Straus L.G., Otte M. et Haesaerts P. (éds.), *La Station de l'Hermitage à Huccorgne*. Liège, ERAUL 94, 2000.

CHAPTER 14

SPATIAL ANALYSIS OF THE GRAVETTIAN LEVELS AT HUCCORGNE

Anthony E. Martinez

INTRODUCTION

Huccorgne is an open-air site located in the Méhaigne river valley of Belgium. Situated near sources of Maastrichtian Hesbaye flint, this loess deposit was excavated initially in the late 1800's and periodically thereafter through the mid 1970's by a series of amateur and professional researchers. Under the co-direction of Lawrence Straus of the University of New Mexico and Marcel Otte of the Université de Liège, this site was re-excavated in 1991-1993 (see Chapter 1, Figure 3). These excavations have revealed a series of deposits of Gravettian affiliation which date preliminarily to 23,170 +/- 160 BP via conventional radiocarbon and several AMS dates in the range between 26-28 kya (this volume). Artifacts encountered in these excavations included a thin scatter of chipped stone artifacts located in a beige, compact loess associated with poorly preserved faunal remains including reindeer, horse, and mammoth.

This study considered only Gravettian materials from this site, as the Mousterian occupation was significantly removed spatially from the Gravettian materials. This resulted in the analysis of materials from edge of the main ("Dock") Gravettian site area and a four square meter area on the western edge of the Gravettian occupation near the road right-of-way. Additional excavation material was also evaluated in this study in the form of collections from the INRSB Haesaerts 1976 and 1980 excavations along the roadcut on the western edge of the major area of the Gravettian occupation. Though an attempt was made to gain access to the substantial amateur Destexhe collections from excavations in 1969-1970, these materials unfortunately remained unavailable for consideration.

This study presents the analysis of spatial patterning of the Gravettian levels at Huccorgne and addresses issues of:

-What evidence is there for the presence of 'structures' or activity areas on the site?
-Can areas where artifact refits were found be isolated mathematically?
-Can an occupational link be made between the Gravettian materials recovered from the UNM/ULG excavations and those recovered by Haesaerts in 1976 and 1980, and studied by Straus in 1992 and Martinez in 1993.
-What evidence can be discerned for distinct occupational episodes or horizons at the site?
-What evidence is there for disturbance or re-working of archaeological materials?

MATERIALS AND METHODS

The methodology used for examining the site structure at Huccorgne involved using both quantitative analysis techniques as well as examination of the lithic assemblage for the

presence of direct refits. Data analyzed included all piece-plotted artifacts from the easternmost excavation areas of the 1991-1992 University of New Mexico / Université de Liège excavations and the area excavated by the Institut Royal des Sciences Naturelles de Belgique excavations in 1976 and 1980. These areas were chosen as they represent collections from the main ("Dock") site, and internally contain the widest horizontal spatial extent.

DATA COLLECTION AND DATABASE CONSTRUCTION

1991-1992 excavations

Data in this set were collected by the University of New Mexico and the Université de Liège during 1991-1992. Field provenience data used in this study are of two types. Artifacts and teeth >= 1 cm and bones >= 5 cm in length were plotted relative to Cartesian space, while smaller finds were collected in arbitrary 5-8 cm levels (spits) and 50 x 50 cm sub-squares. Stratum, excavation square, sub-square, and spit data were recorded for all artifacts. For those elongated items which were piece-plotted, orientation relative to magnetic north and inclination of primary and (sometimes) secondary axes relative to the horizontal level were also recorded.

Following construction of a database containing field provenience and laboratory analysis information, data were re-coded into new variables using several criteria. First, lithic raw material types were collapsed into a new dataset containing general probable source and material information in such a fashion that the full analytical list (see Straus, chapter 8, Table 1, this volume) was condensed into:

flints and cherts (implies local Hesbaye nodules)
limestone (implies local outcrops)
sandstone and siltstone (“Brussels” sandstone and possible Paris basin source)

Next, due to small sample sizes for some categories, a similar process (see Straus, chapter 8, Table 2, this volume) was used to lump debris categories into:

cores and platform renewal flakes
blades
flakes
debris (items less than 1 cm, equivalent to Straus's microdébitage)
cortical lithics
noncortical lithics
tools

Poor faunal preservation prevented identification of all but a few bones and teeth. Identified bones were also plotted in Cartesian space by faunal type as was the general assemblage of all identified and unidentified bones and teeth.

1976 and 1980 Excavations

The 1976 and 1980 excavation data were collected under the direction of Paul Haesaerts of the Intitut Royal des Sciences Naturelles de Belgique (IRSNB). These excavation areas are primarily along the modern roadcut through the oxbow ridge. Most items in this series were piece-plotted and mapped during excavation. Lawrence Straus of the University of New Mexico

analyzed all collections during 1992 using the laboratory methodology developed for the South Belgium Paleolithic Project for lithic debitage and refit analysis. Anthony Martinez of the University of New Mexico, Kilian Melloy of St. John's College, and James Noone of the University of Michigan conducted further refit analysis of these collections in 1993.

Artifact locations were reconstructed from field maps provided by Haesaerts, and integrated into the database developed for the South Belgium Paleolithic Project. Due to difficulties in relocating the exact location of the IRSNB site datum and changes in site topography between 1976 and 1980 and 1991-1992, artifact locations relative to the UNM/ULG excavations cannot be considered to be exact. The IRSNB collections do, however, make an important contribution to the overall understanding of Huccorgne in that site taphonomy over a larger physical area can be inferred based upon these curated resources. It should be noted, however, that a significant gap in the spatial data exists in that it was not possible to gain access to or analyze the considerable collections made by J. Destexhe in 1969-1970 in the area between the Haesaerts and Straus/Otte excavations.

REFIT ANALYSIS

For the purposes of general integration of the methodology and results of this analysis with respect to the analysis of archaeological site structure, a brief summary of the refit methodology is presented here. This methodology involved the systematic observation of all chipped stone implements that possessed morphological characteristics that matched the color, patination, cortical surface, grain size, and inclusions of the core. Then, pieces were conjoined to the core on the basis of any attributes of Hertzian morphology that might indicate a direct correspondence. Maps detailing refit sets were then prepared and compared to the quantitative distribution maps prepared using the method described below.

Quantitative analysis

The discontinuity between and relatively limited area excavated in each of the data recovery location presented a significant challenge to the quantitative study of the Gravettian materials at Huccorgne. In a broader context, however, the goals of study were quite straightforward – namely gaining insight into the human uses of Huccorgne during the Gravettian period. In addressing this goal, the application of highest density regions (HDR's) was chosen in conjunction with the graphical display of artifact distributions using a kernel-based spatial intensity function.

Highest density regions (HDR's) have been demonstrated by Hyndman (1994) to be useful in the analysis and display of multimodal distributions. Also used in Bayesian analysis, HDR's have also been called credible sets, plausible sets, and Bayesian confidence sets (Box and Tiao; 1973). In practice, they are defined by the assumption that every point inside a region should have a probability density at least as large as every point outside a region. Defined formulaically, HDR's can be calculated using the following function (Hyndman 1994).

