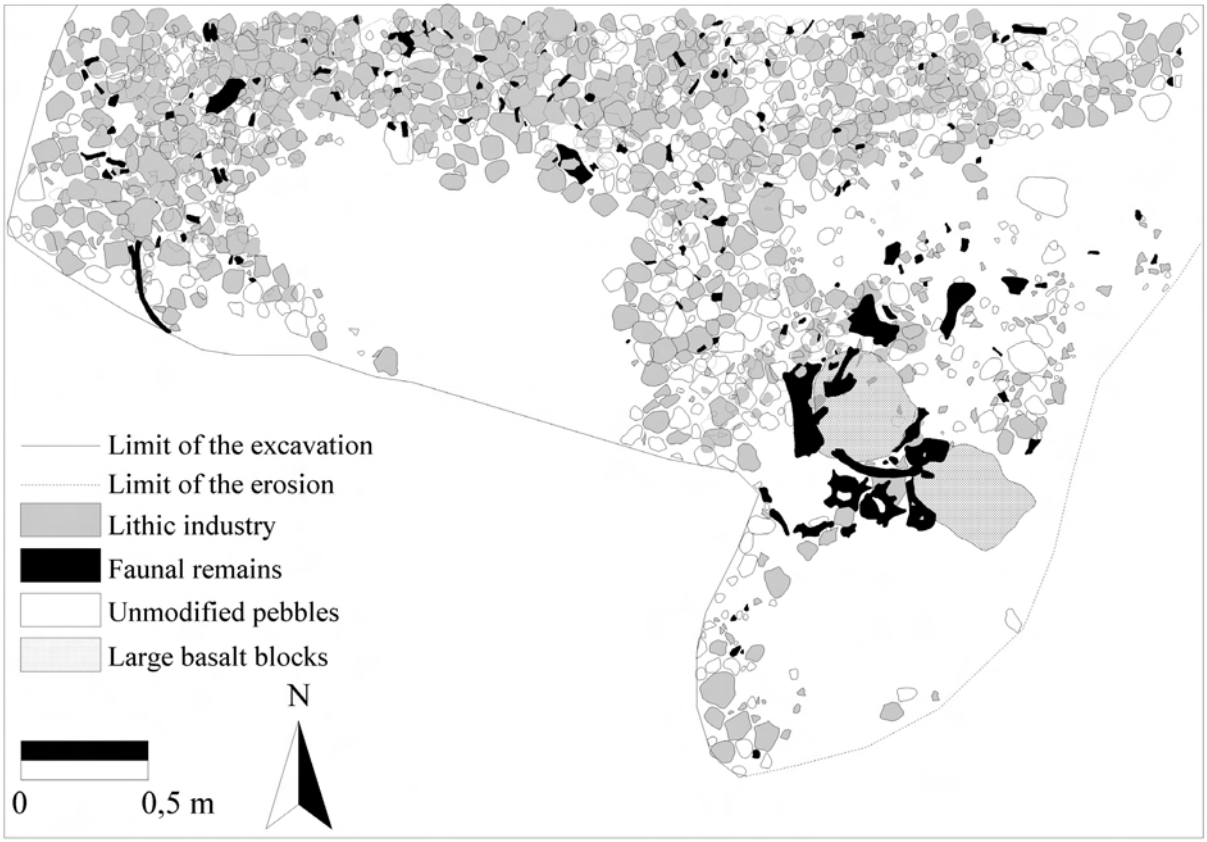

Plate 4. Garba IV D. Detail of a semicircular area without remains in the southern area of the Western Sector.
(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)

Remains became less frequent near the south-eastern edge of the WS. The upper half of WS was characterized by a more uniform distribution, with small zones with higher densities and frequencies in squares 1-2E/7N, 1E/8-9N, and 3E/9N, while in the central part of the sector (Fig. 5) frequencies were lower (squares 1W-1E/6N).

Unmodified pebbles and large blocks

As was remarked above, the whole of paleosurface D was strewn with 6654 pebbles that show no trace of use or intentional modification. They are generally of basalt or other volcanic rocks, with the exception of 9 obsidian pebbles. The WS, again, yielded more specimens (3711, 55.85%) than ES (2934, 44.15%), but the discrepancy was less than in the case of the total finds.

The zones with especially high or low concentrations of unmodified pebbles are roughly the same as those described for total finds. In this case, however, the squares with the highest densities lay in the central part of the WS, especially near the western edge of the excavation (squares 2-3-4W/4N, with 550, 513, and 479 specimens respectively; Plates 5, 6).

Since the depth of individual unmodified pebbles was not recorded, it is not possible to show their distribution. However, their horizontal distribution in various plans corresponding to different superimposed layers shows at least their relative depth compared to that of other object categories. Although we have to allow for a certain margin of error, since determination of relative depth is strongly influenced by the size of the objects, unmodified pebbles appear to be distributed evenly through the whole thickness of the layer – especially, like all the other finds, where the deposit is deepest – and not exclusively at the base of the layer (Plate 7).

A recurrent feature of paleosurface D was the presence, in several parts of the excavated area, of large blocks of basalt weighing over 15 kg, also lacking evident traces of intentional transformation. Faunal remains of especially large size (vertebrae, pelves, ribs, horn-cores, etc.) were clustered around these blocks.

In ES there were four of these large blocks, all concentrated near the northern portion of the explored area. Two lay in squares 9-10E/7N; near the northernmost of these, fragments of bovid skulls and horn-cores were especially abundant. A third block (Fig. 6), lying in square 9E/6N, was surrounded by an even higher number of remains of large and small fauna (two alcelaphine horn-cores and a skull fragment, a fragment of a hippopotamus scapula, and a suid tooth). The dispersal area of these materials, which appears to be somehow connected to this large block of basalt, extended over a surface of at least 4 square metres. A fourth block straddled squares 5-6N/12E; in front of it were not only numerous medium to small faunal remains, but also a high concentration of obsidian flakes and debris (Plate 8).

The correlation between the large blocks and the faunal remains appears even more distinctive in the WS. Two of the blocks (Fig. 7) lay in the southeast portion of the WS (squares 1E/2N and 2E/1N). They were surrounded by several hippopotamus remains (scapula and fragments of the bones of the pelvis, as well as two whole vertebrae) and fragments of bovid skulls (Plate 9). Another block (Fig. 8) lay in the east-central part of WS (square 3E/6N), but most (7) were found in its northern part (squares 1-4E/9N e 1-3E/8N). This is where the highest concentration of the remains of large fauna of the whole paleosurface D was found (Fig. 9), including numerous bovid horn-cores and skull fragments, especially Alcelaphini, teeth and large fragments of hippopotamus, and a fragment of an elephant pelvis (Plate 10).

As far as the location of the large basalt blocks is concerned, it is clear that they lie at the very bottom of the layer: no other remains were found beneath them. On the distribution plan, some of the finds

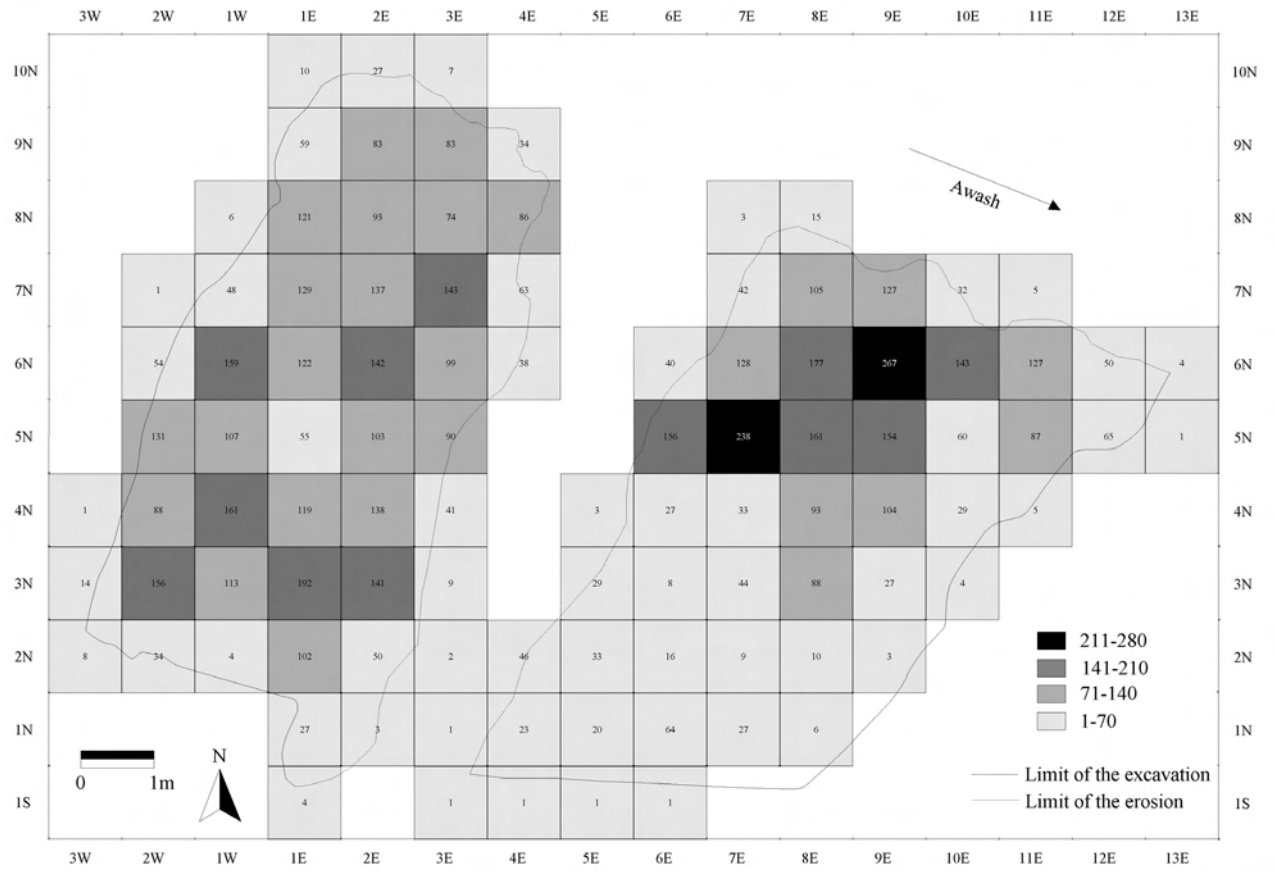

Plate 5. Garba IV D. Frequency of unmodified pebbles.

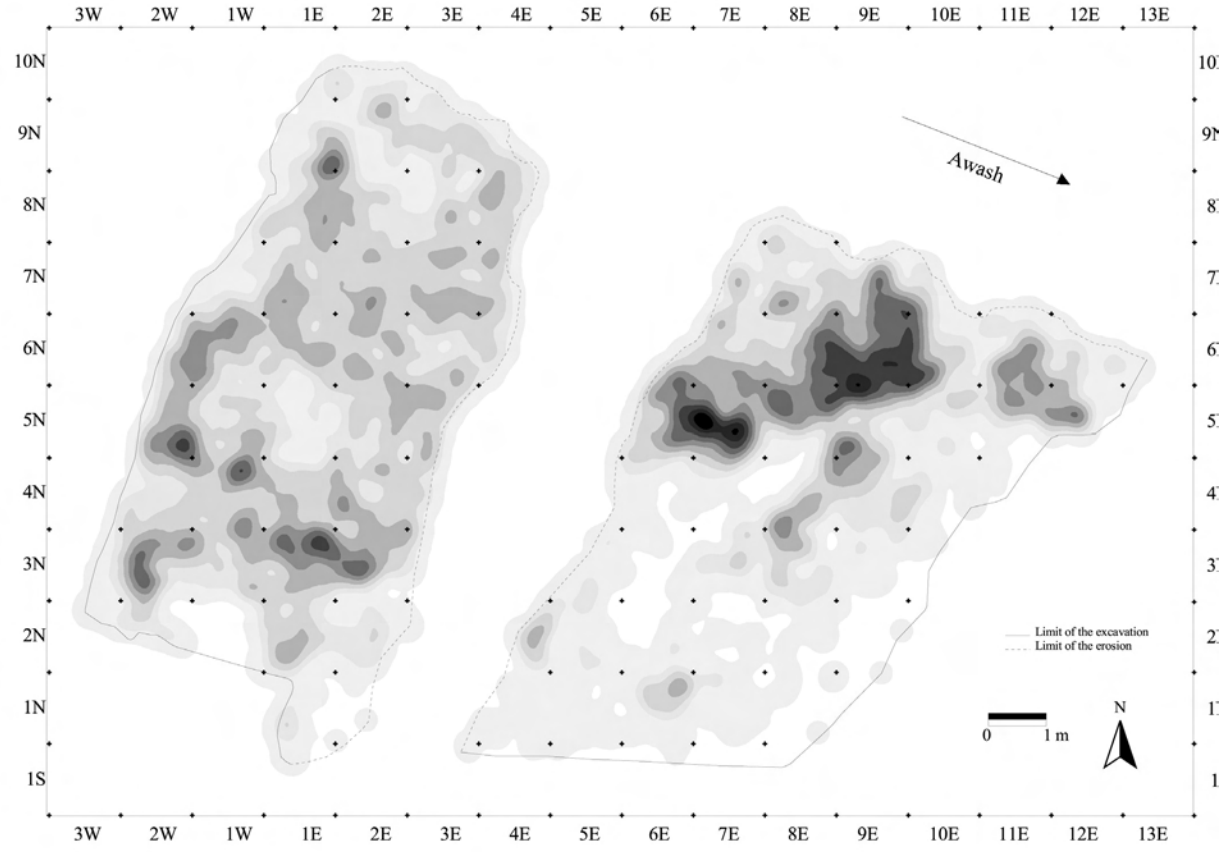

Plate 6. Garba IV D. Density areas of unmodified pebbles.

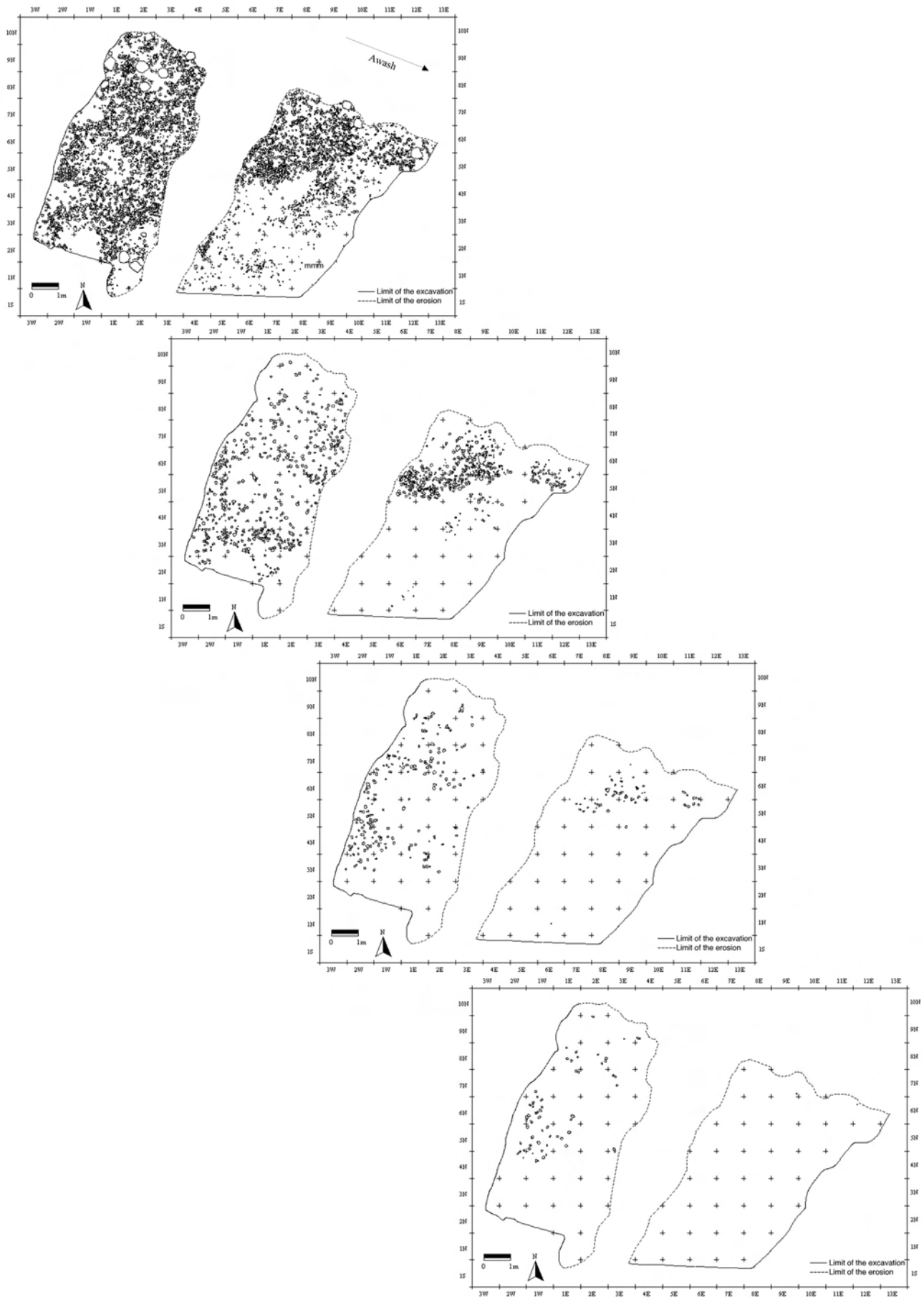

Plate 7. Garba IV D. Distribution plans of unmodified pebbles.
(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)

Fig. 5. Garba IV D. Detail of the central area of the Western Sector.

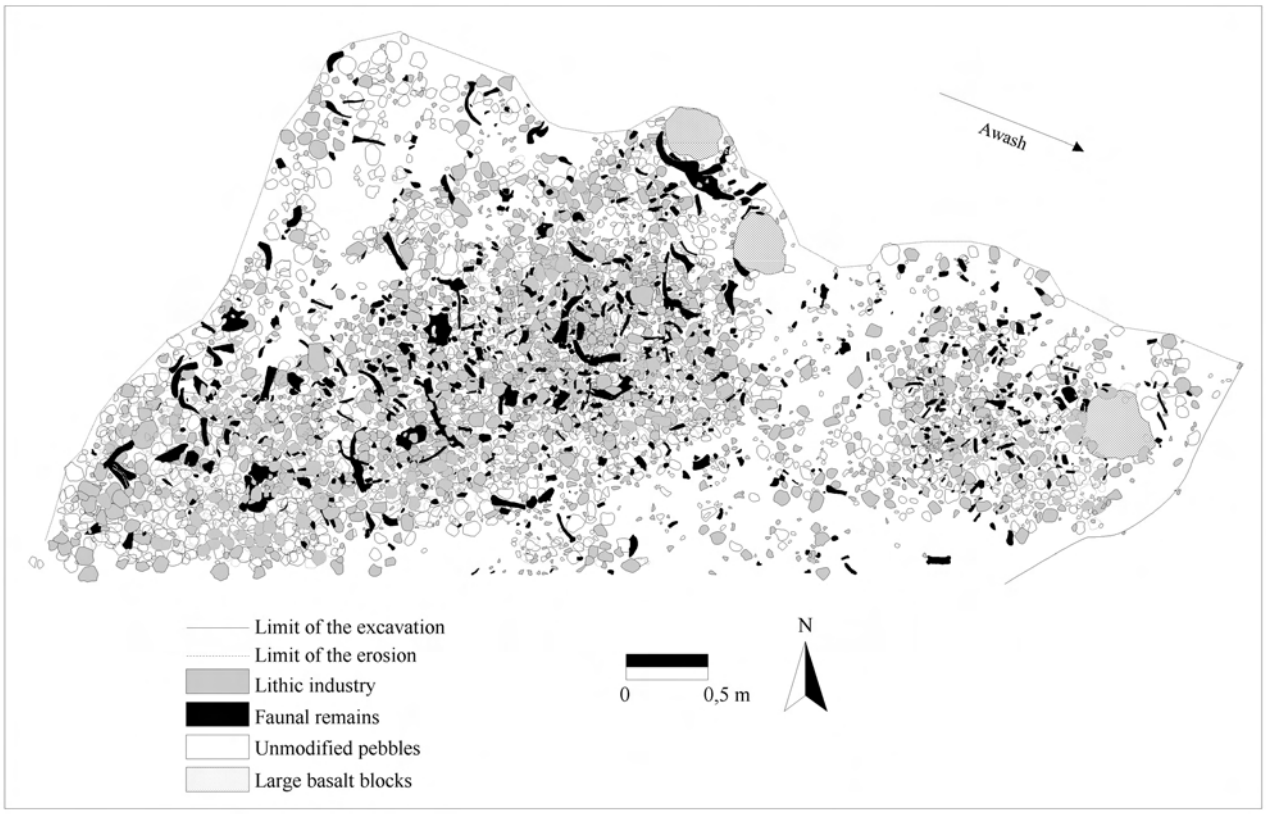

Plate 8. Garba IV D. Detail of large basalt blocks surrounded by faunal remains in the northern area of the Eastern Sector. *(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)*

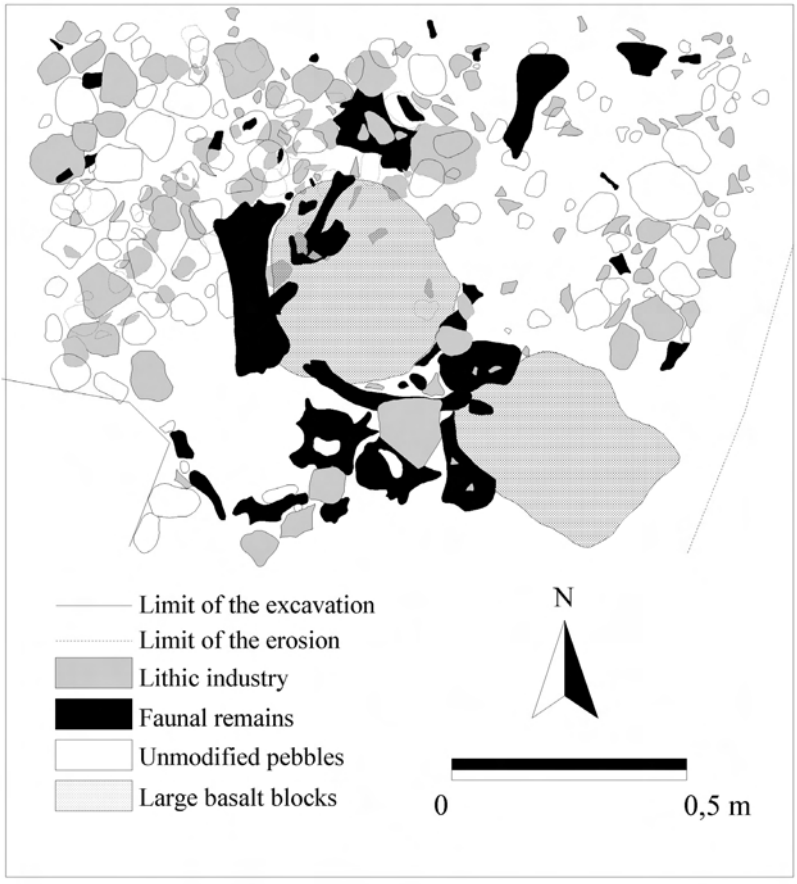

Plate 9. Garba IV D. Detail of large basalt blocks surrounded by faunal remains in the southern area of the Western Sector. *(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)*

Fig. 6. Garba IV D. A large basalt block surrounded by horn-cores and bones in the Eastern Sector (9E/6N).