Let $f(x)$ be the density function of a random variable X. Then the 100(1-α)% *HDR* is the subset $R(f_\alpha)$ of the sample space of X such that:

$$R(f_\alpha) = \{x : f(x) \geq f_\alpha\}$$

where f_α is the largest constant such that $\Pr(X \in R(f_\alpha)) \geq 1 - \alpha$.

The HDR derived from this function covers the smallest possible volume in the sample space of *X* and the mode is contained in every HDR.

As applied to the analysis of Gravettian materials at Huccorgne, HDR's were calculated for a series of major artifact classes or combination of classes representing 25%, 50%, and 75% of the artifact distribution for each class. In other words, class membership was defined on the basis of percent membership within the HDR as opposed to percent contribution to the overall assemblage. This was intentionally done to assist in the comparison of vastly different sample sizes within certain artifact classes. The goal in doing this was directed at better understanding the human use of space at Huccorgne and to evaluate overall patterns and test for concentrations of similar materials that could be remnants of activity areas on the site.

The representation of this data was done graphically through the use of spatial intensity maps detailing HDR's for each artifact class studied. To help prevent the introduction of "noise" in the data as a function of irregularly sized grid collection units (especially in the eastern excavations along the railroad cut) a kernel-based approach was used in the preparation of spatial intensity maps. The kernel method uses a weighted function of the points in the surrounding region of influence (here applied as other artifacts of like type within 0.25m of the item being evaluated. Within this region of influence, a quartic kernel estimator is applied that estimates of the intensity of a spatial point pattern (Kaluzny *et. al*; p160).

In practice, this means that the maps produced have a "smoother" appearance at the expense of a loss of resolution in picking up small-scale variations in the data distribution. This loss, however, also results in greater ease in detecting overall trends that may be better suited to answering questions about site integrity, site structure, and the human use of space at Huccorgne during the Gravettian period.

RESULTS

1976 and 1980 excavations

Distinct clustering in horizontal and vertical space is evident with the Haesaerts collections. There is, however, also evidence for some potential mixing of materials in vertical space.

The HDR of the flake distribution (Fig. 1) indicates strong clustering in P115-117 with high frequencies also being present in P121. Moderate clustering is also present in portions of P118 and P119. The vertical distribution of flakes in the Haesaerts excavations indicates that artifacts appear to be scattered along a low slope trending from the north to the south. Clustering in vertical space is of note in that the HDR suggests the presence of potential occupation surfaces in P115 and P118-P119. In addition, two separate occupation surfaces are possibly present in P121.

The blade distribution (Fig. 2) in the Haesaerts collection is similar to that seen in the flake distribution, with strong clustering being seen in P116-P117 and P121. Moderate clustering is again present in P118. As with the flakes, potential occupation surfaces are suggested in vertical space, with one surface being seen in P115-P119 and two surfaces being suggested in P121.

The debris distribution (Fig. 3) in the 1976 and 1980 excavations is of note in that strong clustering is seen at the top (P116) and bottom (P118-P119) of the low, north-south trending slope, as well as in P121. Moderate clustering is present in P117. The vertical profile of this area again suggests a possible surface within P118-P119, and two possible occupation surfaces in P121.

Cores and tools (Fig. 4) in the Haesaerts collections are largely confined to P115-P116, with additional items being present in P121. Again, artifacts are scattered along a low, north-south trending slope, with one potential surface crossing P117-P118. In contrast, artifacts in P121 are distributed between what appear to be two separate lenses.

Mapped lithic refits (Fig. 5) in the Haesaerts collection are present in P115-P117 and P121. Those present in P115-P116 are located near the top of the low, north-south trending slope, and direction of refit is essentially down along the slope from north to south. The four refits in P121 essentially follow the same general trend as the artifacts in the northern portion of the excavation area, but at a reduced slope angle.

1991-1992 excavations

Excavation of Gravettian materials at Huccorgne during 1991-1992 was concentrated in two separate areas. The first was along the east side of the main ("Dock") site and the second was on the western side of the site between the 1969-1970 Destexhe excavations and the 1976 and 1980 Haesaerts excavations described above.

East side excavations

Unlike the Haesaerts excavations, vertical separation of the majority of artifacts in the UNM/ULG excavations is very minimal: 25 cm at most. Horizontally, however, clear concentrations of materials are present that likely represent multiple activities and/or occupations of this portion of the site during the Gravettian period.

The flake distribution (Fig. 6) in this portion of the site is characterized by two distinct, high-density concentrations of materials, as well as a third cluster of lower density. Squares K8 and J6/7 both have “bullseyes” of flakes that are spatially distinct from one another.

The blade concentration (Fig. 7) here, by contrast, is largely restricted to J/K8 with a secondary concentration in K7. In fact, there are virtually no blades to be found in the J6/7 flake concentration.

The debris concentration (Fig. 8) in the eastern UNM/ULG excavations contrast with the blade distribution, but closely mirror the flake distribution, although debris concentrations are more spatially restricted into tighter concentrations than flakes (suggesting that they are the locations of actual knapping loci, where tiny chips and shatter would fall directly to the ground without being further transported).

Cortical lithics (Fig. 9) closely parallel the flake and debris concentration. Non-cortical lithics (Fig. 10) generally follow the flake and debris concentration, but highly HDR’s seem to match the blade distribution.

Refits (Fig. 11; see also chapter 13, this volume) generally follow the overall pattern of distinction between blades and flakes/debris. In fact, the concentration of flakes and angular debris that seem to characterize later occupation and reuse of the core are also associated with the by-products of general core reduction while blades appear to be associated with other evidence of spatially restricted general blade production.

Tools (Fig. 12) in the eastern excavations have a distribution that is somewhat different than that seen in either blade or flake/debris concentrations. Not surprisingly, many of the blades found in the general blade concentration appear to have been used as tools. Squares I/H 8, however, also have a concentration of tools that is not seen in any of the other HDR distributions.

Faunal elements (Fig. 13 and 14) were poorly preserved at Huccorgne and it is likely that those recorded are not representative of the original distribution of materials during the Gravettian period. Those present are found in essentially the same area as the concentrations of both blades and flakes/debris. Teeth (Fig. 15) generally follow the same pattern as overall bone, though a concentration was also found in I6 that matches none of the other HDR distributions and likely represents the poorly preserved elements from a single animal. Very little bone was identified due to poor preservation conditions and the creation of HDR's was not warranted due to low sample sizes. On a visual basis alone, however, reindeer and mammoth bones seem to be spatially discrete from one another with reindeer being co-associated with the blade distribution and mammoth being co-associated with the flake/debris concentration.

In addition to specific HDR's being constructed for lithic and faunal materials, a general inquiry was made on all burned items (lithic and faunal). Three concentrations of burned items (Fig. 16) appear in the HDR that appear to represent four potential hearths in H8/9, H6, J6/7 and K8. The tightness of these distributions should be particularly emphasized as it likely speaks to the issue of general intactness in this flatter area of the site.

Western Sondages on the Main Site Area

As in the Haesaerts trenches along the eastern face of the road cut, the artifacts from the UNM/ULG western *sondage* (Q-S/25-26) near the road cut are not as restricted in vertical space as those artifacts found in the eastern portion of the site. Though only a few centimeters separates them, two distinct concentrations of artifacts are present in vertical space (Fig. 17). Furthermore, the assemblage in this portion of the site appears to be on a low slope trending away from the artifacts on the eastern portion of the site and toward the Haesaerts excavations. Clear concentrations of lithic type and raw materials are present that may be indicative of separate occupations and/or activity areas. It should be emphasized, however, that excavations in this portion of the site represent only about four square meters and that inferences drawn from such a small sample may not be representative of the overall pattern of the human usage of space in this portion of the site.

The flake distribution (Fig. 18) in the UNM/ULG western Gravettian *sondage* is divided into two areas of high HDR's and one moderate HDR area (Q25/26, R26, and R25 respectively).

The blade distribution (Fig. 19) in this part of the site is virtually identical to the flake distribution, but is concentrated in the same areas.

The debris concentration (Fig. 20) also parallels the general blade and flake distribution but appears to be more spatially restricted than either of the previous HDR's and has somewhat high HDR values in R25.

Cortical (Fig. 21) and non-cortical (Fig. 22) lithic distributions also parallel preceding HDR's in this portion of the site, though cortical lithics are fairly restricted spatially while non-cortical lithics are not.

The western UNM/ULG Gravettian *sondage* is different from either the eastern UNM/ULG excavations or the Haesaerts excavations, in that a greater diversity in raw material types was present. The three primary material types recovered were flints, limestones, and sandstones. Significant spatial separation of each of these material types is observed. Flints (Fig. 23) are largely concentrated in the same location as blades, flakes and debris, while limestone (Fig. 24) is virtually a mirror image of this distribution with higher HDR values being seen in the "S" row, as well as in R25/26. Sandstone (primarily "Brussels" sandstone) (Fig. 25) somewhat parallels the flint distribution, but is much more restricted spatially. While flints dominate the overall raw material sample size, limestone and sandstone artifacts are highly restricted to this *sondage* and, of particular note, are spatially distinct within this *sondage*.

DISCUSSION

The plan and profile views of all artifact classes in the 1976 and 1980 collections paints a somewhat confusing picture. On the one hand, clear distinctions are present in flake and blade distributions in contrast to general debris. Seen in profile, real surfaces also appear to be present upon which artifact are concentrated in essentially one layer in P115-P119, but two layers in P121. Focusing on debris, the presence of concentrations of debris on top of and at the bottom of a slope with virtually no debris along the slope would be consistent with an interpretation of possible alluvial and/or colluvial (i.e., slop wash) transport. The presence of nearly all refits in the 1976 and 1980 excavations along the top of and side of this low grade further suggests the movement of artifacts along a north-south axis. Artifacts in P121 uniformly appear to be more scattered in the vertical plan with "clouding" of artifact HDR's between two potentially distinct occupation surfaces. Given that just over a single square meter describes this phenomenon, it is really impossible to do more than suggest that a potentially different depositional environment may be present in this portion of the site even though it is only a single meter away from the other artifacts found in the P115-119 series.

The western Gravettian UNM/ULg *sondage* suggests an interesting picture. On the one hand, little diversity in technological types is present in HDR distributions. On the other hand, real differences are present in raw material concentrations that may indicate genuine spatial diversity and real site structure that is the product of human behavior. Such differences in raw material type, combined with apparent separation in vertical space in lithic concentrations could easily represent the occupation of this portion of the site by different groups of individuals at different times. Should this have occurred, however, it would also suggest that the Gravattian occupants were essentially practicing the same technological tasks (core reduction and blade manufacture) in the same portion of the site using different raw materials at different times. Again, it should be emphasized that with only four square meters to consider, such extrapolations are somewhat tenuous.

By contrast, the eastern UNM/ULG excavations are characterized by virtually no separation in vertical space and major differences in the use of space horizontally. The separation of core reduction and blade production activities make a strong case for the reoccupation of this portion of the site at different times; with the temporal separation being during a period of intense cold during which severe dehydration of some core refits occurred. Similarly, distinct, "tight" concentrations of burned items are present which suggests minimal horizontal movement of materials in this portion of the site. Interestingly, faunal elements essentially fall just outside of the burned HDR's and may represent the interior of a "toss-zone" as described by Binford (1978). Tool HDR's also fall along the edge of and between multiple hearths, along the edge of a potential seating area and associated with concentrations of limestone slabs that may represent "site furniture."

CONCLUSIONS

In summary, the main questions to be addressed in this study were:

1) What evidence is there for the presence of 'structures' or activity areas on the site?

Clear distinctions are present in the UNM/ULG excavations that are likely the product of human behavior and are associated with real differences in the production of flaked-stone implements and in the reduction of lithic raw materials. The tight concentration of burned items is consistent with remnants of Gravettian hearths, and the distribution of tools and faunal remains with respect to these burned concentrations is consistent with a model of individuals sitting around a fire producing tools and processing game.

2) Can areas where artifact refits were found be isolated mathematically?

The application of highest density region analysis in conjunction with spatial intensity mapping clearly mirrors real distinctions in general blade production and core reduction activities – even among other artifacts that did not directly refit to the core and were likely not even from the same core.

3) Can an occupational link be made between the Gravettian materials recovered from the UNM/ULG excavations and those recovered by Haesaerts in 1976 and 1980, and studied by Straus in 1992 and Martinez in 1993.

A potential occupational link is not necessarily demonstrated by this analysis. Given that the western Gravettian UNM/ULG excavations comprised a very limited spatial area, and that the Haesaerts excavations have a gap between the P115-119 and P121 excavations, it is difficult to determine how materials in each of these areas is associated with the other except in a general sense.

4) What evidence can be discerned for distinct occupational episodes or horizons at the site?

Distinct occupation episodes are suggested in each of the three areas examined. In the Haesaerts excavations, P121 hints that separate occupational horizons are present. The western Gravettian UNM/ULG *sondage* similarly suggests the possible presence of two vertical lenses of artifacts within the lithic concentration. The dramatic distinction in the location of raw material types may also be indicative of separate occupational events related to lithic reduction

episodes. Most clearly, the eastern UNM/ULG excavations show through the refitting of a Gravettian core, the distinction of primary core reduction and blade production activities, the spatial isolation of burned items, and the spatial separation of tool and faunal elements with respect to possible hearth locations that this portion of Huccorgne was repeatedly occupied during the Gravettian.

5) What evidence is there for disturbance or re-working of archaeological materials?

Evidence is suggested for the disturbance and reworking of materials in the Haesaerts excavations. While tenuous, the clear separation of debris from other artifact categories along the very top and very bottom of a low slope is consistent with an interpretation of smaller items being carried downslope through colluvial and alluvial processes. Similarly, the presence of lithic refits trending from the top of to the sides of this low slope suggest the downward movement of artifacts. Should this interpretation bear out, however, it is indicative of limited movement but not major redeposition of materials in this portion of the site.