Fig. 7. Garba IV D. Two large basalt blocks surrounded by bones in the southern part of the Western Sector (1-2E/2N-2E/1N).

appear to lie under their outer edges, but this is because the almost polyhedron-shaped blocks did not actually rest upon these finds.

The horizontal distribution of faunal remains and lithic artefacts is essentially the same as that of the unmodified pebbles. However, the percentage of faunal remains and lithic artefacts is comparatively higher in the WS (8295, 66.79%) than in the ES (4124, 33.21%). The areas where the highest and lowest concentrations were found are also the same; however, in this case higher frequencies are observable in squares 2W-1E/4N of the WS and in square 9E/6N of the ES (Plates 11, 12).

Unmodified pebbles are always more numerous than the faunal remains. In the ES, in the east-central part of the upper half of the WS, and near the southern edge of the WS, they are also more abundant than lithic artefacts, while in the central portion of the WS, lithic tools prevail (Plate 13).

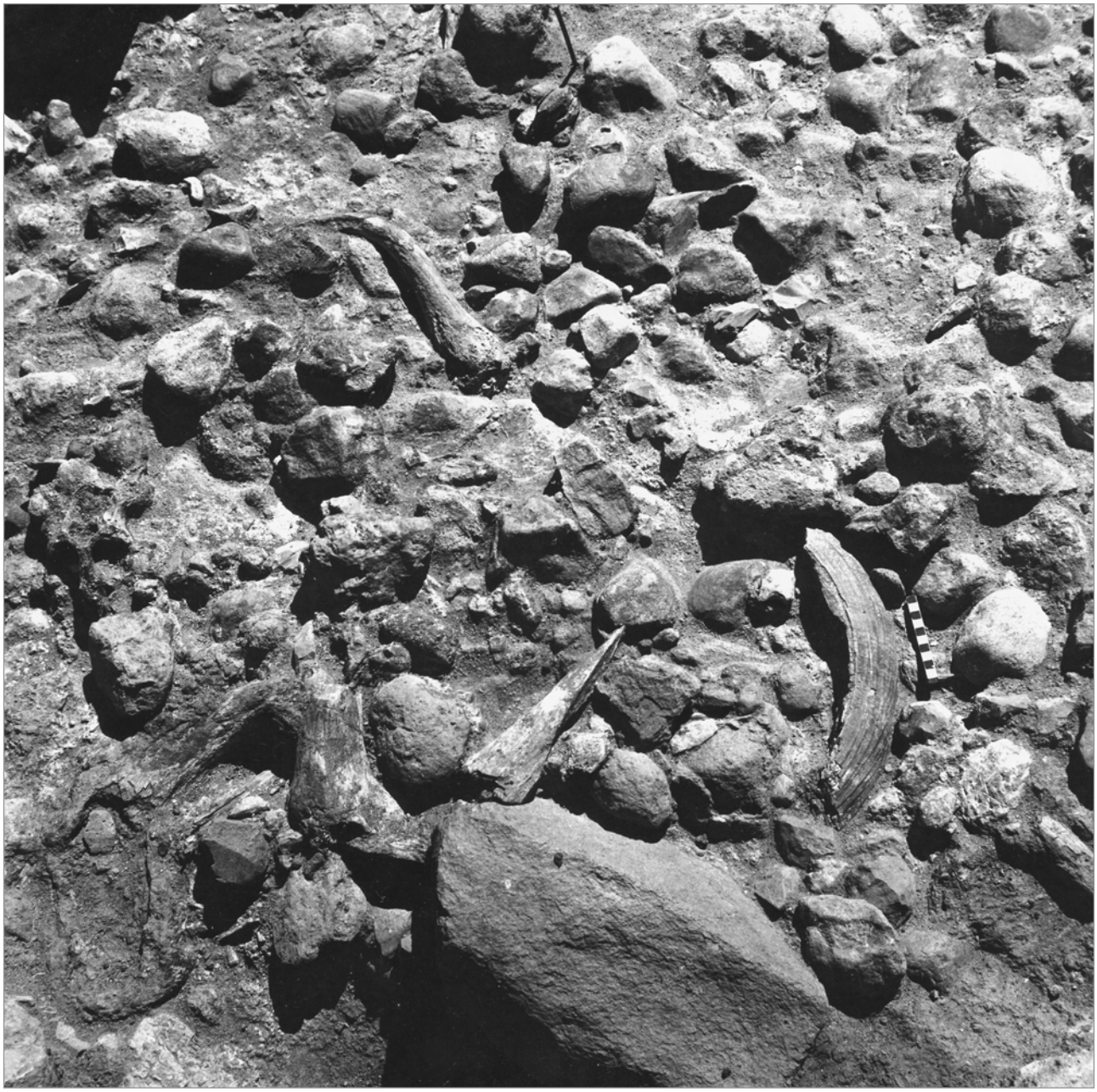

Fig. 8. Garba IV D. A large basalt block surrounded by bones in the northern part of the Western Sector (1E/8N).

Vertical distribution of finds

With regard to the vertical distribution of finds, it should be stressed, once again, that only the distribution of the lithic and faunal remains has been analyzed in detail, because of the previously mentioned lack of data on the depth of unmodified pebbles.

The paleosurface lies within a minimum depth of -98 cm and a maximum depth of -153 cm. The difference between these two depths (55 cm) does not correspond to the real thickness of the layer, since the area slopes down slightly from west to east. This slope has a remarkable influence on the general north/south section, since the maximum depth of the layer observable in its central portion is actually due to the projection of all the remains along the longitudinal axis, without taking the inclination of the surface into account. For the same reason, a sort of gap appears between squares 2-5N, where the level is, distinct into two sub-

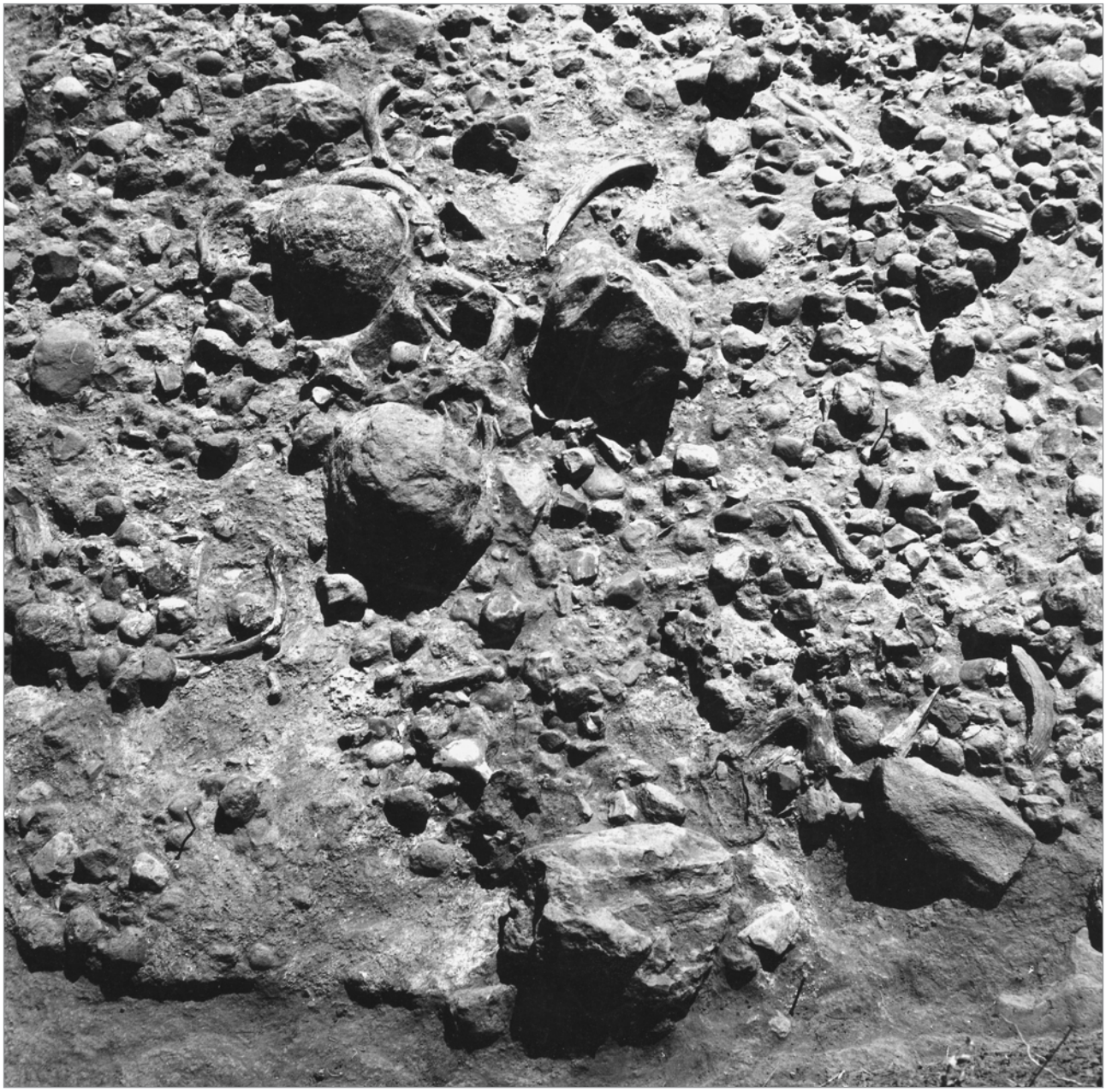

Fig. 9. Garba IV D. Large basalt blocks surrounded by bones in the northern part of the Western Sector.

levels. In fact, even this inclination, which is observable in the general east/west section, does not necessarily affect each point of the paleosurface in the same way or to the same extent (Plates 14, 15).

To make up for this inconvenience, and reduce the margin of error as much as possible, both north/south and east/west sections were subdivided into 1 m strips based on the excavation grid.

East/west sections

By dividing the section into 1 m strips, it becomes immediately evident that the inclination and depth of the layer varies from one sector and zone to the other. The layer does slope from west to east, from the WS to the ES, but in some points it appears to be almost horizontal, especially in 3-4E of strips 7-8N and 1-3E of strips 3-5N in the ES, and squares 7-10E of strip 6N in the ES.

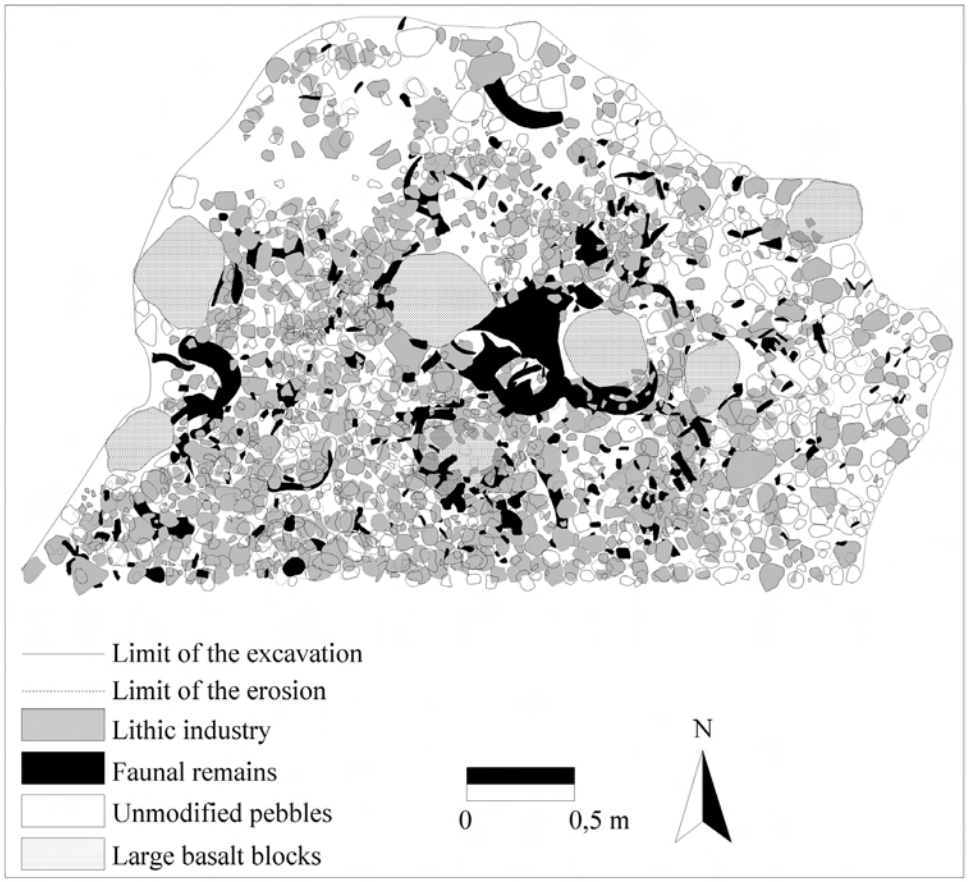

Plate 10. Garba IV D. Detail of large basalt blocks surrounded by faunal remains in the northern part of the Western Sector. *(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)*

In the southern portion of the ES (strips 1S/1-3N and squares 10-11E of strip 4N), the finds are not clustered together as on the rest of the paleosurface; rather, they appear to float in the sandy level containing the paleosurface. It is hence difficult to reconstruct the vertical layout of this zone. The inclination is inverted (E-W) only in strip 7N in the ES and in squares 8-9E of strip 4N.

In the WS, the paleosurface attains its maximum thickness (22 cm) in square 2W of strips 4-5N, near the western edge of the excavated area, while it gets thinner towards the north (strips 6-10N), the south (strips 1S/1-2N), and the east, especially in square 1E of strip 6N. The empty space in square 1W of strip 2N corresponds to the semicircular area without finds shown in the plan.

In ES, the paleosurface reached its maximum depth (18 cm) in squares 7-10E of strip 6N. In the same strip, the two zones of maximum density, one straddling squares 7-10E, the other squares 11-12E, are separated by a small zone, corresponding to the eastern half of square 10E, where remains are sparse.

In general, the deepest vertical accumulations are found in the same zones where the highest horizontal densities were observed, except in the southern portion of the ES (strips 1S/1-3 N and squares 10-11E of strip 4N), where the finds appear rather dispersed both vertically and horizontally, but are, nevertheless, distributed through the entire thickness of the layer. In squares 5-7E of strip 4N, squares 5-6N and half of square 7N of strip 3N, squares 4-6N of strip 2N, and squares 4-5 E of strip 1S-1N, no projections of the objects are shown because in this area their depth was not recorded.

The ellipsoidal area devoid of finds in the central zone of the ES (Plate 3) is not visible in the east/west sections because of its oblique inclination (SW-NE). The empty space is filled in by the perpendicular projection of the finds on the abscissa.

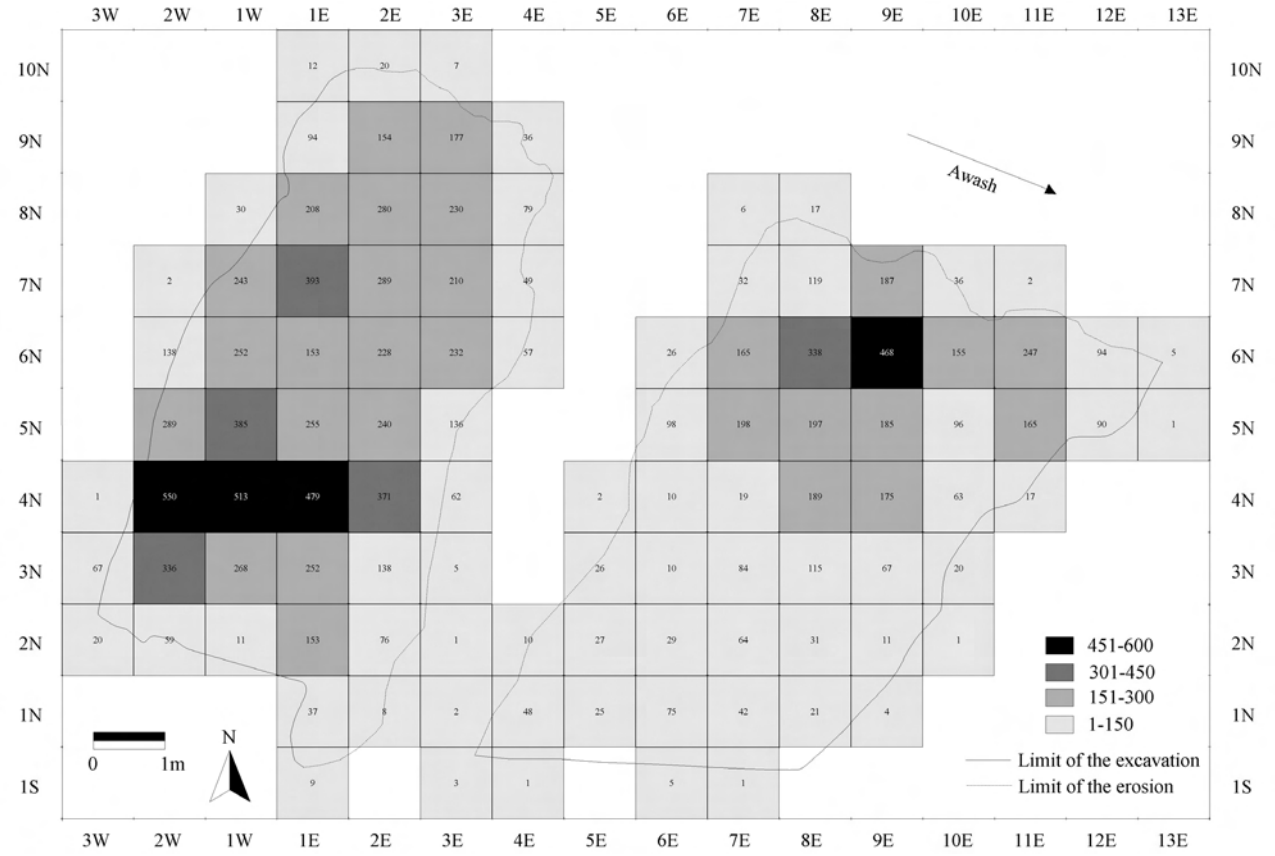

Plate 11. Garba IV D. Frequency of lithic artefacts and faunal remains.