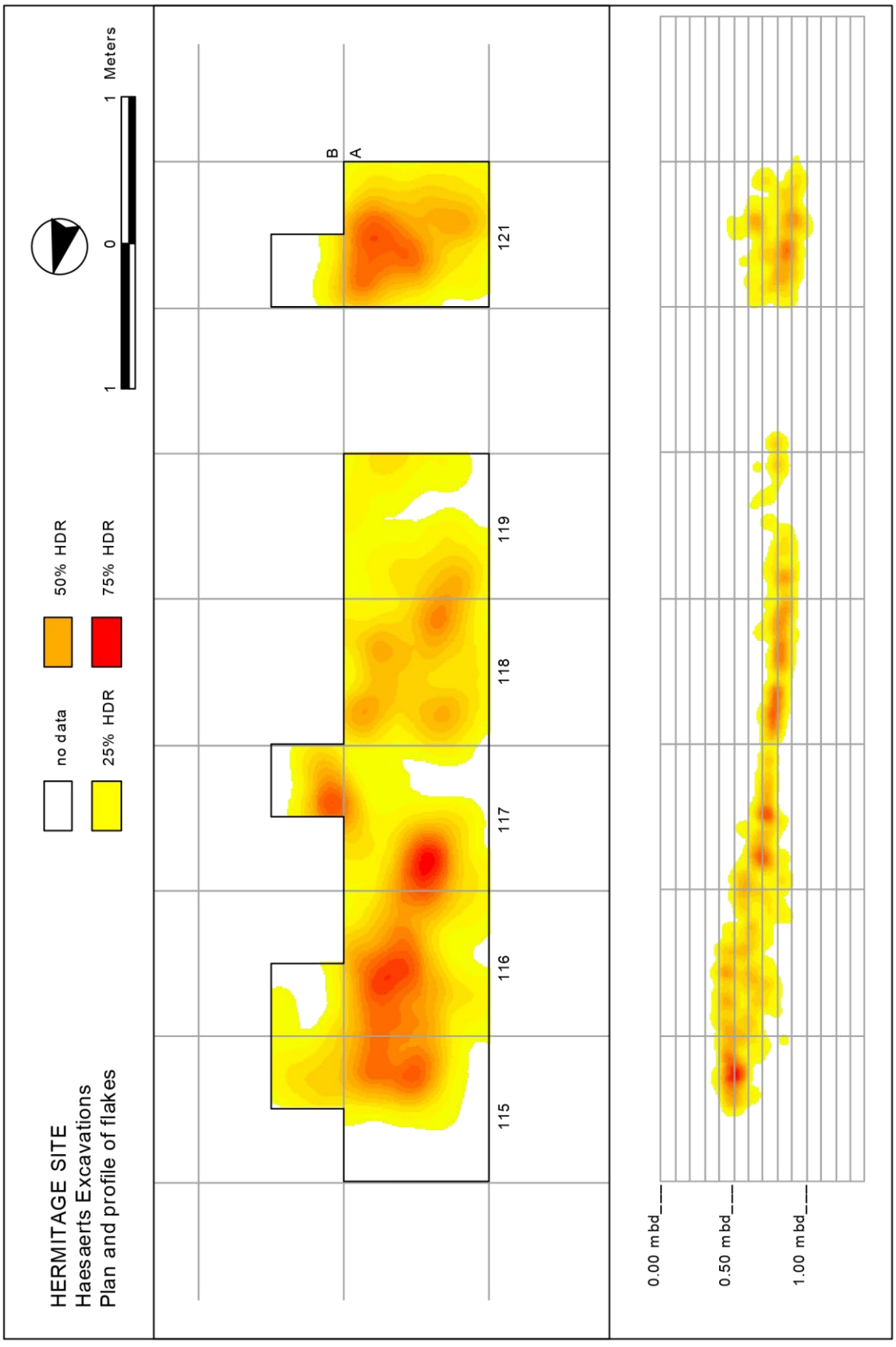
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Figure 1.

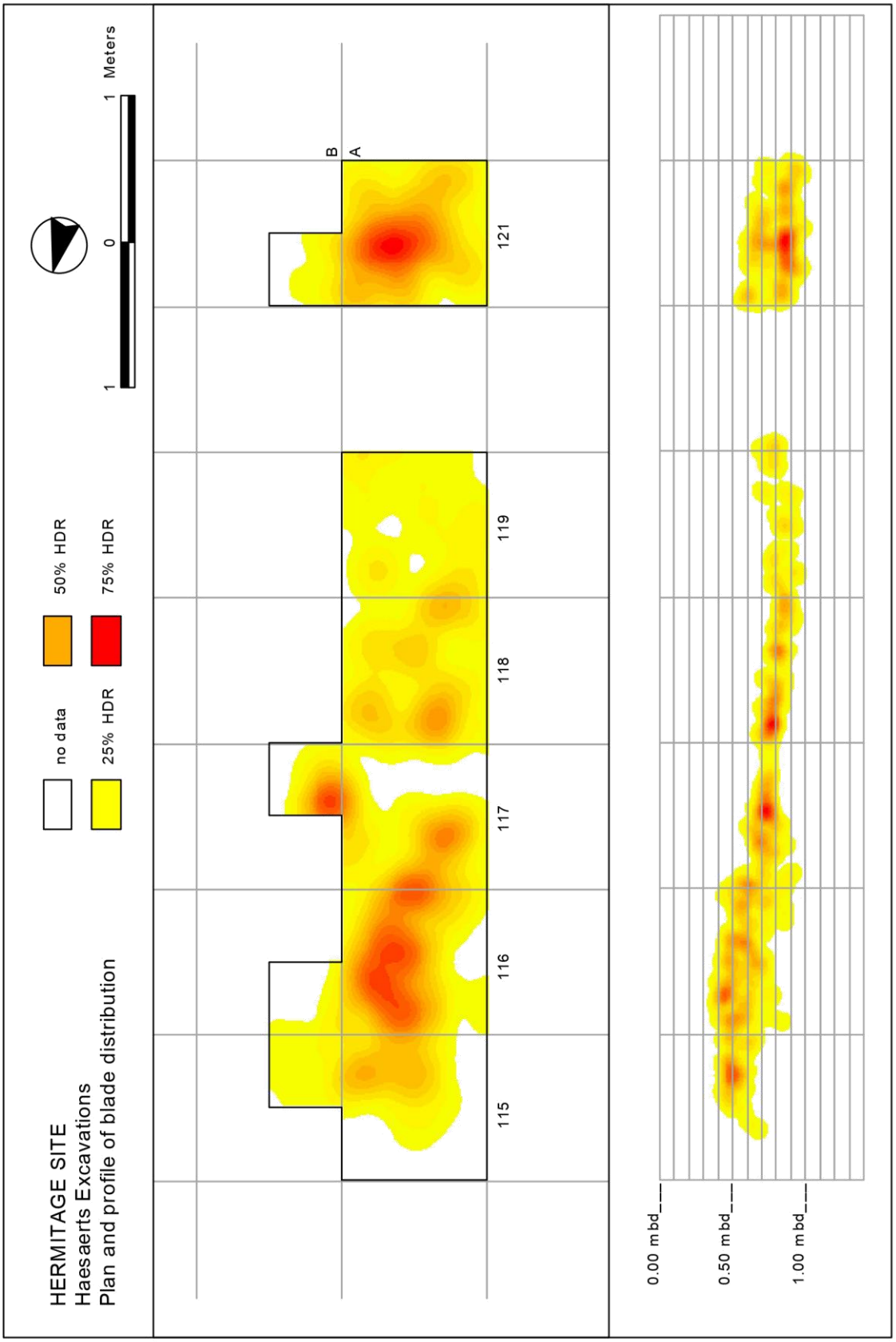
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Figure 2.

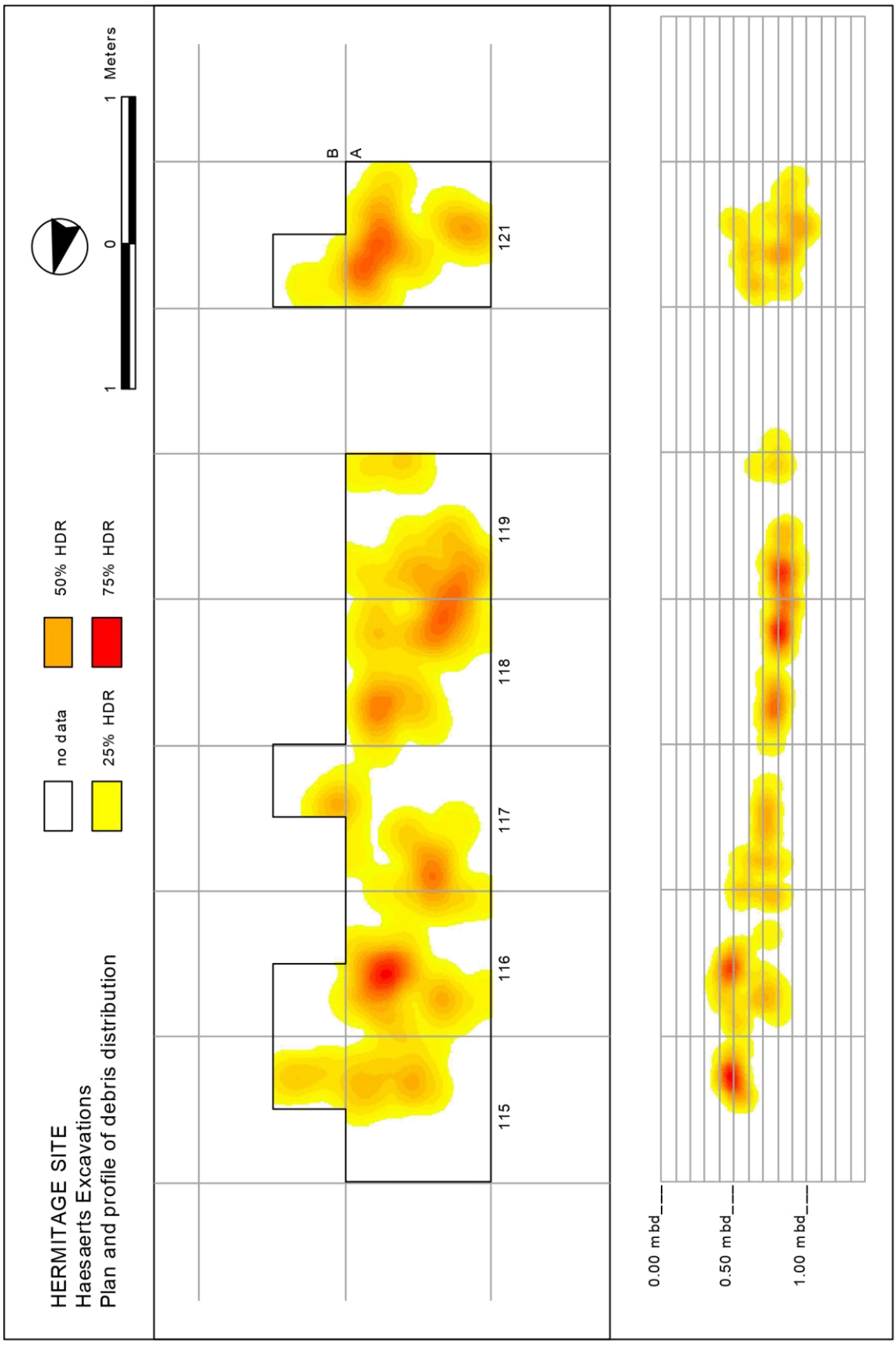
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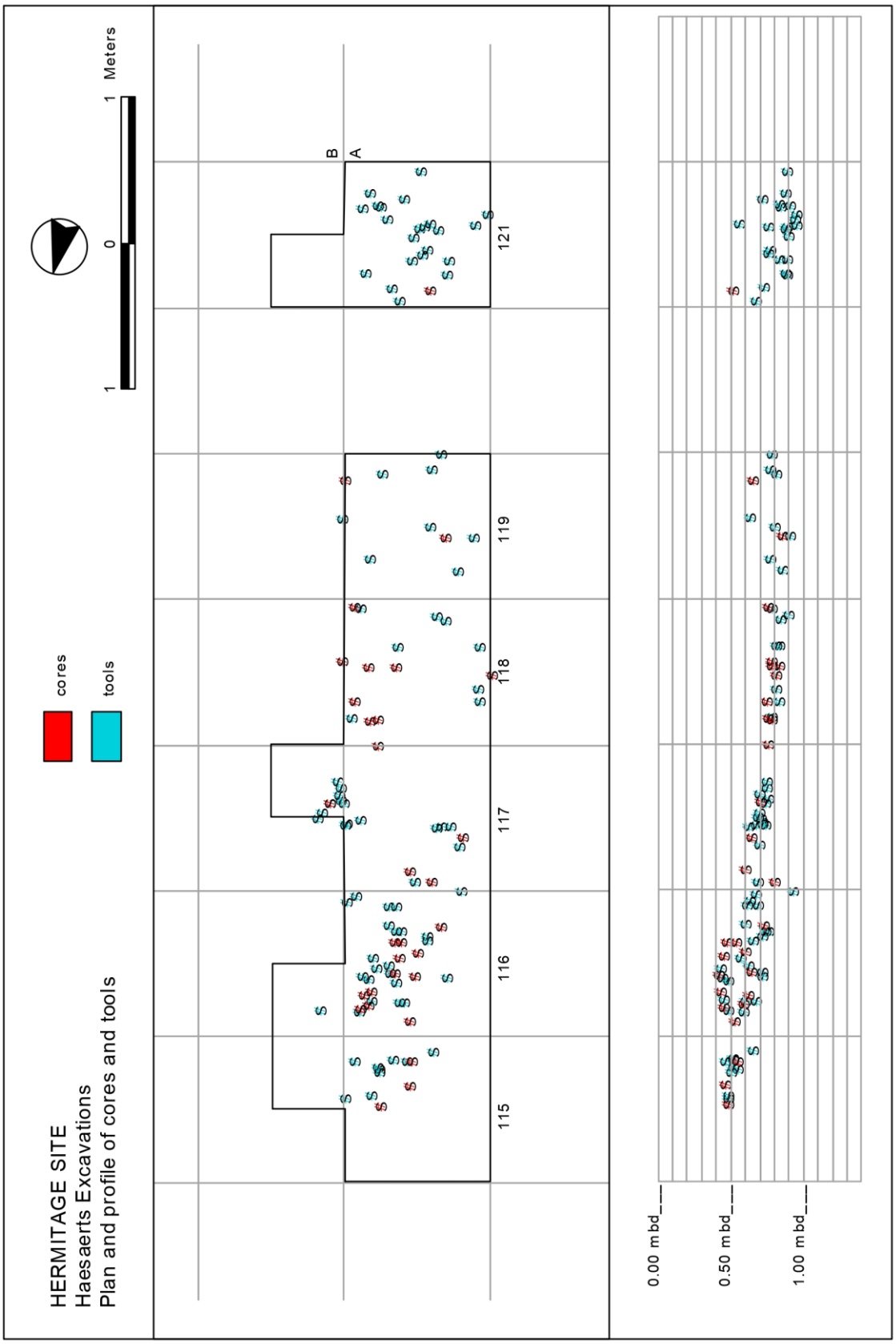
Figure 3.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Haesaerts Excavations
Plan and profile of cores and tools
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tools
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Figure 4.