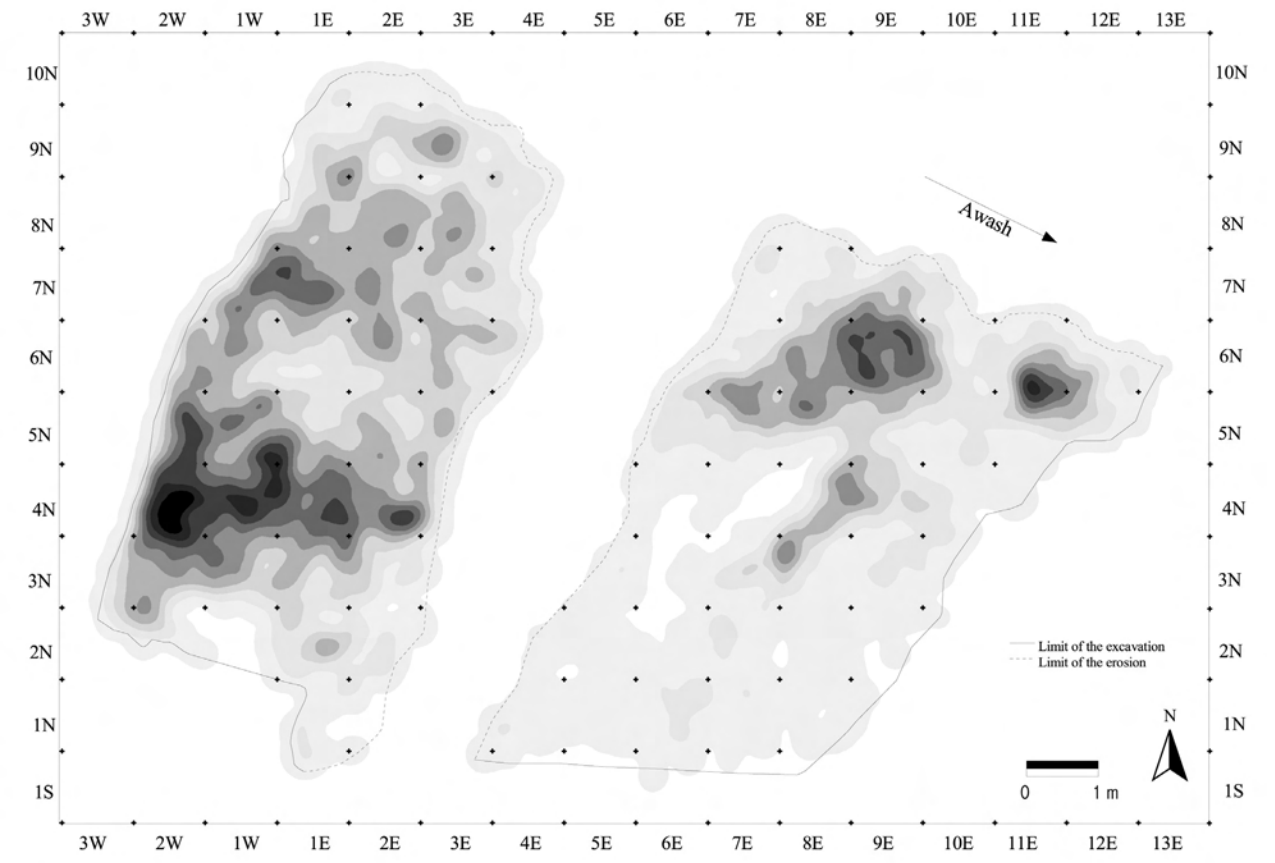

Plate 12. Garba IV D. Density areas of lithic artefacts and faunal remains.

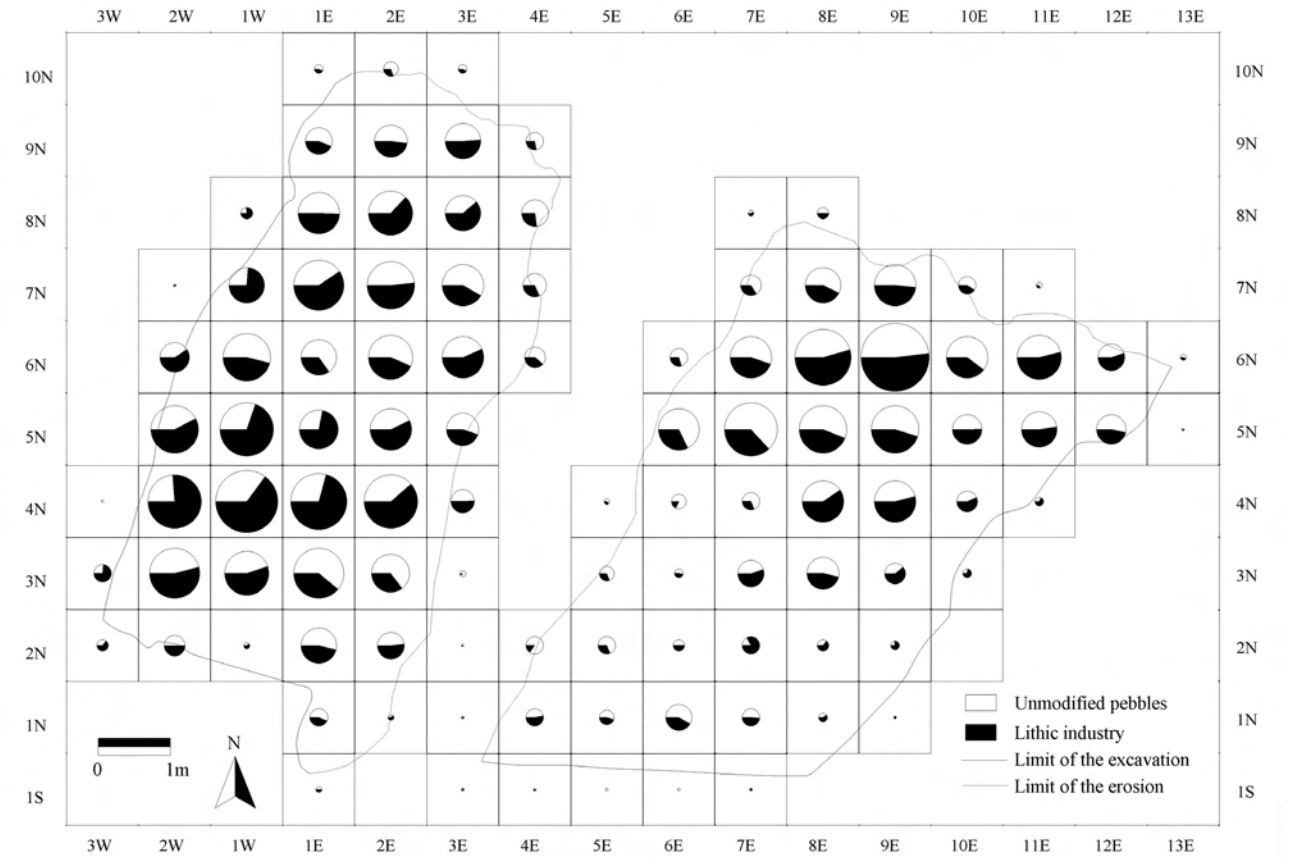

Plate 13. Garba IV D. Relationship between unmodified pebbles and lithic artefacts.

Plate 14. Garba IV D. East/west section with projection of lithic artefacts and faunal remains.

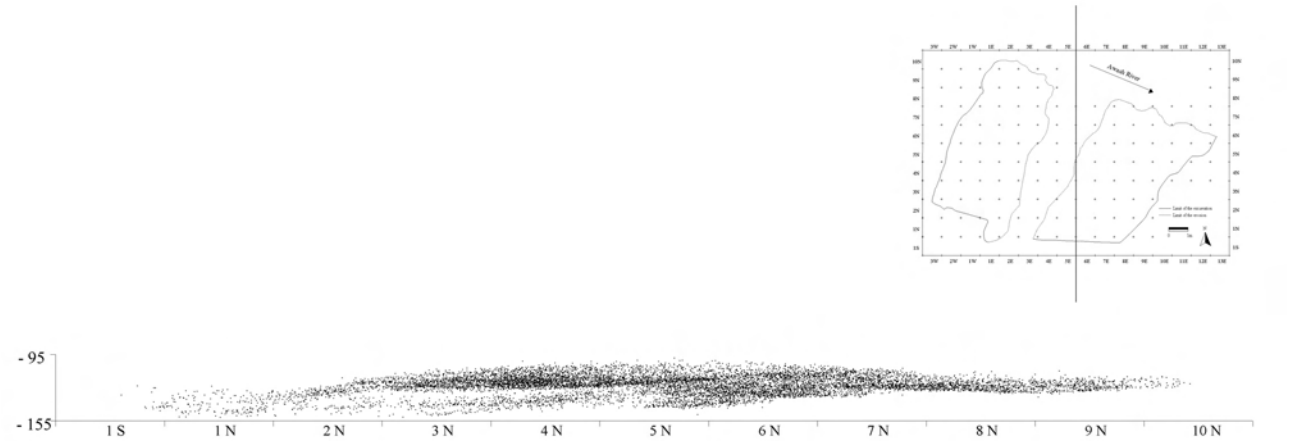

Plate 15. Garba IV D. North/south section with projection of lithic artefacts and faunal remains.

North/south sections

In the northern portion of WS, the paleosurface is practically level in squares 7N through 10N, except for strip 1W, where a northward inclination is visible. The remaining part, comprising squares 6N-1S, shows, instead, a slight southward inclination, except for strips 3-4 E, where the paleosurface remains level. In strip 4N, only two finds are visible because the depth of the rest of the finds was not measured. No object depths were recorded in strip 5E either. In square 2N of strips 1-2W, the finds become sparser near the circular area that yielded no finds.

In the northern portion of the ES, the paleosurface is roughly level, except in strips 11-13E where a southward inclination is visible, in the northern half of square 7N of strip 8E where it rises towards the north, and in strip 7E where there is, again, a slight northward inclination. From the middle of square 5N the paleosurface slopes southward. South of square 3N and in square 4N of strip 11E, objects become sparser. The empty space in strip 7E, square 4N, corresponds to the area with practically no finds visible in the plan.

Horizontal distribution of finds

Considering the distribution of the lithic industry on the one hand, and faunal remains on the other, it can be noticed that, while in the ES the concentrations of both overlap, in the WS the distribution of faunal remains appears more uniform and does not show such a concentration in the west-central zone of the paleosurface, as is the case with lithic artefacts, which attain their highest frequencies in squares 1E/5N and 2W-1E/4N, with 248, 282, 298 and 288 specimens respectively (Plates 16-19).

For a detailed description of the distribution of faunal remains, we refer the reader to the article on taphonomic analysis (see Fiore and Tagliacozzo in this volume). However, certain features of the spatial arrangement of faunal remains, and their general distribution, will be dealt with here in cases when they present interesting correlations with lithic artefacts. For example, a remarkable characteristic of paleosurface D, noticed since the first years of excavation, is the relatively high frequency of horn-cores (about 100) of different species of Bovids, which are strewn over several zones of the paleosurface (Plate 28).

In the present article, the distribution of the lithic industry will be analyzed in detail, considering both raw material and typology. In the present analysis, broken or battered pebbles and hammerstones are disregarded, since it is often difficult to ascertain whether their characteristics are the product of an intentional human act or not (see Piperno *et al.* in this volume). Most of them (2283, 86.74%) lay in the WS, while only 349 (13.26%) were found in the ES. Broken pebbles do not show different distribution trends from battered pebbles, while hammerstones are found exclusively in the WS, 11 in the central part (squares 2W-2E/6N, 1-2E/5N, 1W-2E/4N) and 1 in the northern part (square 3E/9N). The square with the highest number of broken or battered pebbles and hammerstones lies in the central portion of the WS, along the western edge (square 2W/4N, with 176 specimens), while the highest number in the ES was recorded in square 9E/6N, with 49 specimens (Plates 20, 21).

The same spatial trends characterize pebble tools, which are almost totally of basalt or other volcanic rocks, with a few obsidian specimens. Pebble tools are scarce in the ES (277 specimens, 24.13%), while in WS, 871 were found (75.87%), especially in the lower half near the western edge of the excavation (Plates 22, 23).

In the ES, tools on flake and cores show a different numerical pattern: while their percentages are higher here than those of pebble tools, the high and low concentration zones are the same, although frequencies for each category vary (Plates 24-27).

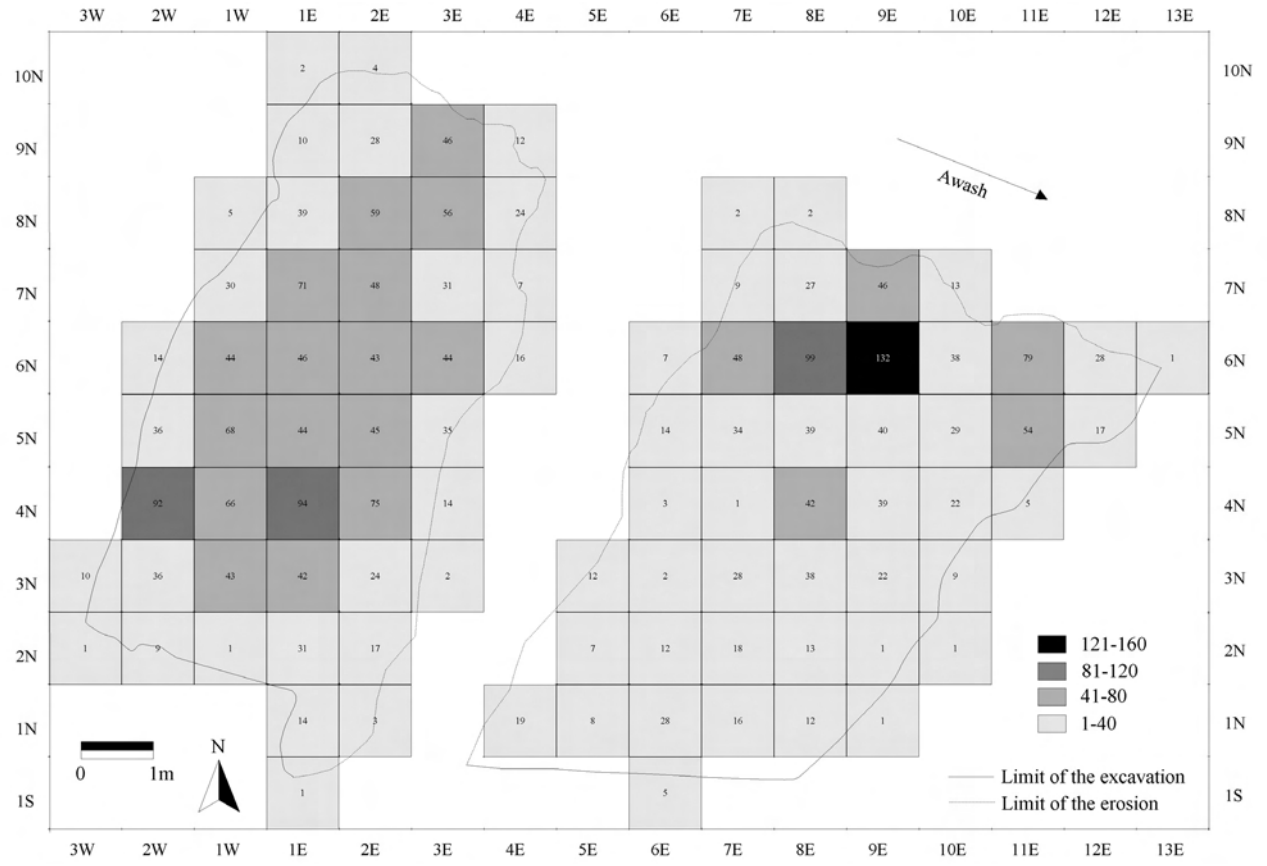

Plate 16. Garba IV D. Frequency of faunal remains.

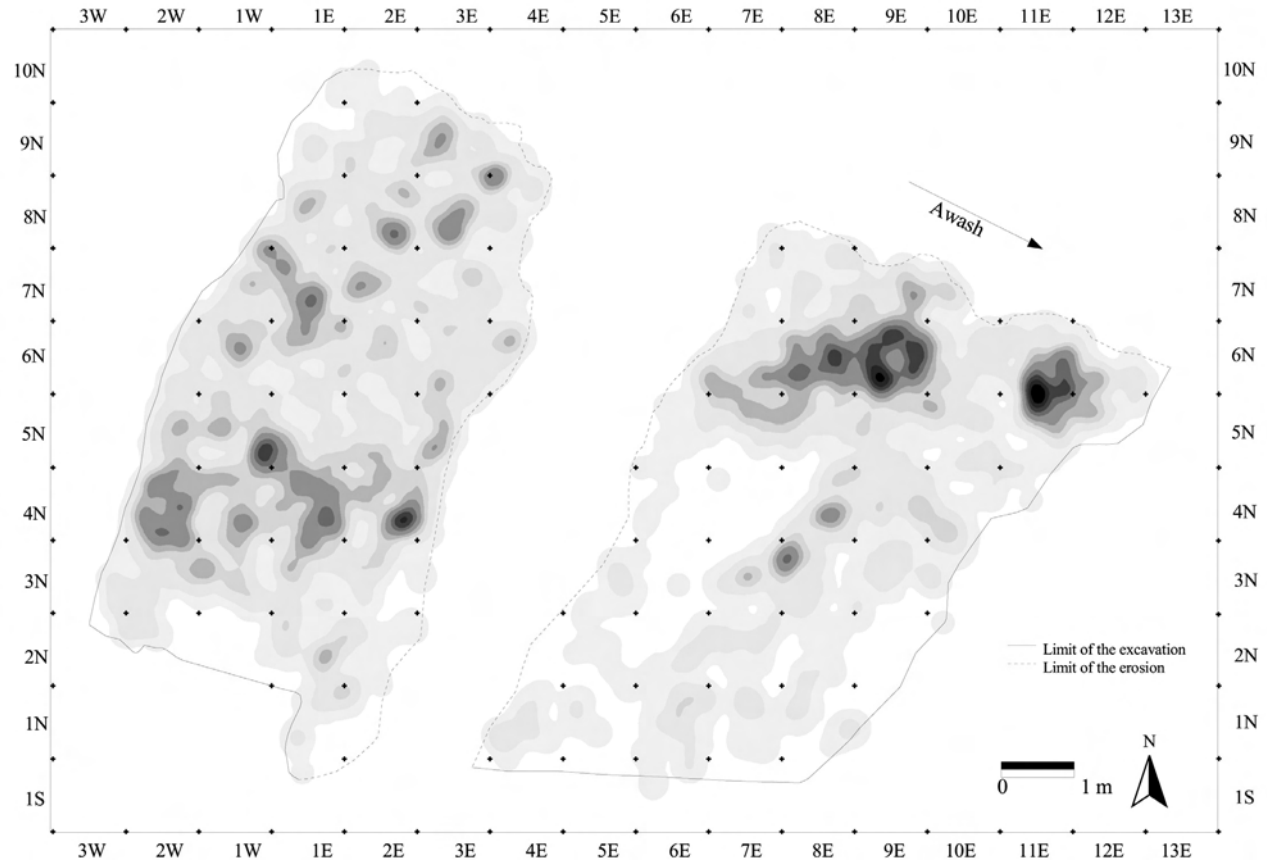

Plate 17. Garba IV D. Density areas of faunal remains.

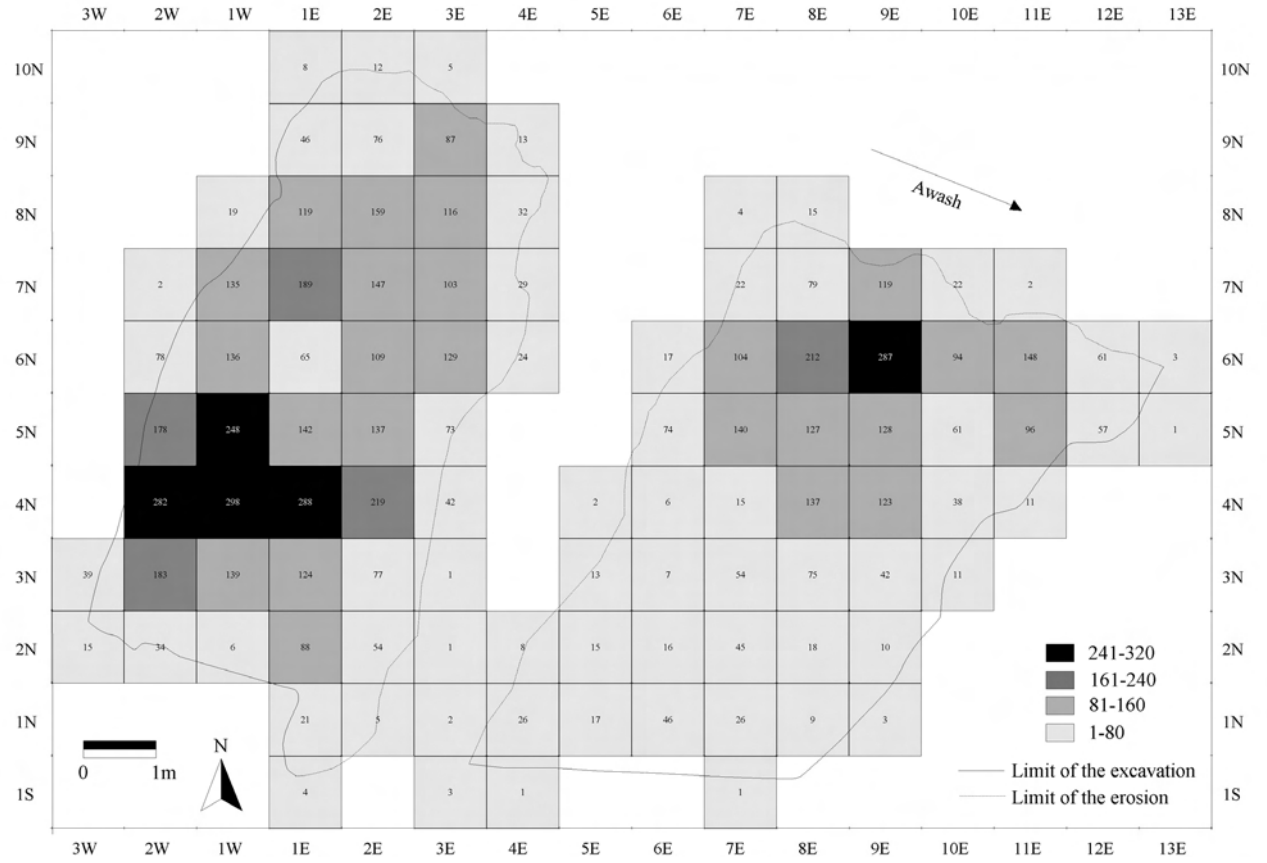

Plate 18. Garba IV D. Frequency of lithic artefacts.