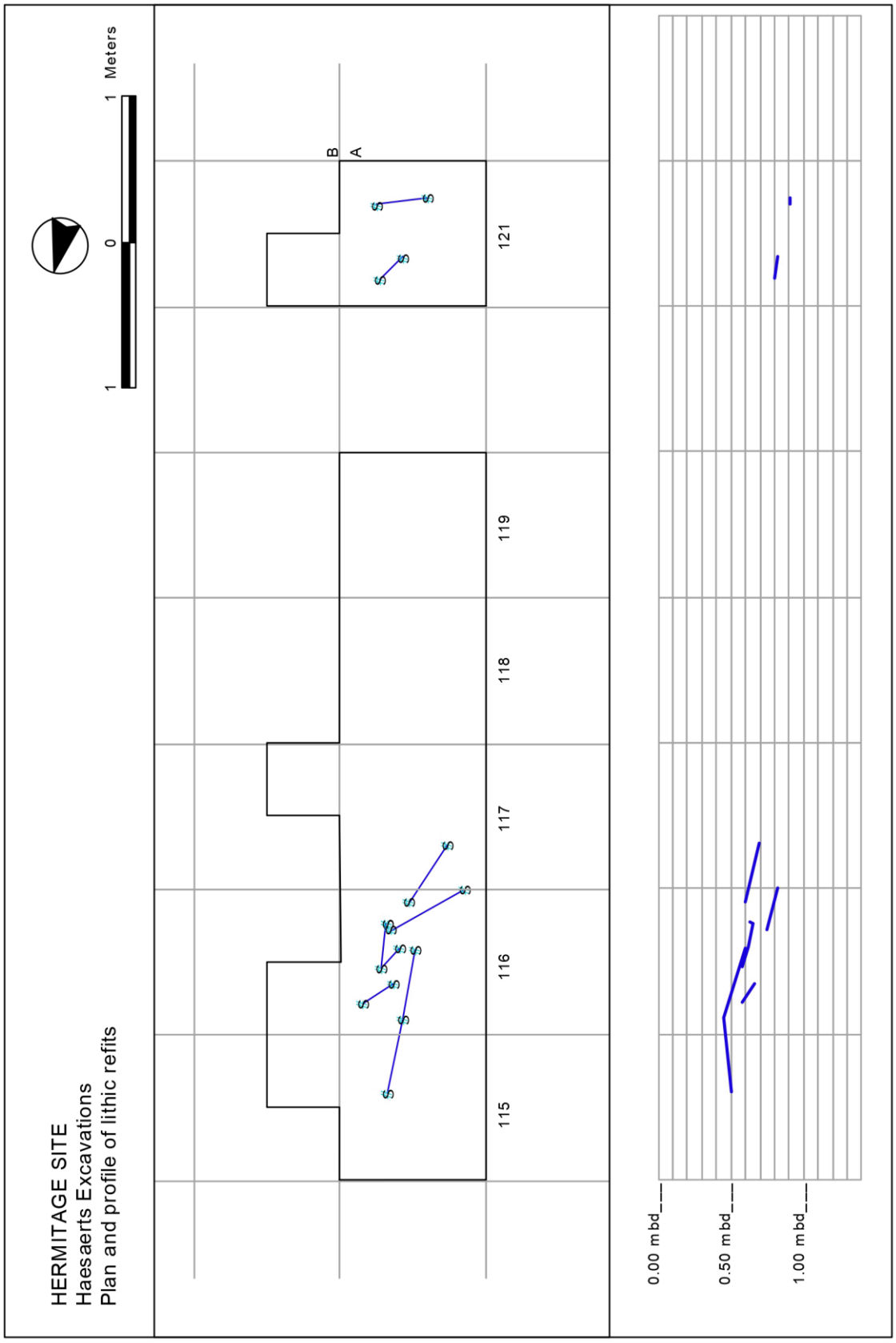
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Figure 5.

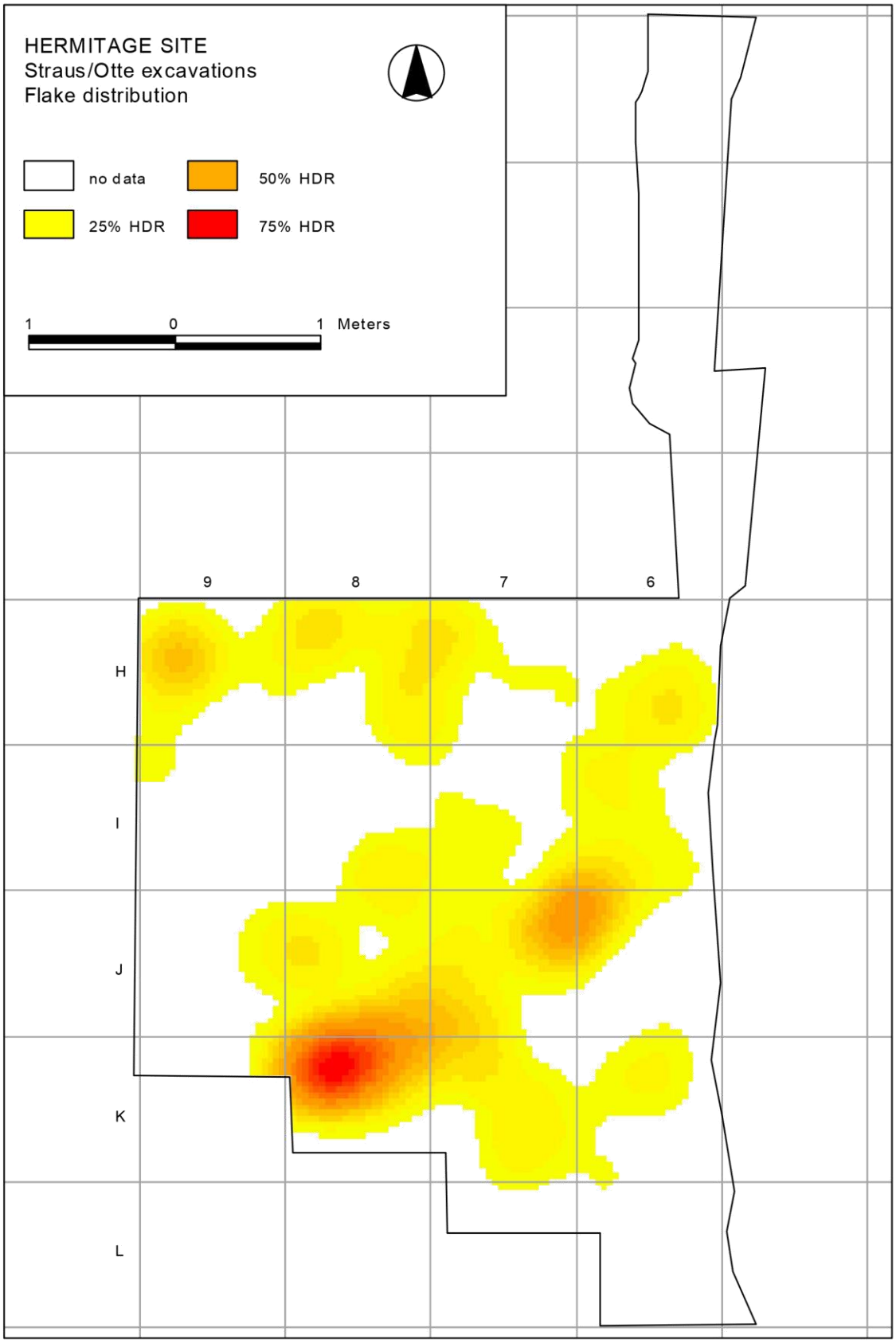
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Figure 6.