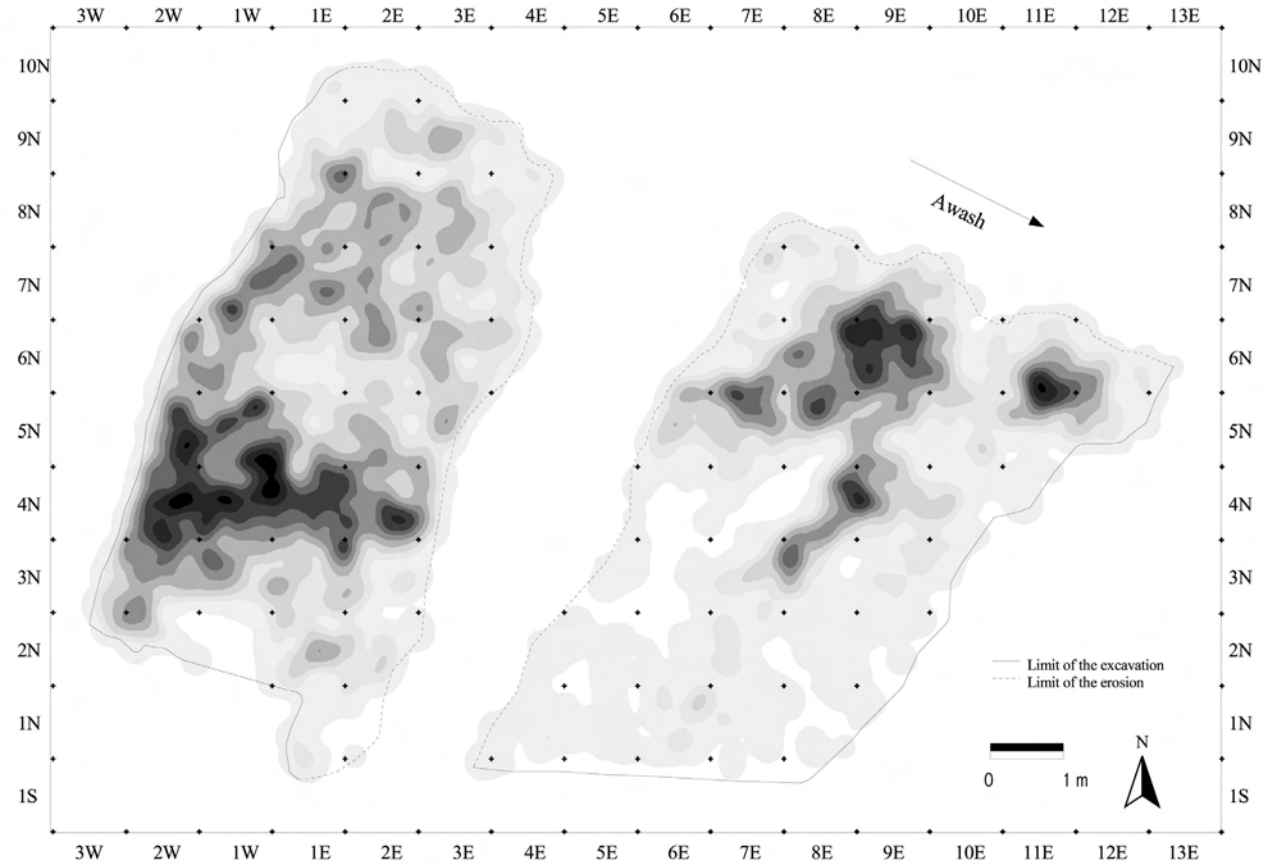

Plate 19. Garba IV D. Density areas of lithic artefacts.

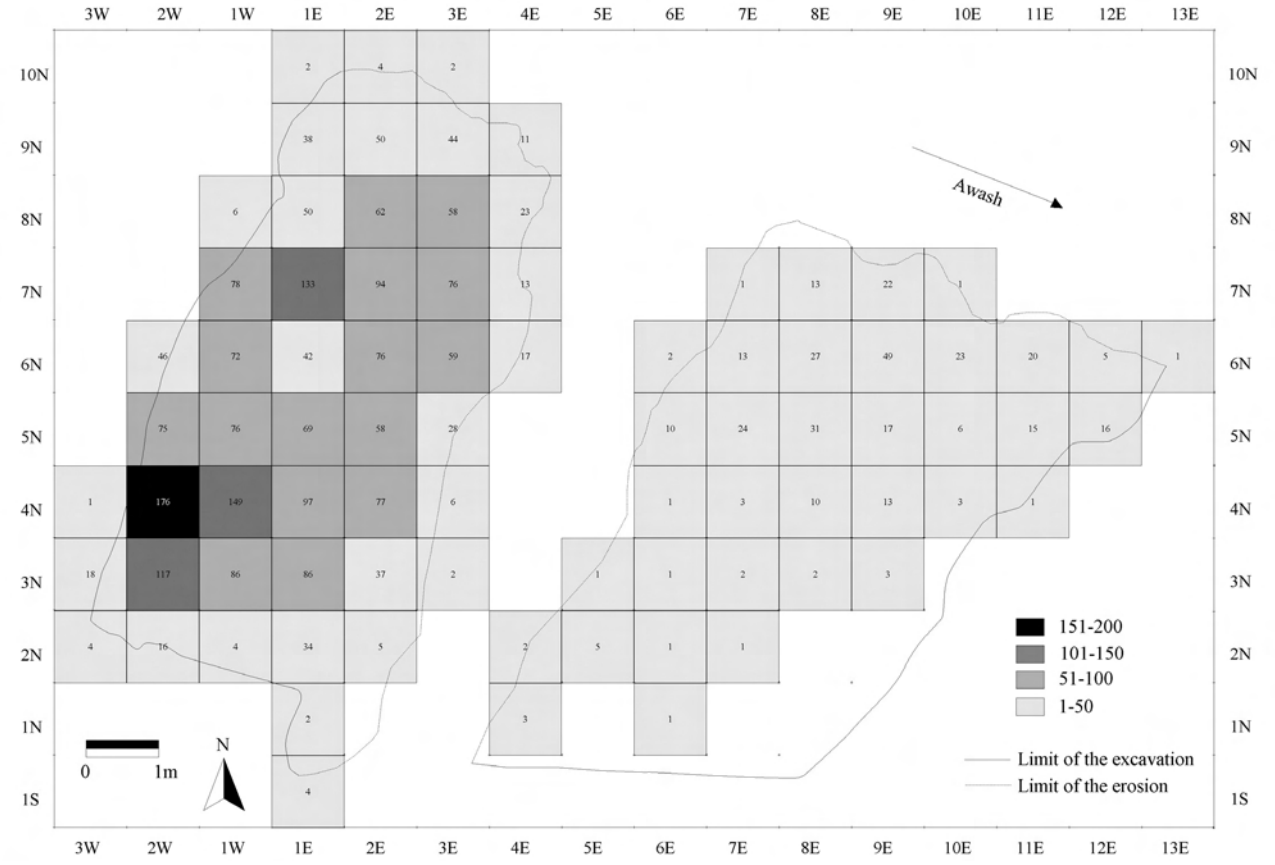

Plate 20. Garba IV D. Frequency of battered pebbles, broken pebbles and hammerstones.

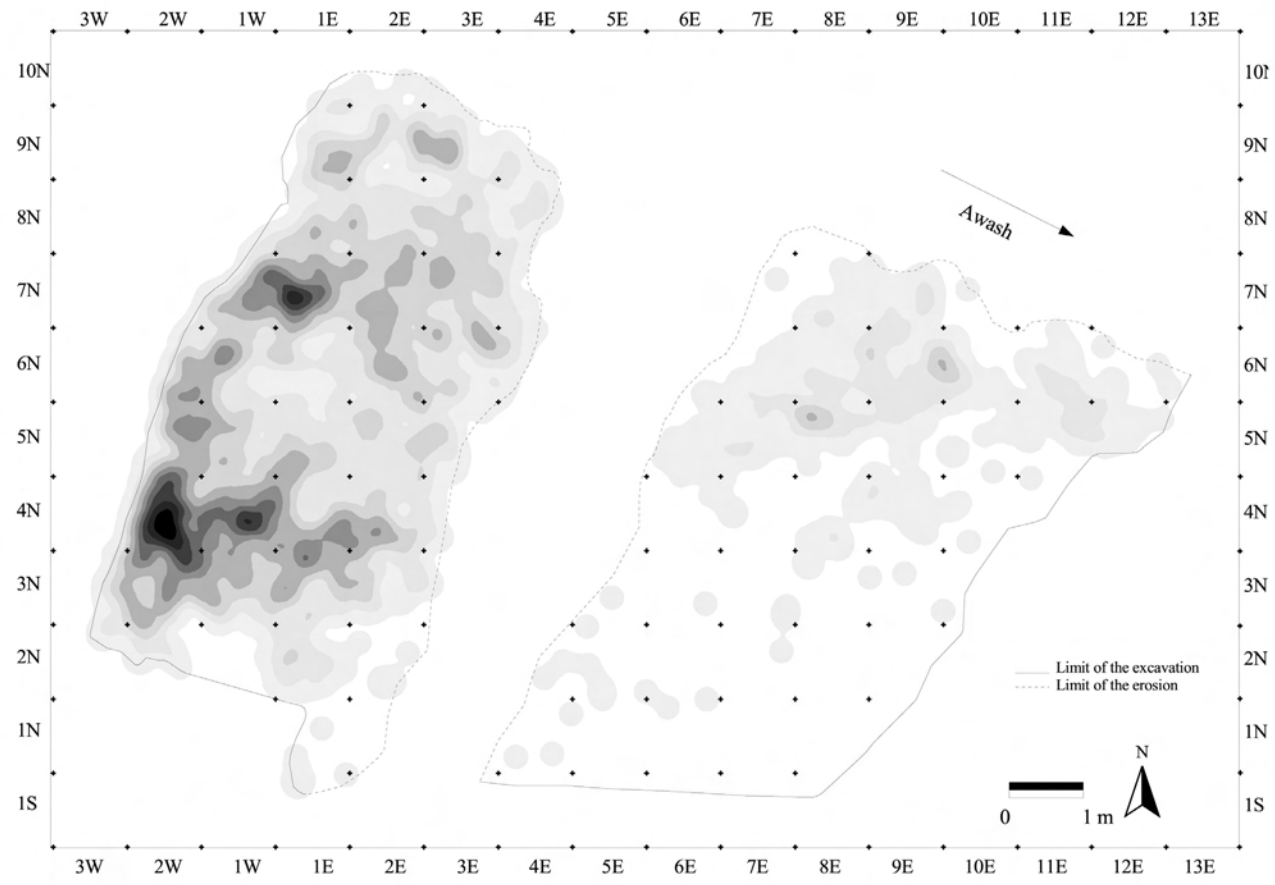

Plate 21. Garba IV D. Density areas of battered pebbles, broken pebbles and hammerstones.

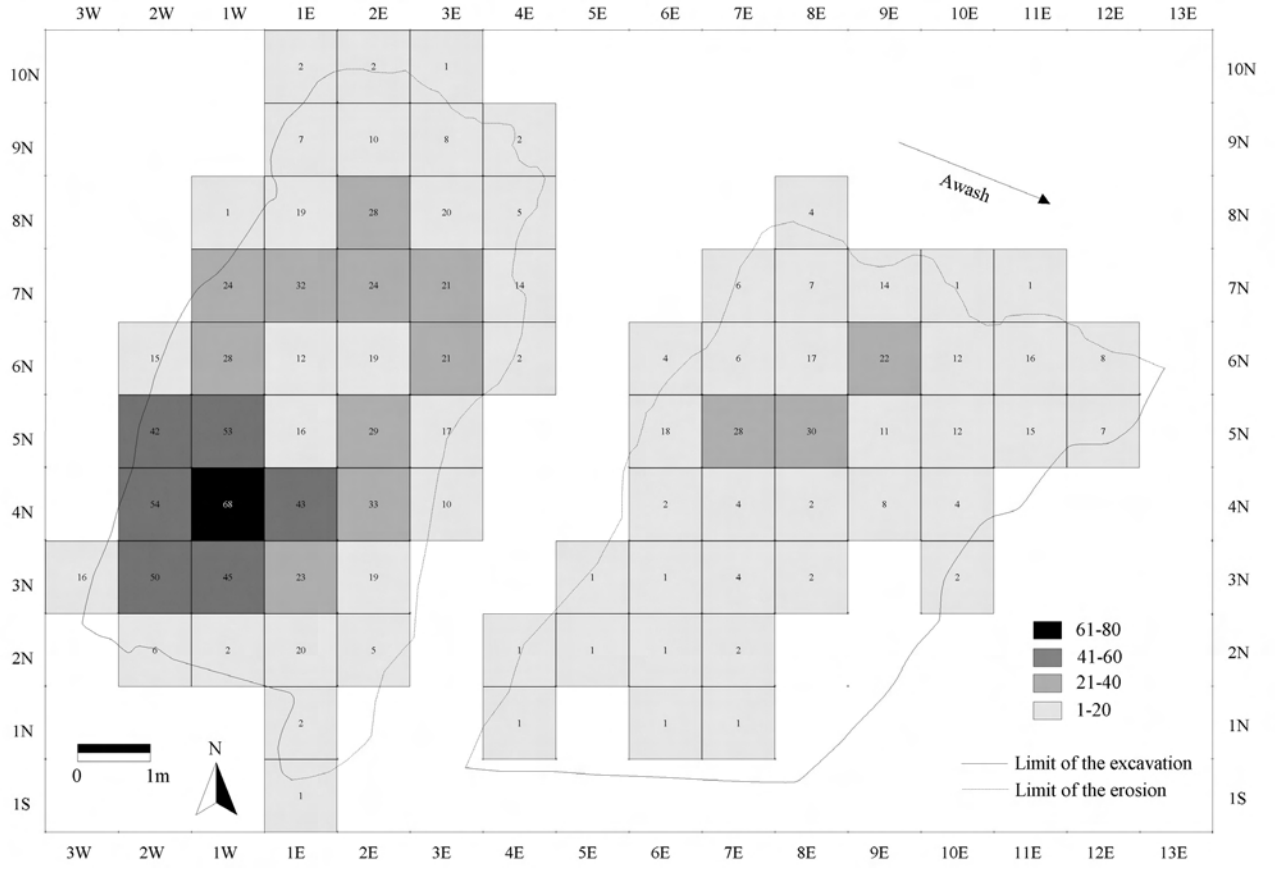

Plate 22. Garba IV D. Frequency of pebble tools.

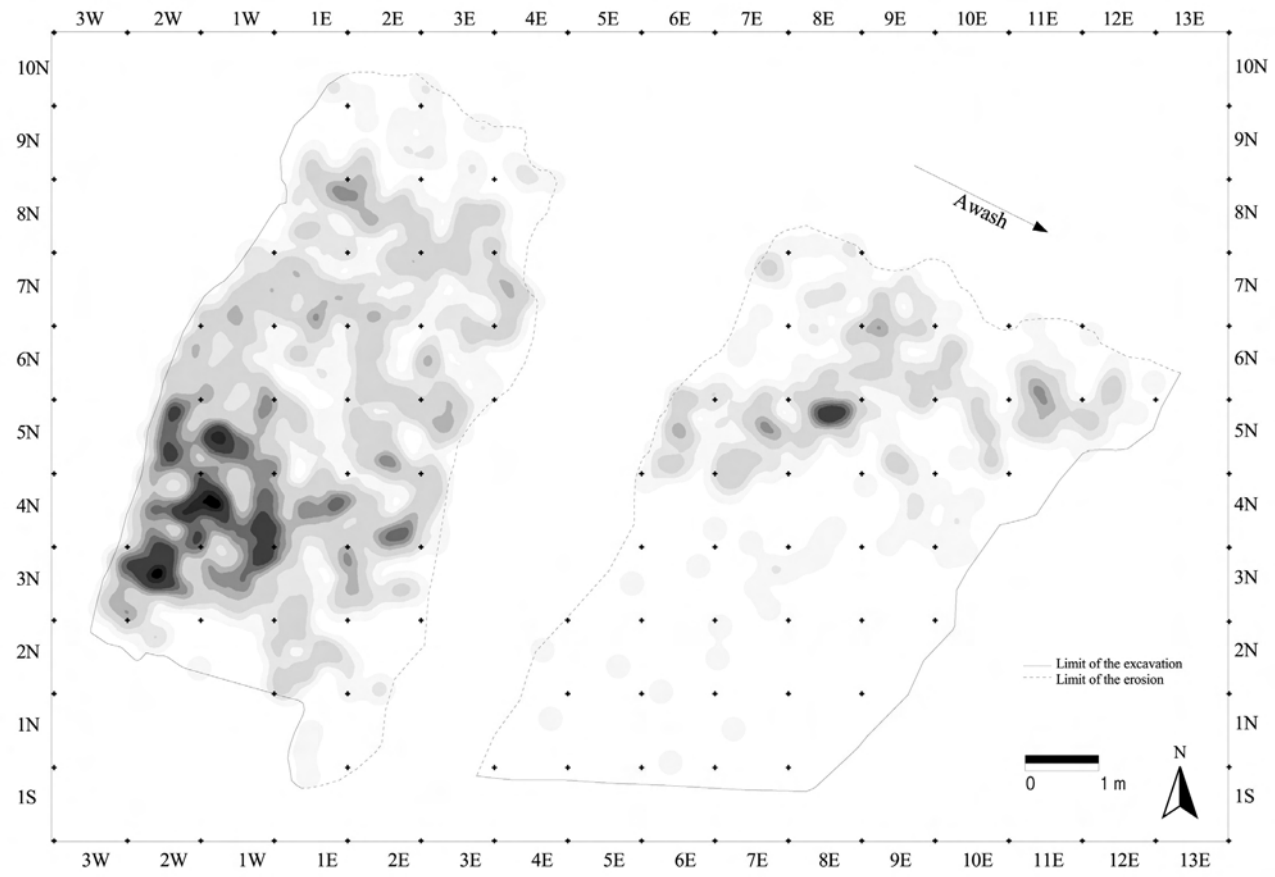

Plate 23. Garba IV D. Density areas of pebble tools.

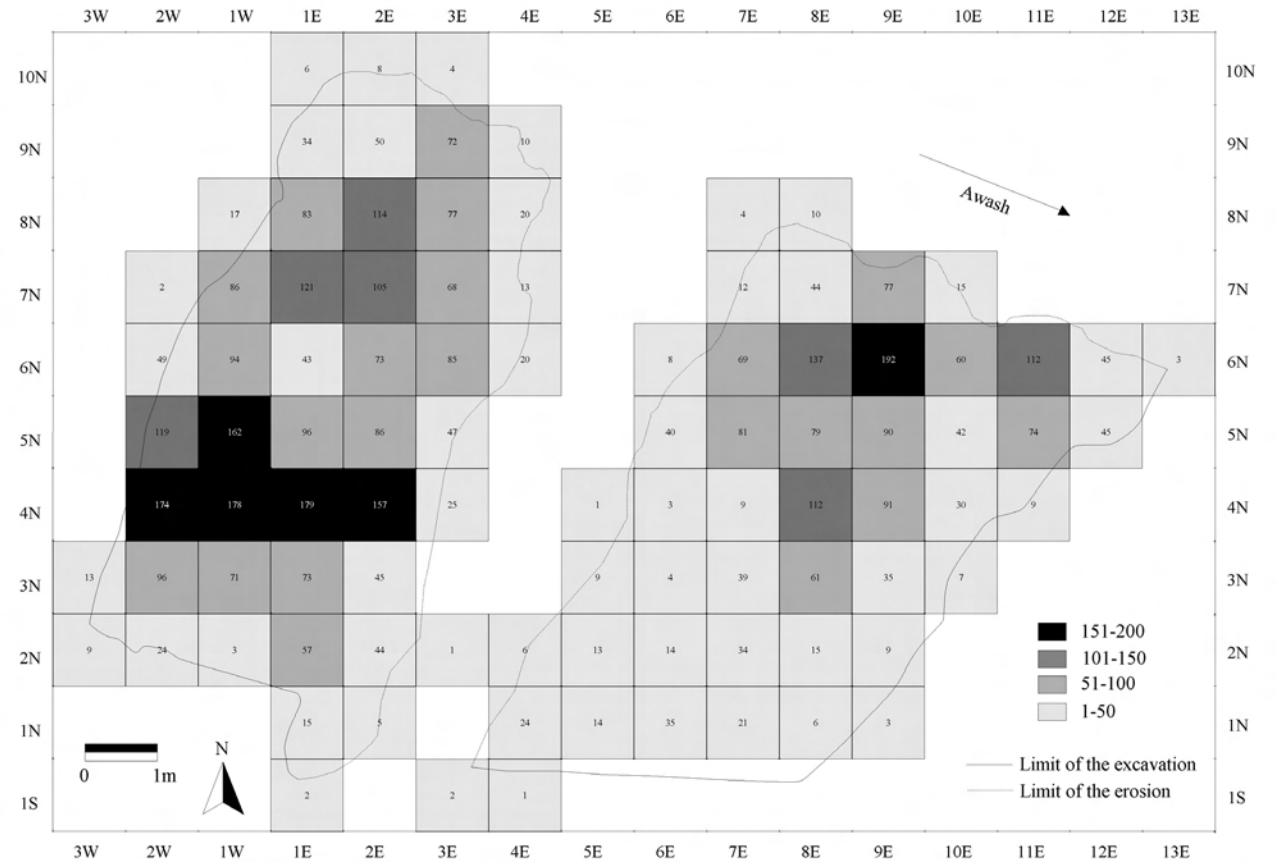

Plate 24. Garba IV D. Frequency of tools on flake.

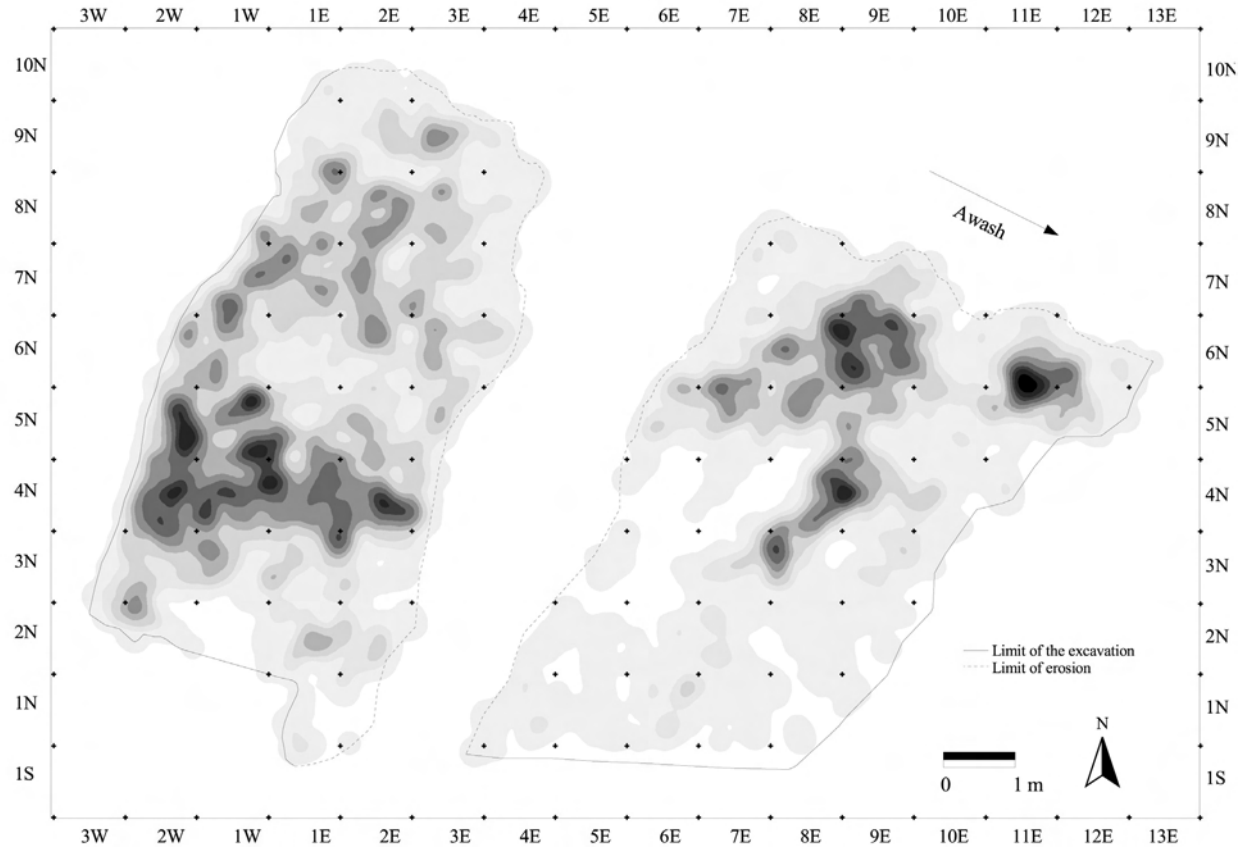

Plate 25. Garba IV D. Density areas of tools on flake.

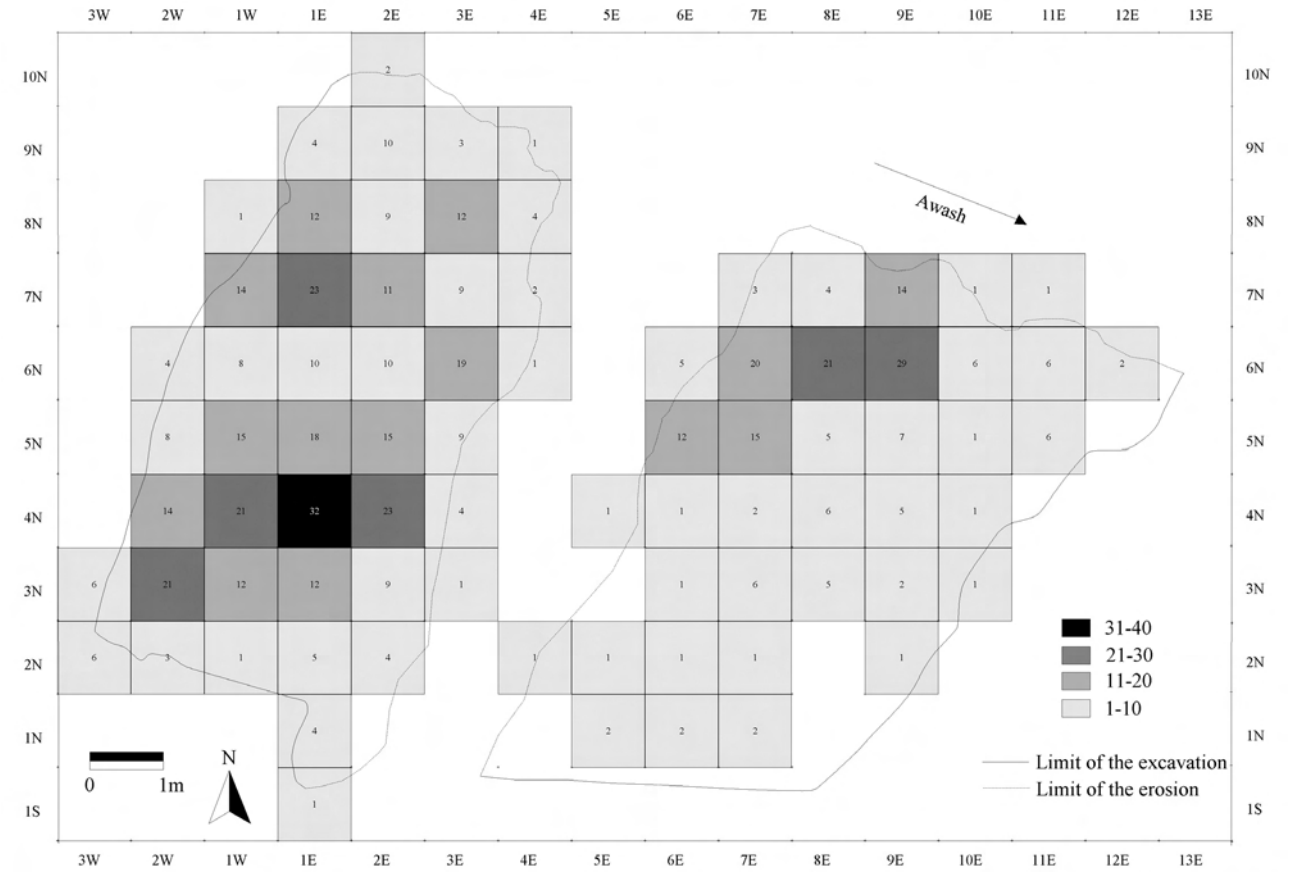

Plate 26. Garba IV D. Frequency of cores.

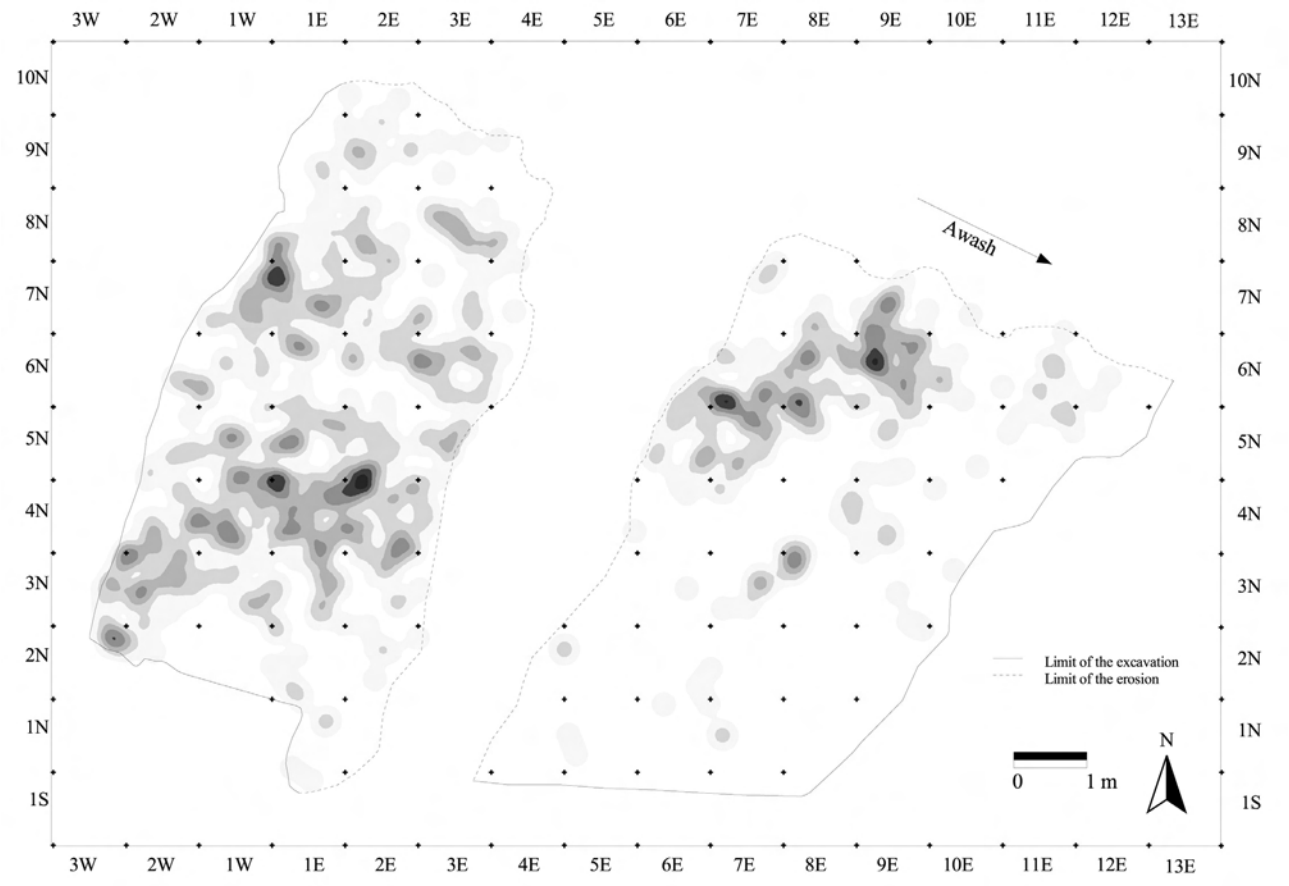

Plate 27. Garba IV D. Density areas of cores.

In this case, too, differences are exclusively quantitative, since the areas of concentration are approximately the same. The obsidian industry attains its maximum density in ES, with the highest frequency in square 9E/6N, whereas in the WS the highest concentration is found between strips 4-5N (Plates 29, 30).

The overall distribution of the obsidian industry coincides with the distribution of obsidian cores and flakes, since there are few obsidian pebble tools. While cores and unmodified, used and retouched flakes are abundant in ES, the number of obsidian tools on flake and fragments is even more significant, especially when one considers that in the WS they are distributed over the whole surface of the sector (40 square metres), while in ES they are only found in the upper half, especially near the large basalt blocks (Plates 31-36).

As regards artefacts of other volcanic rocks, pebble tools are rare in the ES. Even rarer are used and retouched flakes, tools on flake, and fragments, while unmodified flakes and cores are more numerous, and their density appears to increase near the basalt blocks (Plates 37-44).

If we consider the relationship between the distribution of the various raw materials, it is immediately evident that all over the ES obsidian flakes and tools are more abundant than those on other volcanic rocks, whereas in the WS, where basalt and trachyte tools are slightly more numerous, the ratio is more balanced (Plate 45).

To sum up, the distribution patterns of pebble tools made of volcanic rocks other than obsidian on the one hand, and flake and core tools of the same material on the other, are approximately the same, while they differ markedly from those of obsidian flakes and cores. Interestingly, over the whole paleosurface the distribution of faunal remains seems to match quite closely that of the obsidian industry, especially in the high concentration zones in the northern part of ES, where one observes significant associations of basalt blocks, faunal remains of variable size, tools on flake and obsidian cores (Plate 46).

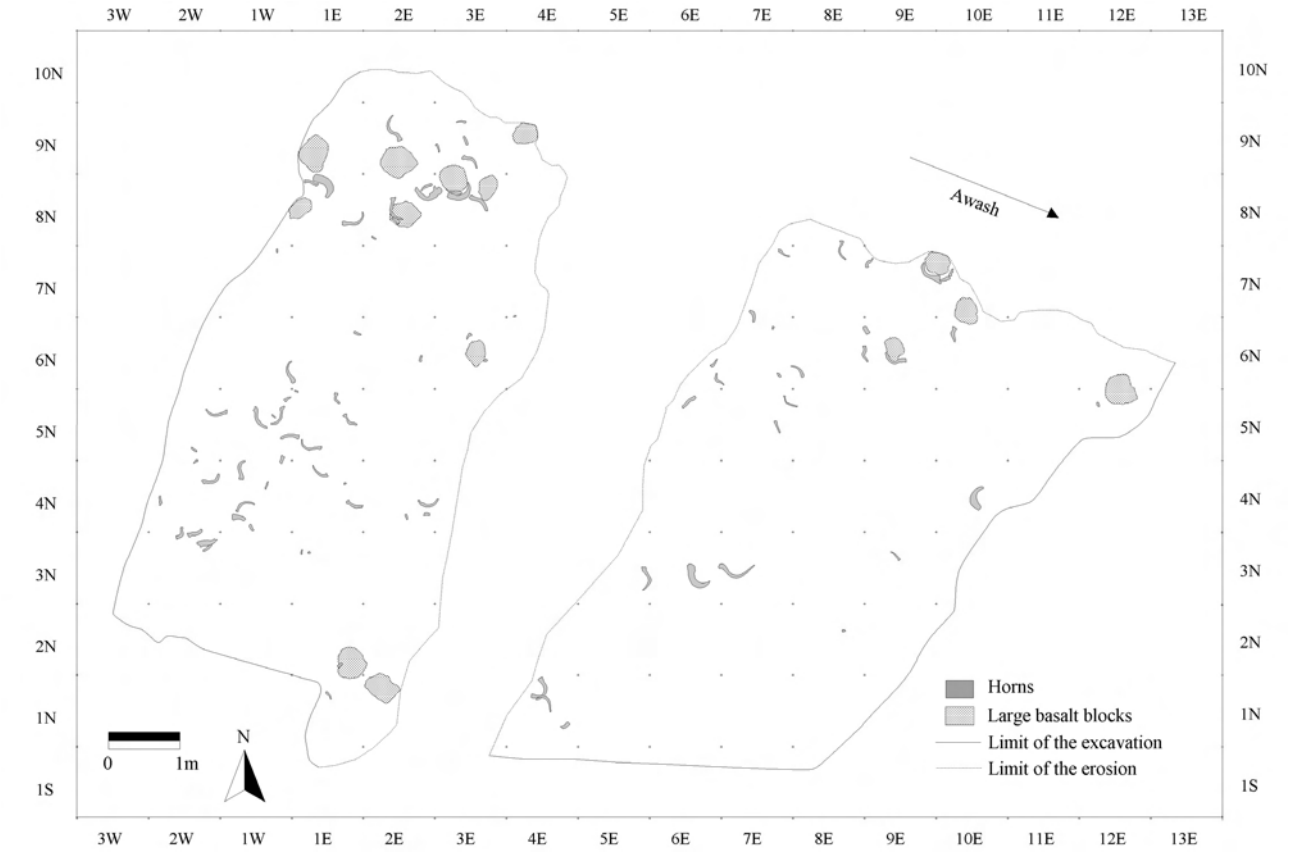

Plate 28. Garba IV D. Distribution plan of horn-cores.

(Original plan by G.M. Bulgarelli and M. Piperno, digital map by R. Gallotti)

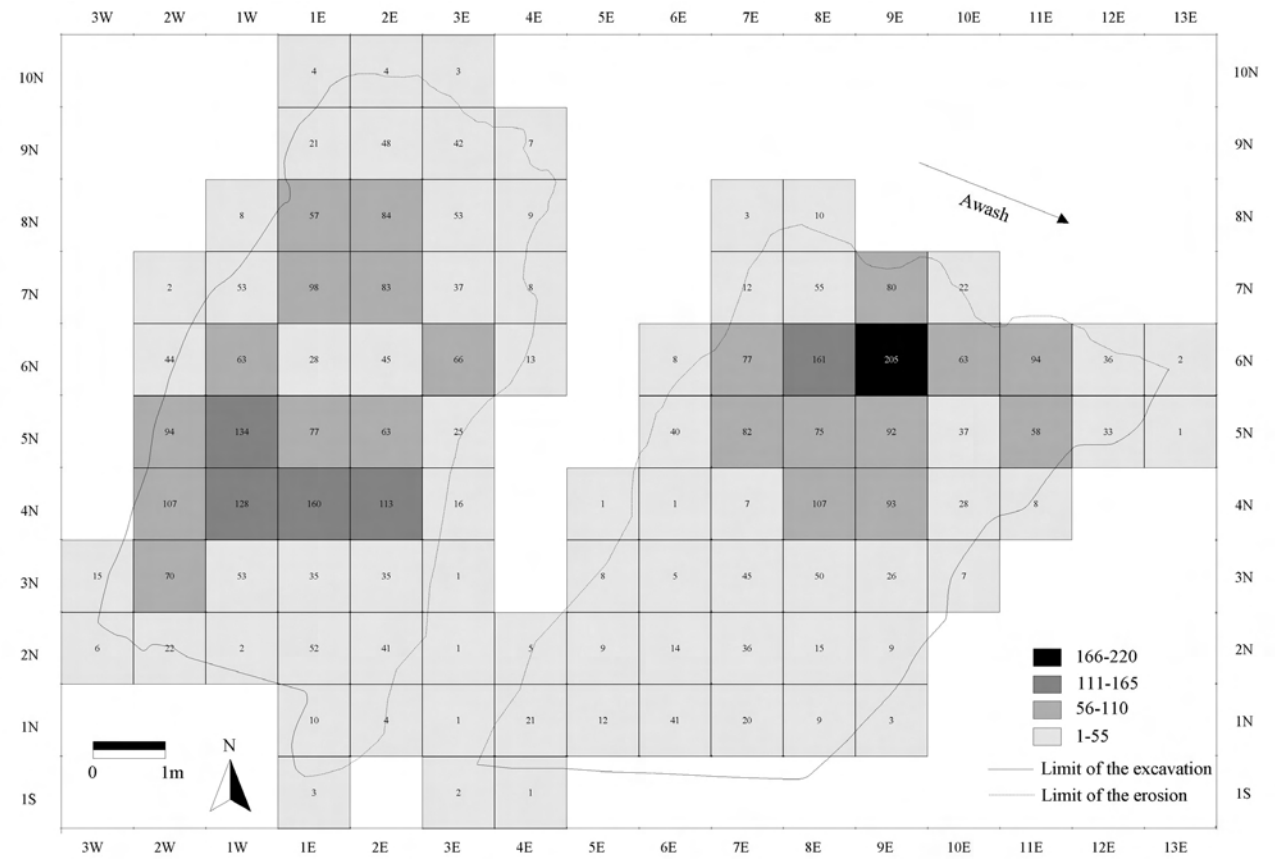

Plate 29. Garba IV D. Frequency of obsidian lithic industry.

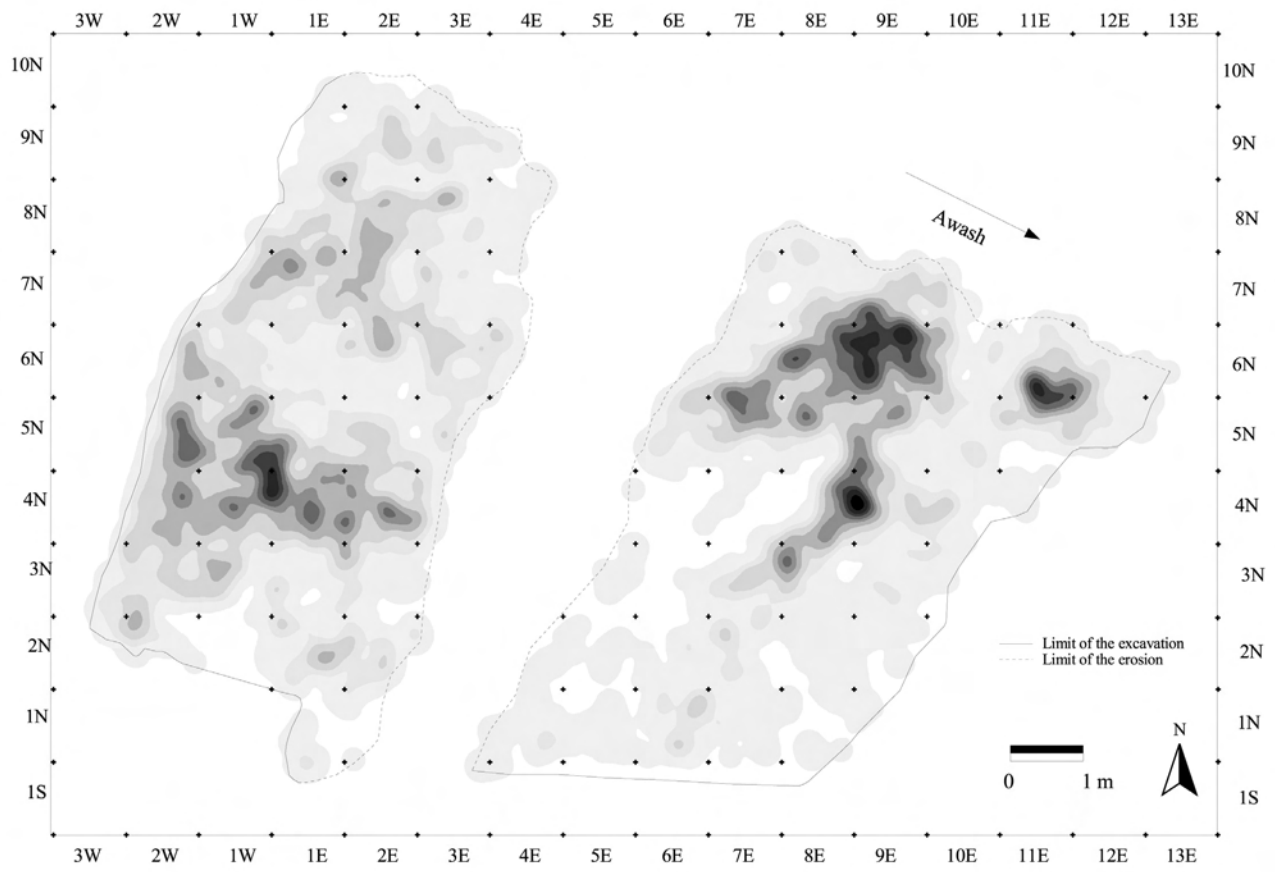

Plate 30. Garba IV D. Density areas of obsidian lithic industry.

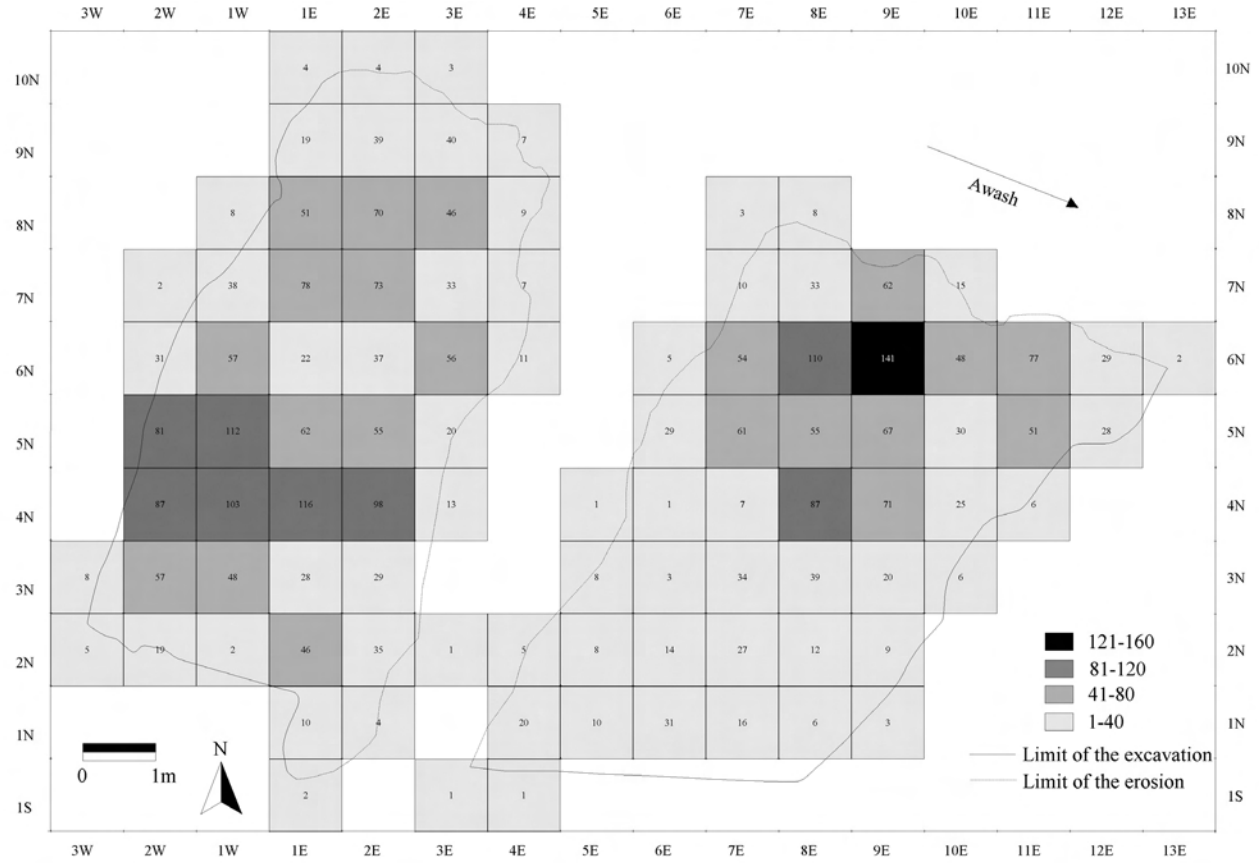

Plate 31. Garba IV D. Frequency of obsidian flakes.

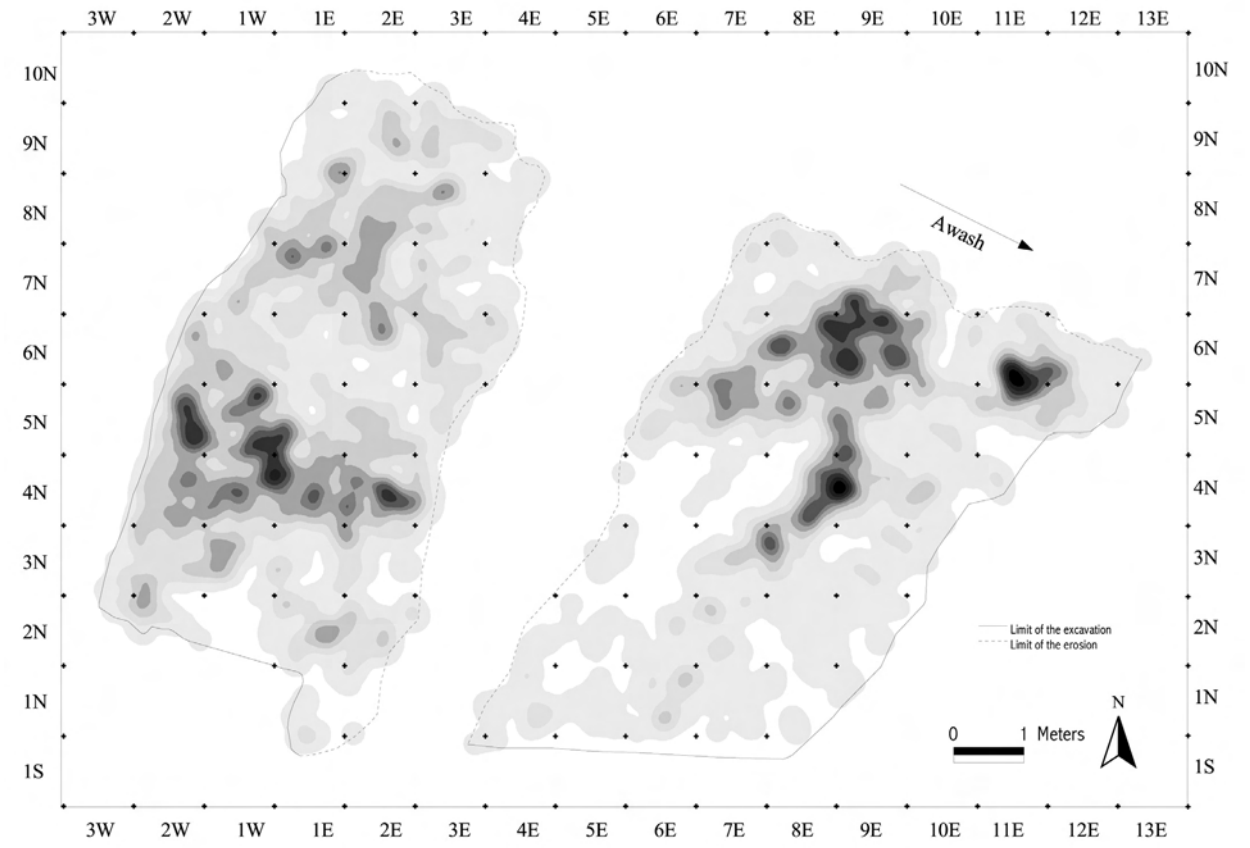

Plate 32. Garba IV D. Density areas of obsidian flakes.

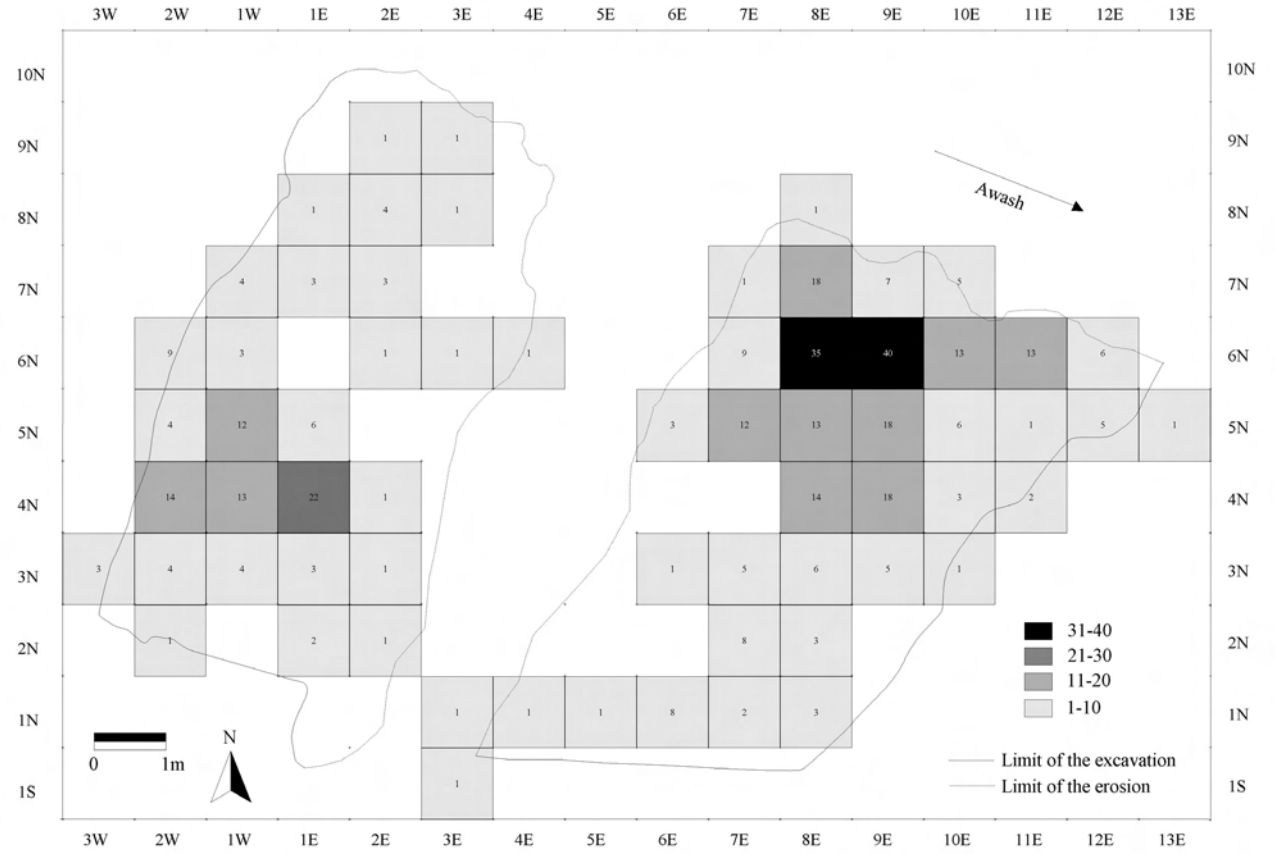

Plate 33. Garba IV D. Frequency of obsidian fragments.

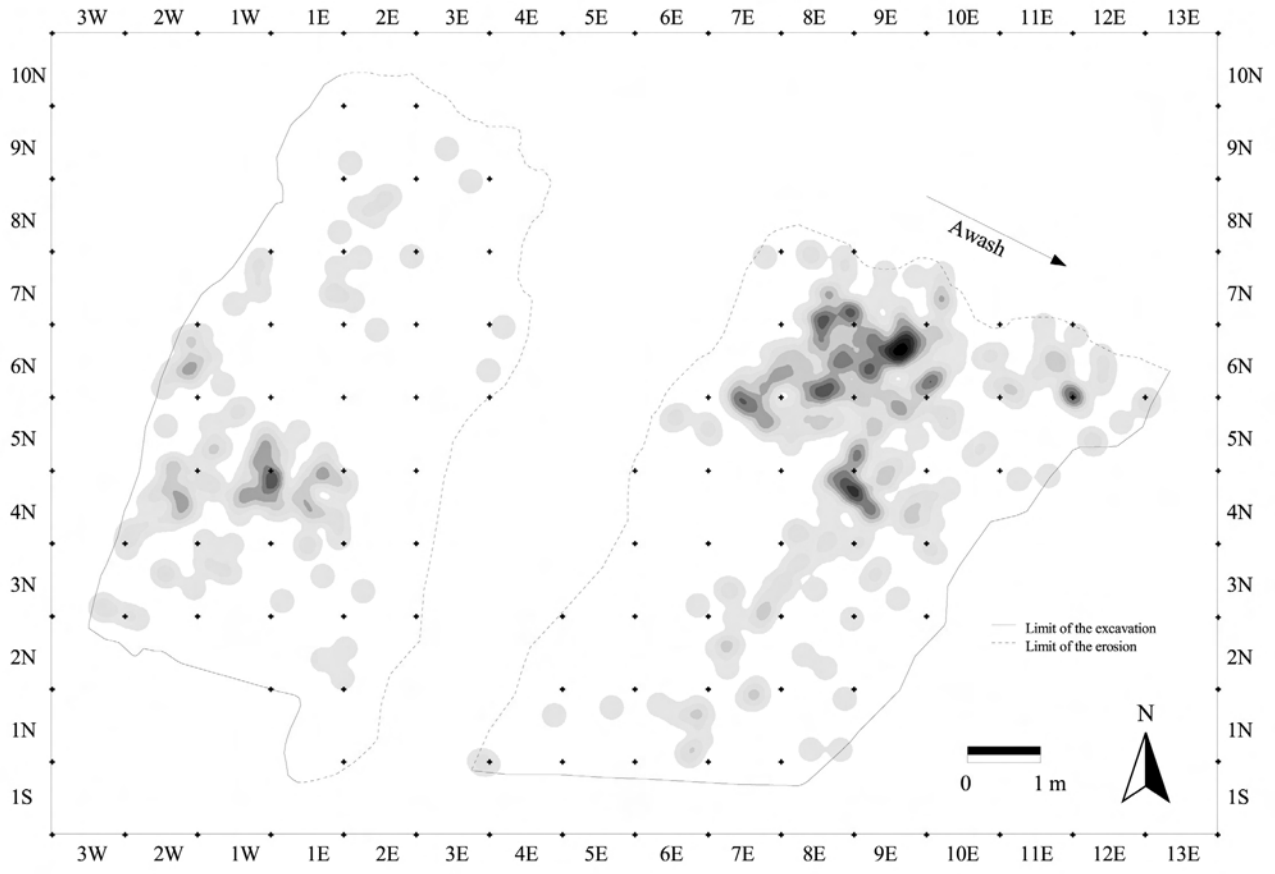

Plate 34. Garba IV D. Density areas of obsidian fragments.

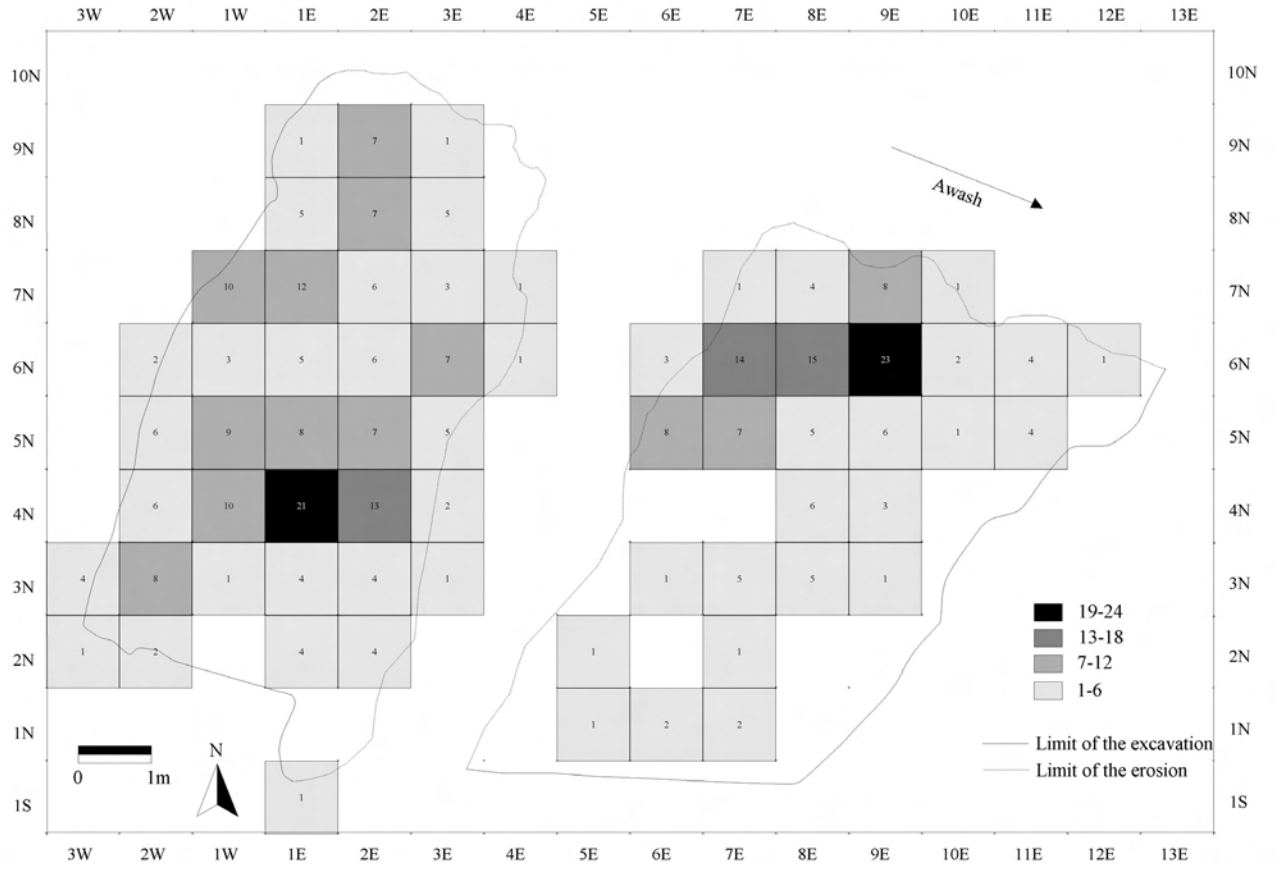

Plate 35. Garba IV D. Frequency of obsidian cores.

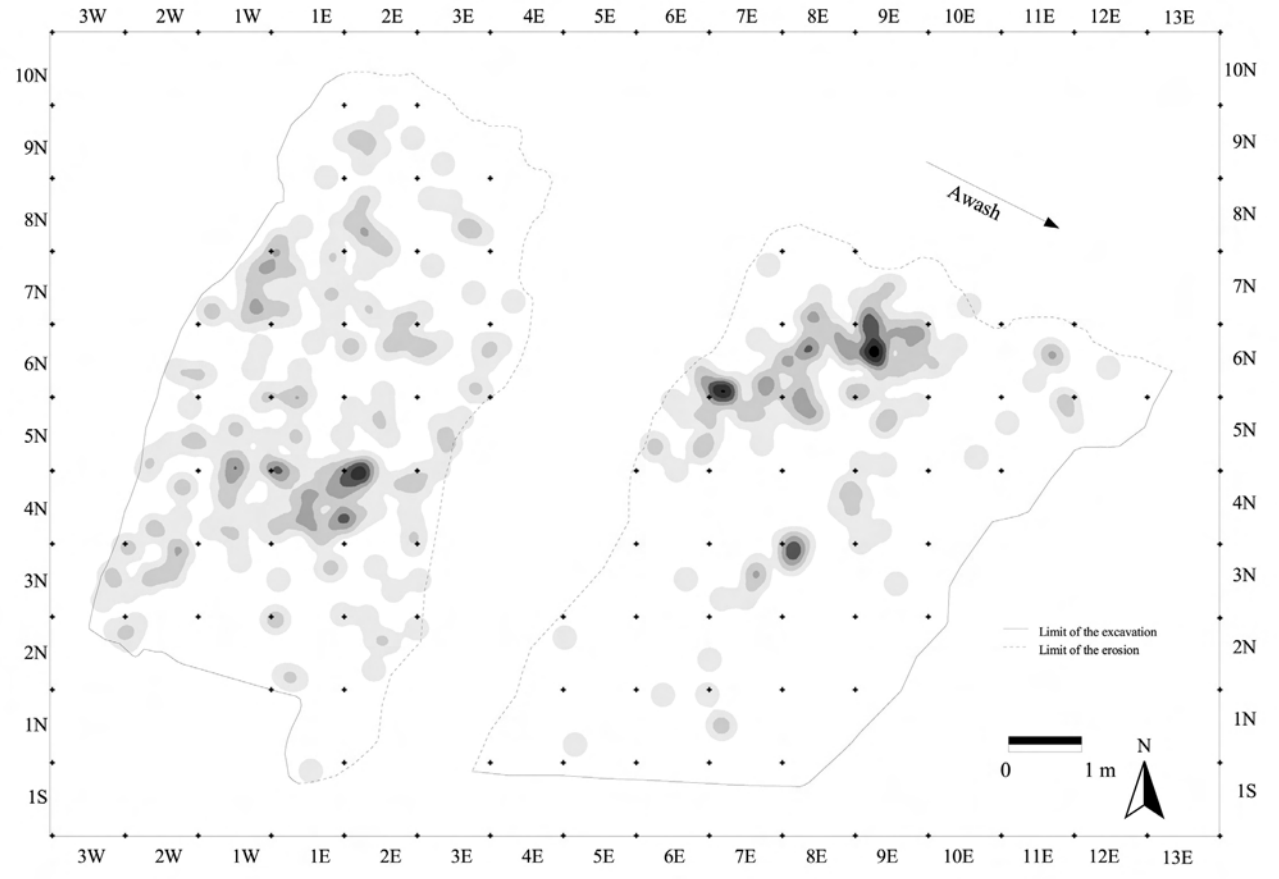

Plate 36. Garba IV D. Density areas of obsidian cores.

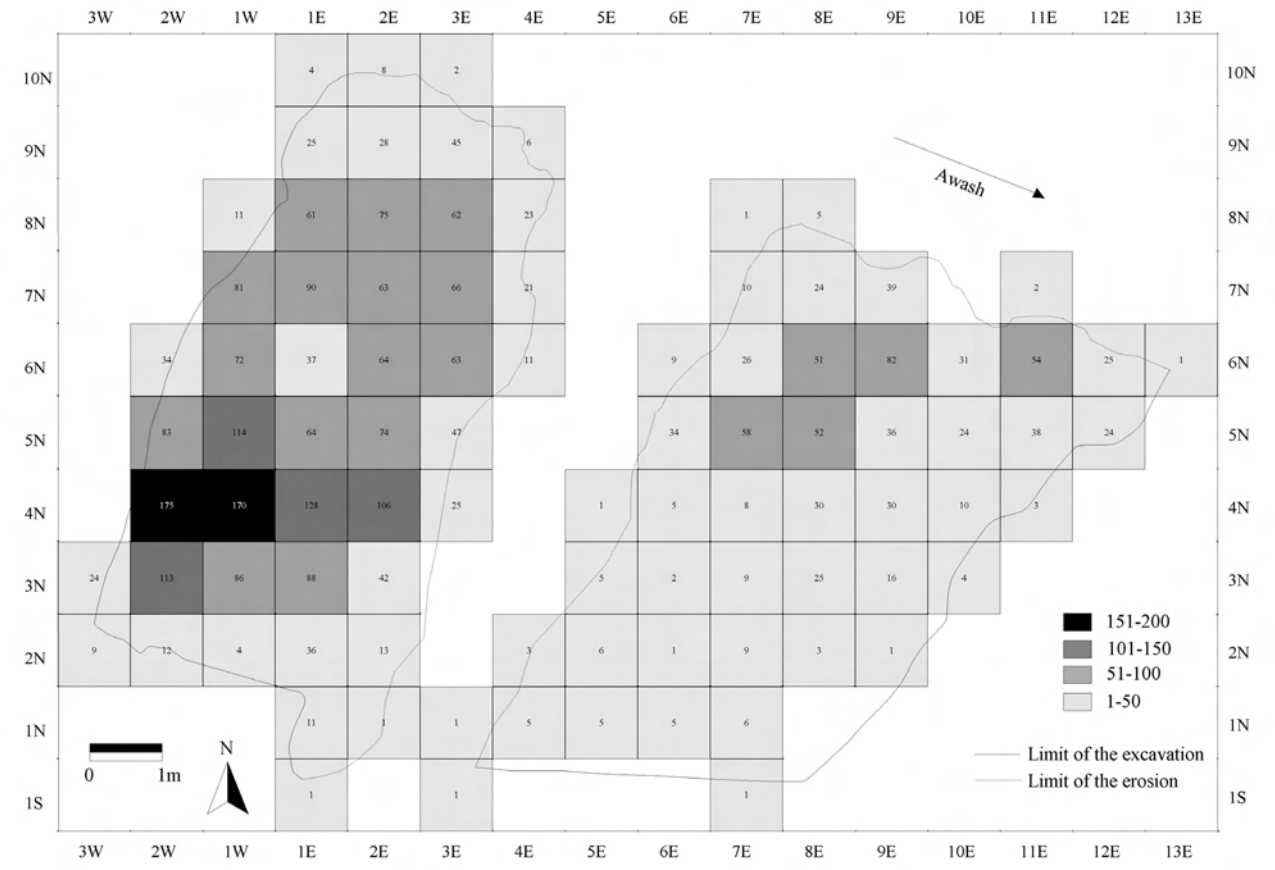

Plate 37. Garba IV D. Frequency of lithic industry of various volcanic rocks.

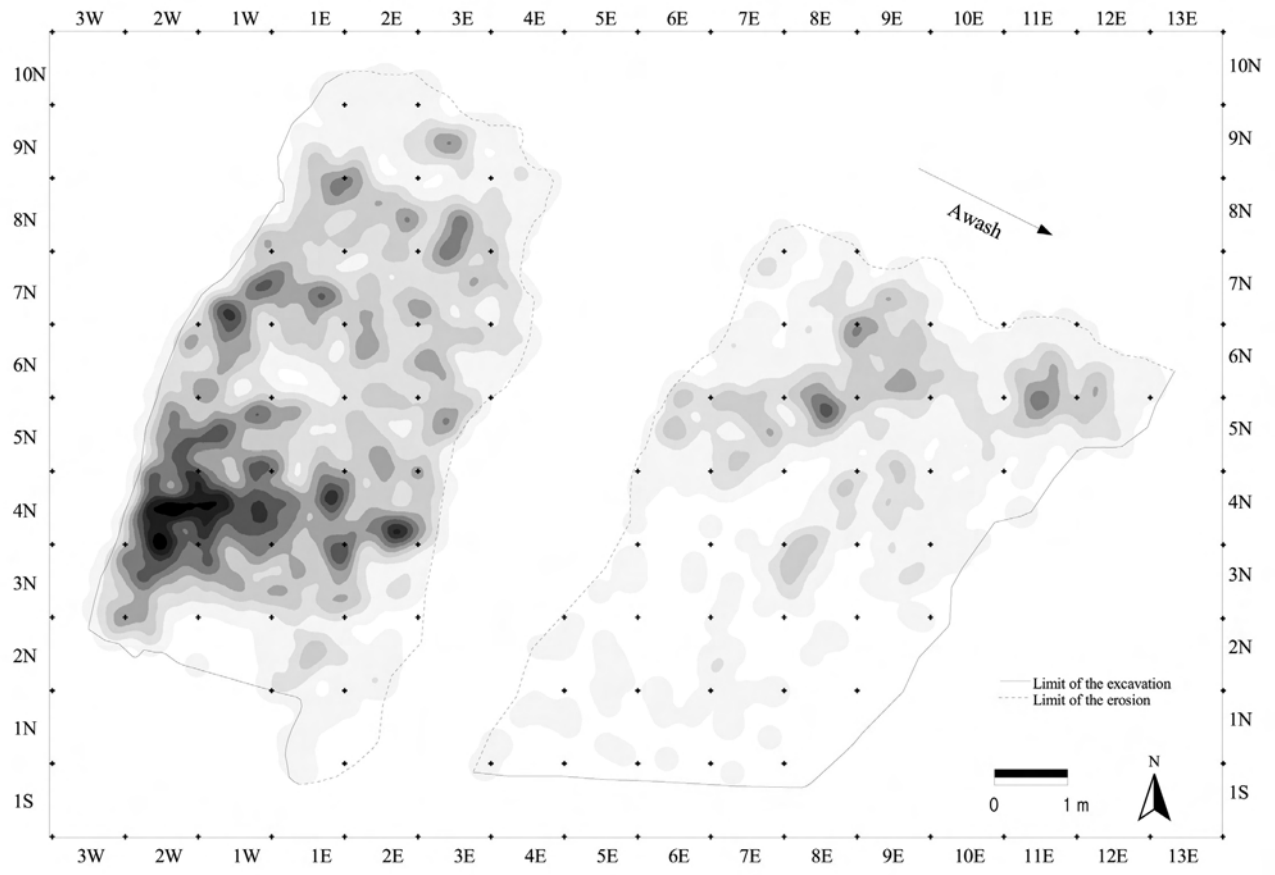

Plate 38. Garba IV D. Density areas of lithic industry of various volcanic rocks.

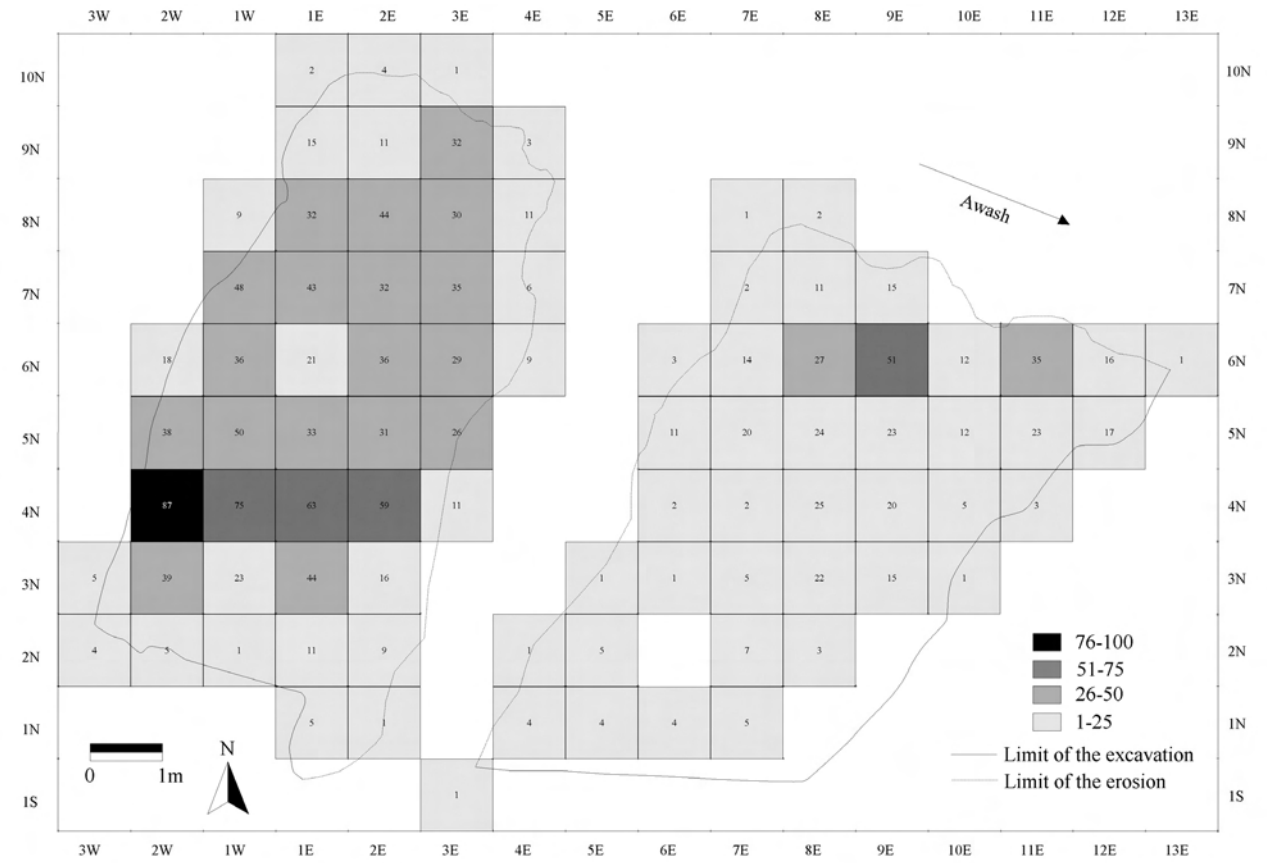

Plate 39. Garba IV D. Frequency of flakes of various volcanic rocks.

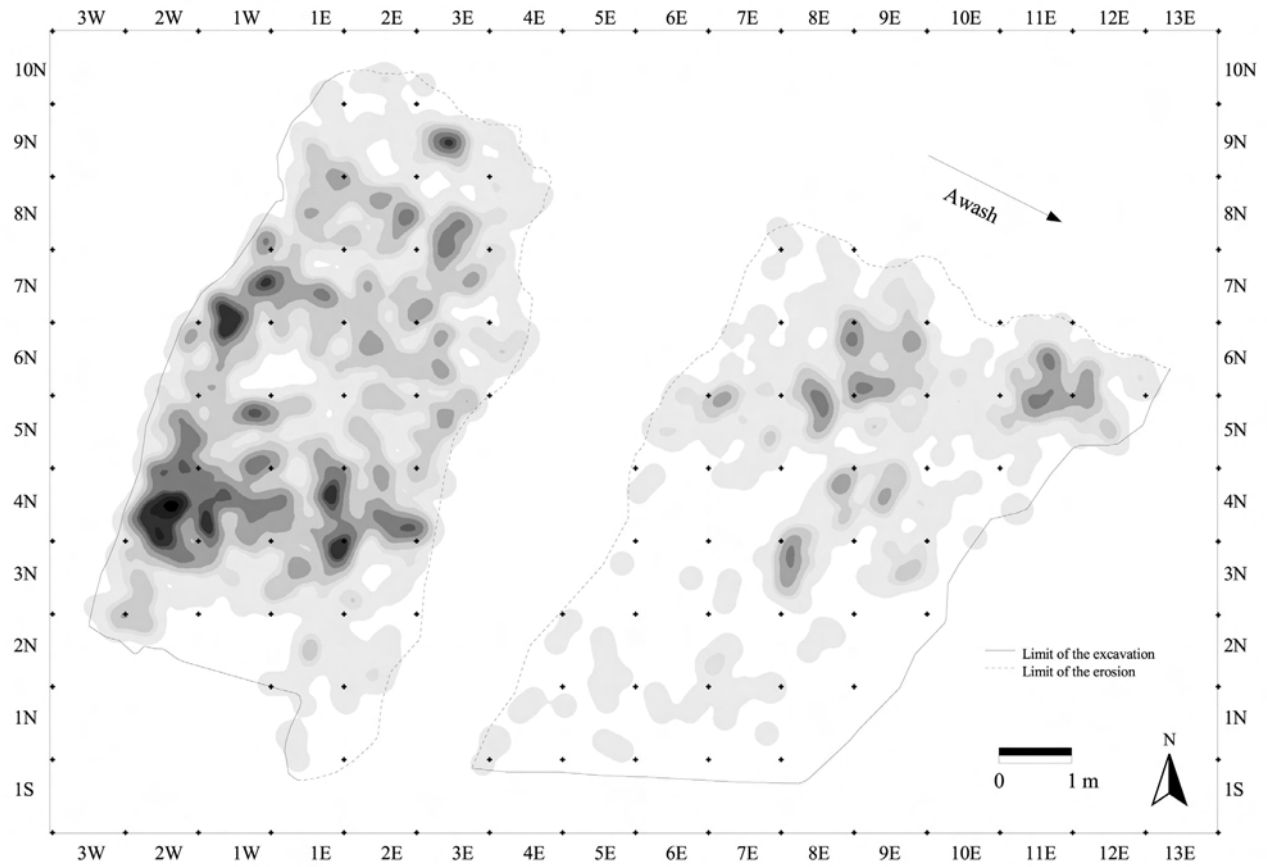

Plate 40. Garba IV D. Density areas of flakes of various volcanic rocks.

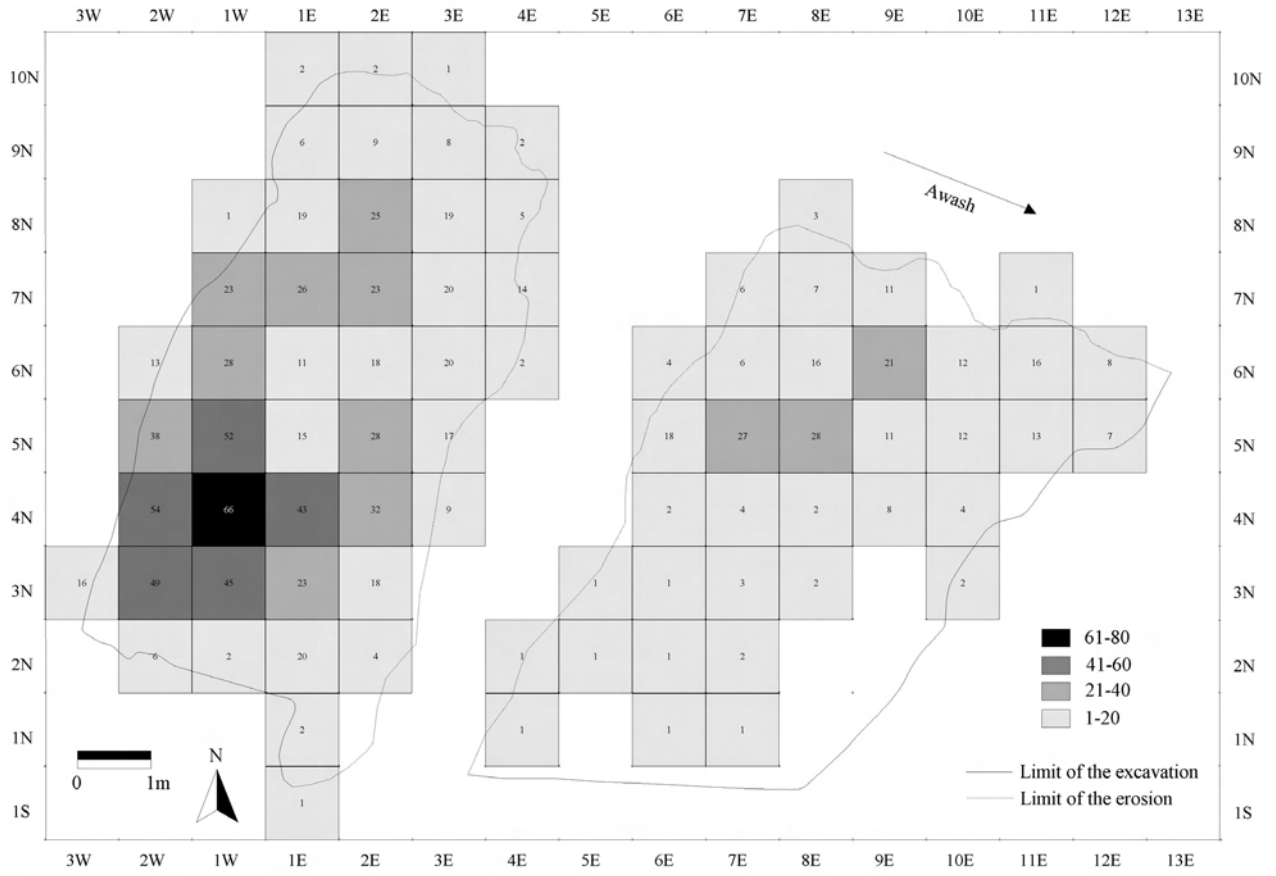

Plate 41. Garba IV D. Frequency of pebble tools of various volcanic rocks.

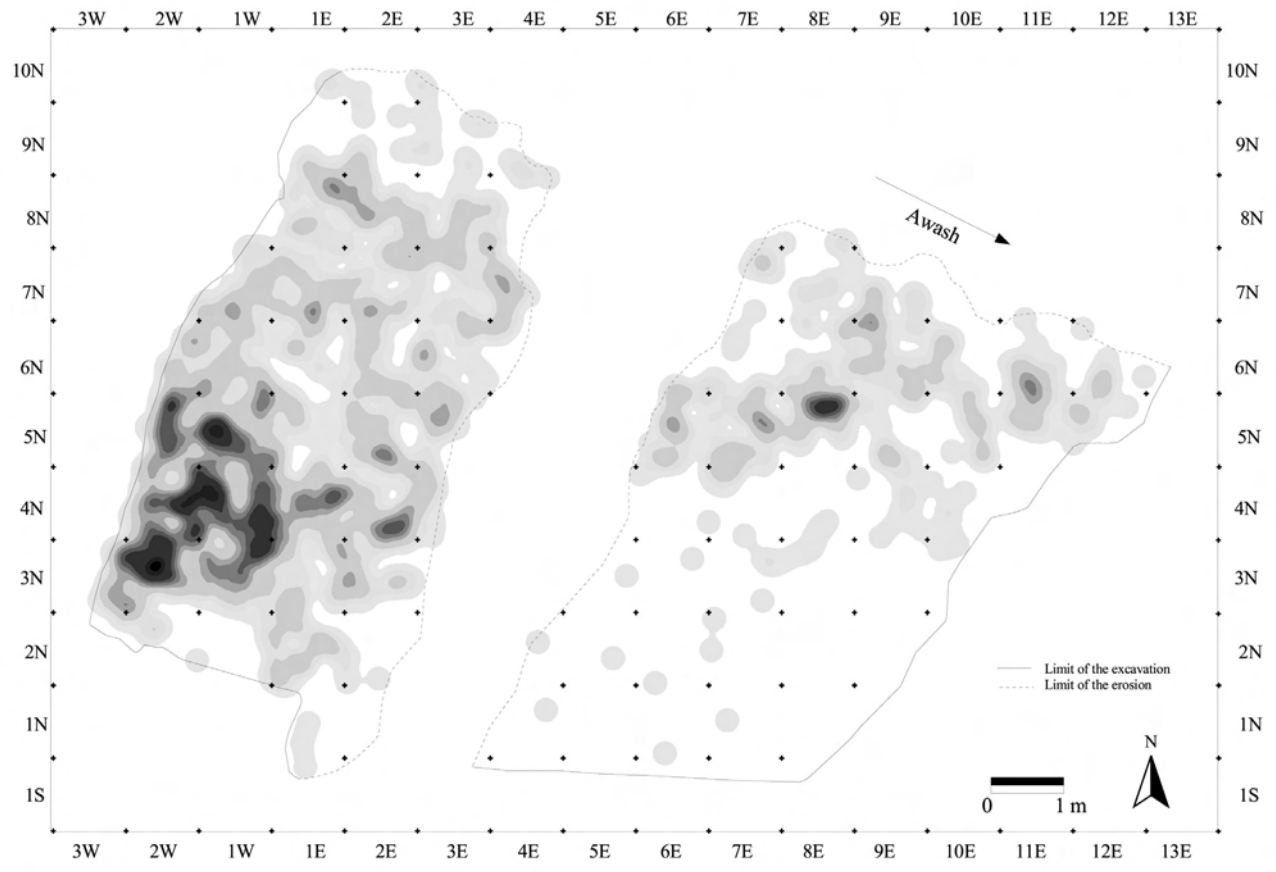

Plate 42. Garba IV D. Density areas of pebble tools of various volcanic rocks.

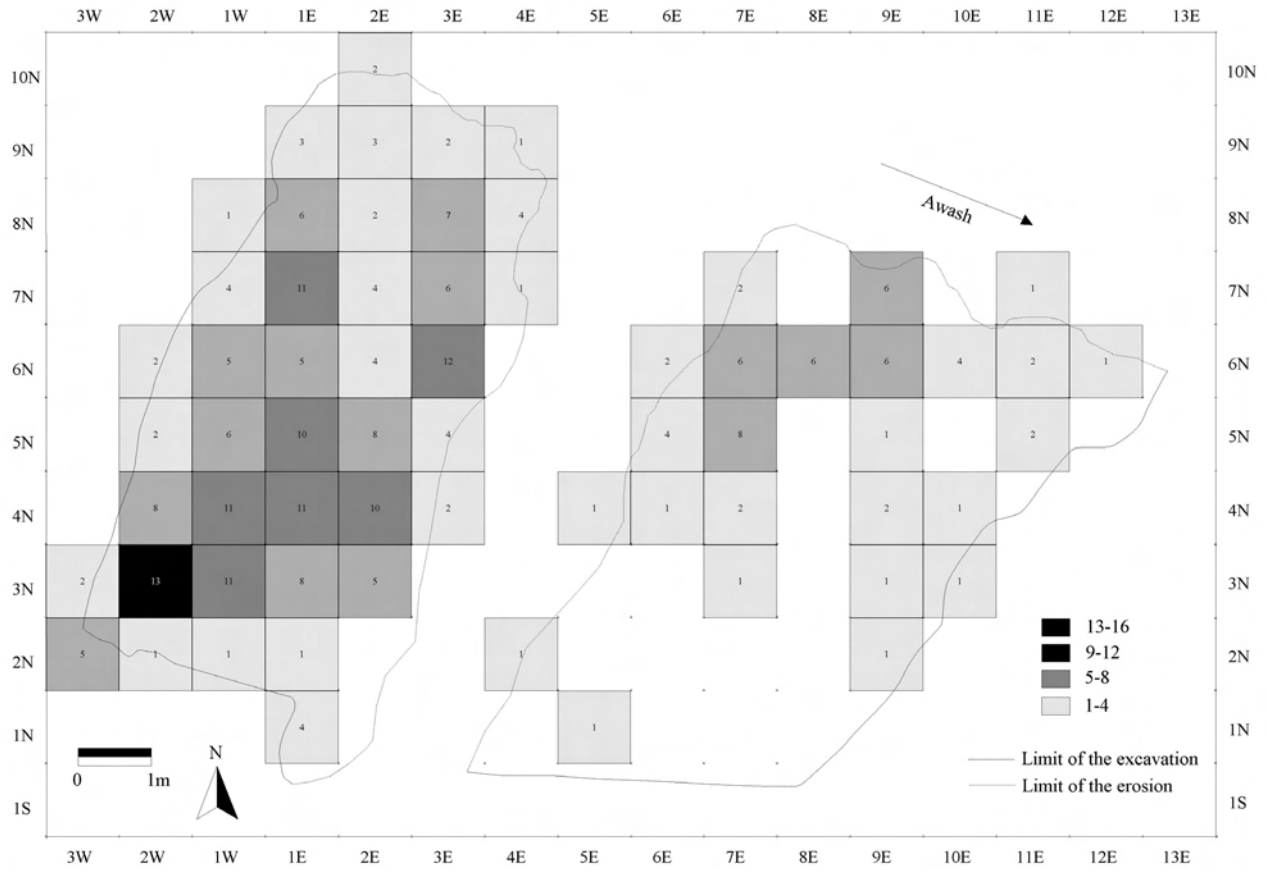

Plate 43. Garba IV D. Frequency of cores of various volcanic rocks.

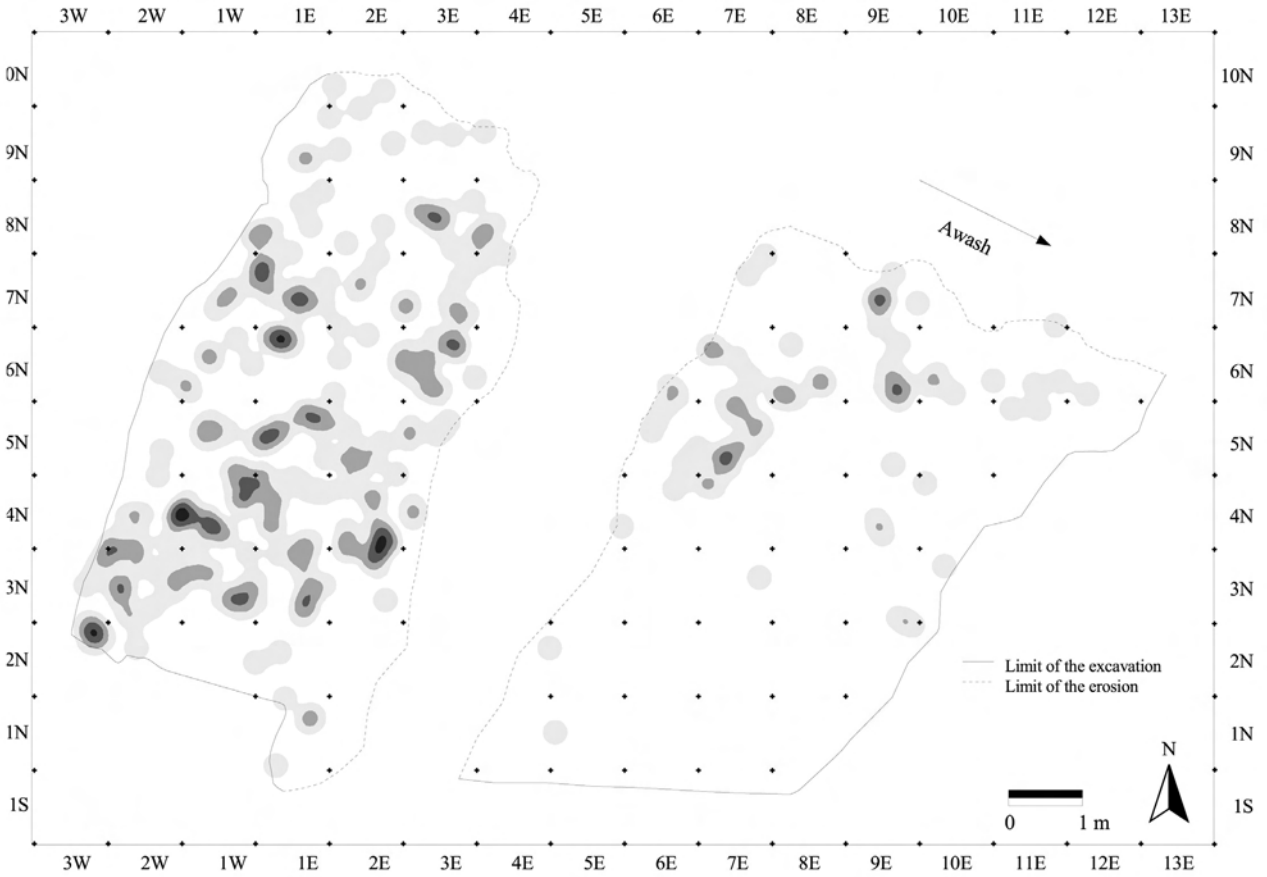

Plate 44. Garba IV D. Density areas of cores of various volcanic rocks.

Even more significant is the distinction between these two maximum density zones, which, while very close, appear to be separated both in the plan and in the section by a small zone where finds are sparse. This suggests that the concentration of remains in those areas is actually connected to the proximity of the large basalt blocks.

The concentration of the obsidian industry near the basalt blocks appears to be numerically less significant in the WS. However, in the north-eastern portion of this sector, the concentration of material around the two blocks appears to be distinguished, in its northern part, from the ample high-density zone which seems to end along a SW-NE line in square 3N. These phenomena are not observable in the northern part of the sector.

Conclusions

Considering the high number of finds, paleosurface D of Garba IV seems to be the result of a series of anthropogenic activities and post-depositional events that occurred over quite a long time period, that is impossible to define. It is logical to think, as indicated by the taphonomic analysis of faunal remains (see Fiore, Tagliacozzo, in this volume), that hydrological events played an important role in the formation of this deposit, considering that it lies near the main bed of a river with a significant flow. The paleosurface was further disturbed by incision of a gully caused by one of the tributaries of the Awash which destroyed the whole central portion of the investigated area.

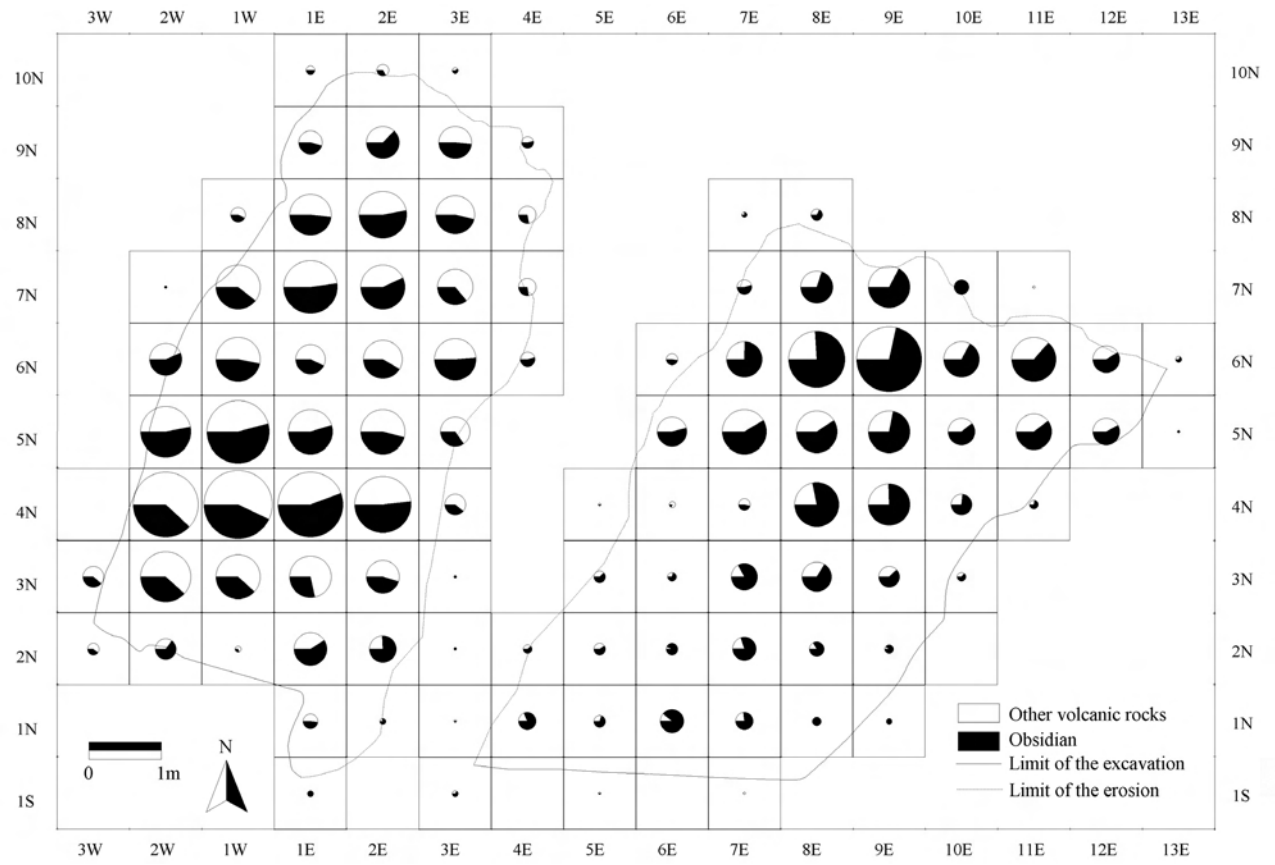

Plate 45. Garba IV D. Relationship between lithic material of obsidian and other volcanic rocks.

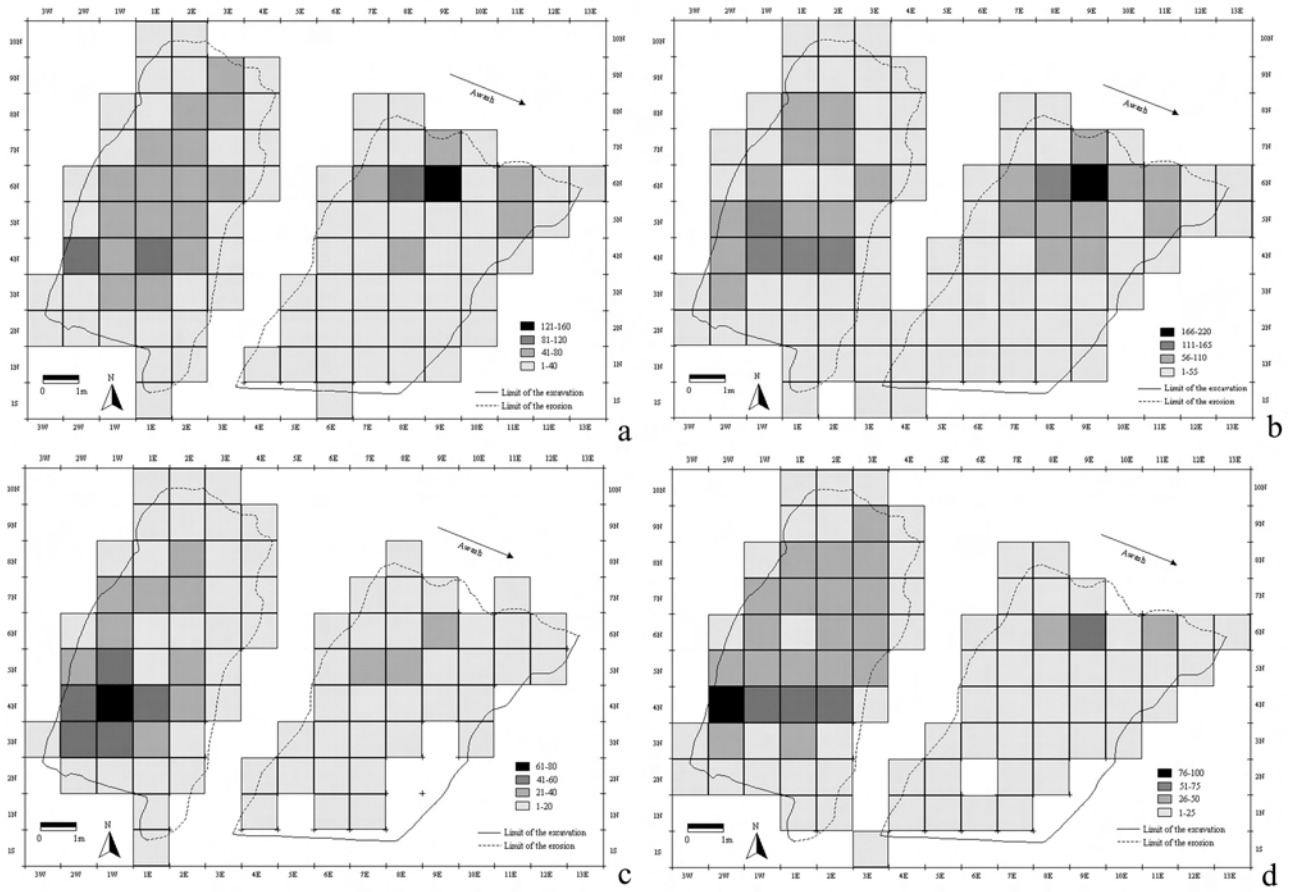

Plate 46. Garba IV D. a) frequency of faunal remains; b) frequency of obsidian flakes, tools and cores; c) frequency of basalt pebble tools; d) frequency of basalt flakes and tools on flake strewn all over the surface of the WS.

It is very difficult to determine whether, at the time it was frequented by humans, this site was a pebble beach like the ones presently found along the course of the Awash. The unmodified pebbles are distributed throughout the entire thickness of the layer, and not exclusively at its base.

Furthermore, although some of these pebbles are of ignimbrite, and hence scarcely suited to being worked (Kieffer *et al.* 2002), many others are of basalt and other volcanic rocks that are widely used for lithic tools.

The mechanism responsible for supplying obsidian was completely different.

While one often finds obsidian pebbles on the present-day beaches of the Awash, only 9 were found on paleosurface D, out of 6654, the rest being of basalt and other volcanic rocks. It follows that obsidian, which was a material of primary importance, considering the number and characteristics of tools made of it, was not directly available on the site, while many cortical obsidian flakes suggest the utilization of raw material whose original shape and size was certainly different from the ones observed on the obsidian pebbles found at Garba IV D.

The pattern of the spatial distribution of the finds, when considered globally, appears totally random. Nevertheless, by breaking down the evidence and analysing in detail the spatial trends of the different categories of finds, it appears possible that some zones of paleosurface D may harbor a kind of “memory”, if not of their original distribution, at least of some associations attributable to anthropogenic action (D’Andrea *et al.* 2002).

Although the zones with high and low concentrations of finds remain more or less constant, regardless both of raw material and object category, variations in frequencies could provide some interesting information.

The lower half of the WS is the largest high-density zone. Here, all the categories of finds are present in more or less important quantities, but without especially significant differences. There is slightly less evidence in the upper half, but it does not show any significant spatial patterns. The only noteworthy element – aside from the semicircular barren area – is the constant proximity of the large basalt blocks and the remains of large fauna. This association is also observable in the ES, but here one also finds a very high number of cores, modified and unmodified flakes, and especially tools on flake and small obsidian debris. Indeed, the two areas with the highest densities seem to be connected to, and possibly determined by, the presence of the large basalt blocks more directly than in the WS. In the same zones one also finds many unmodified pebbles strewn all over the surface of the WS, while pebble tools and broken and battered pebbles are extremely rare.