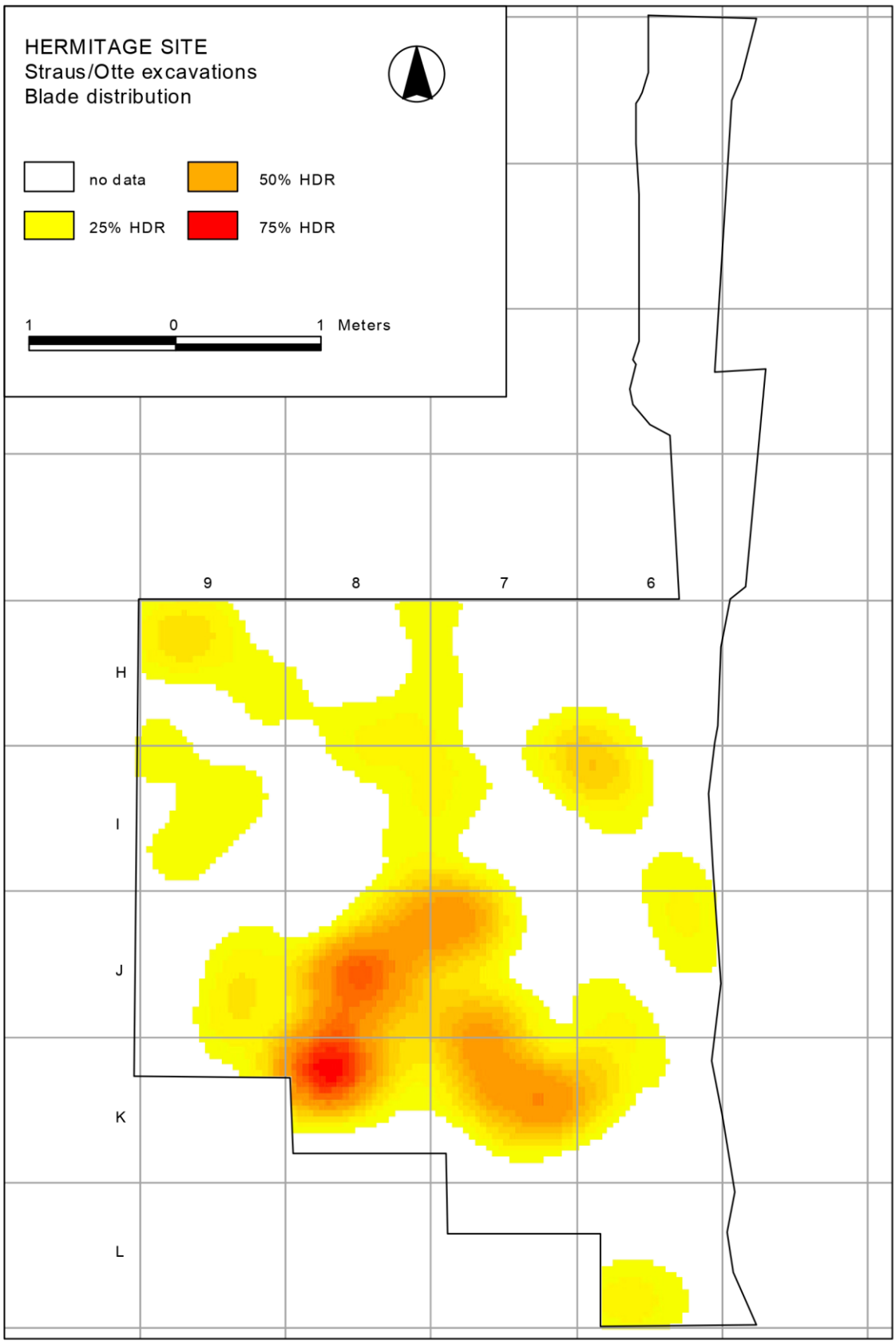
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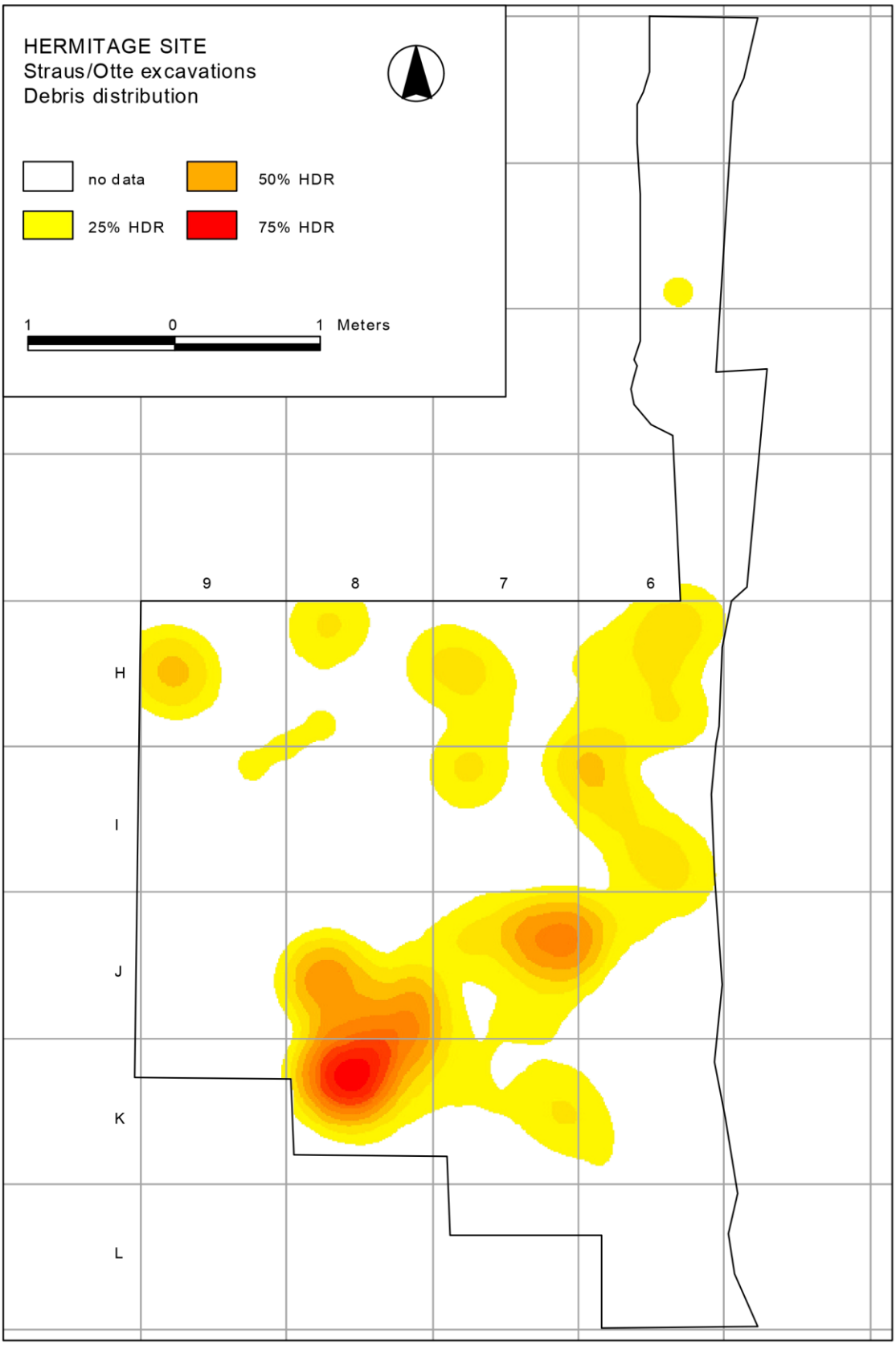
Figure 7.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Debris distribution
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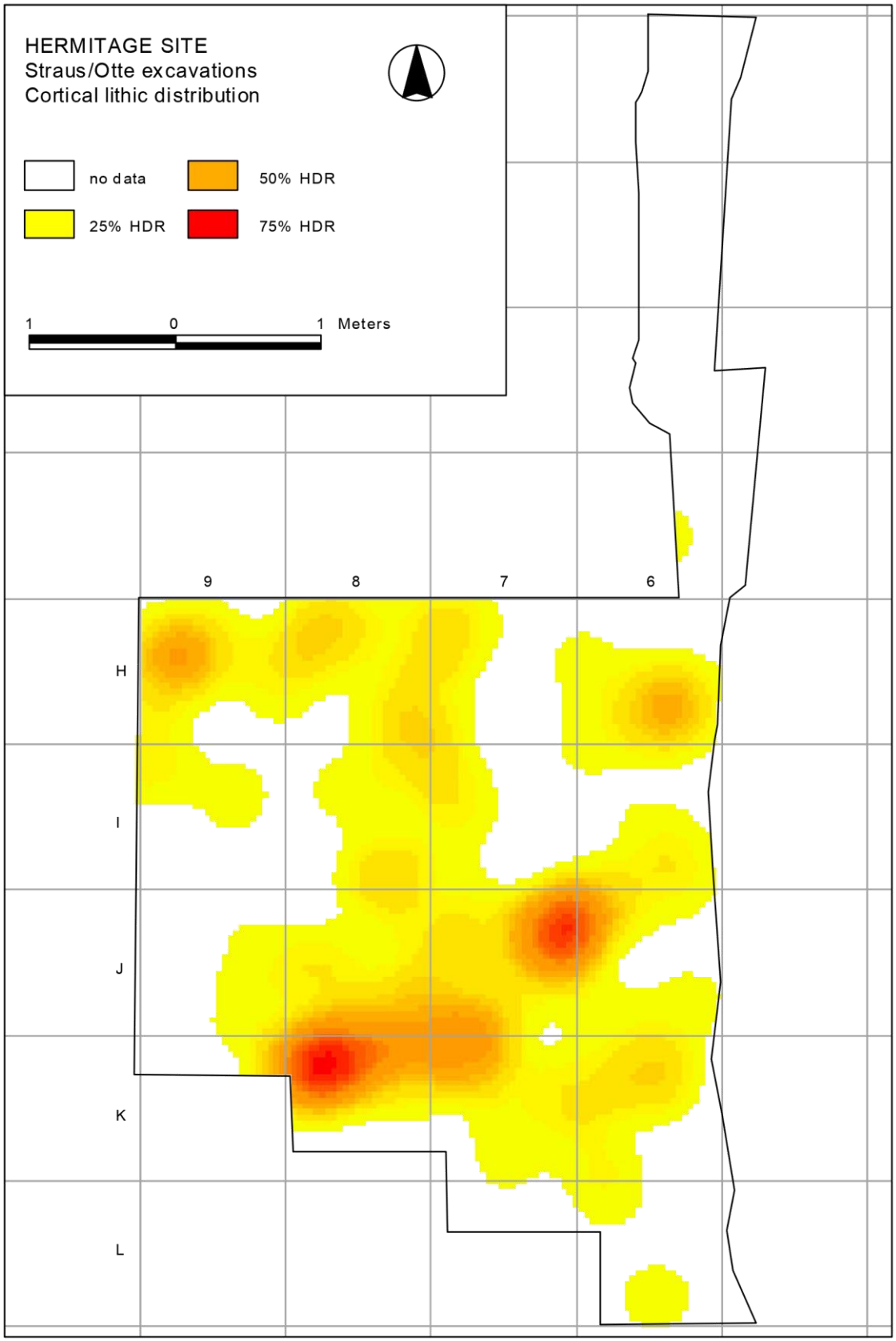
Figure 8.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Straus/Otte excavations
Cortical lithic distribution
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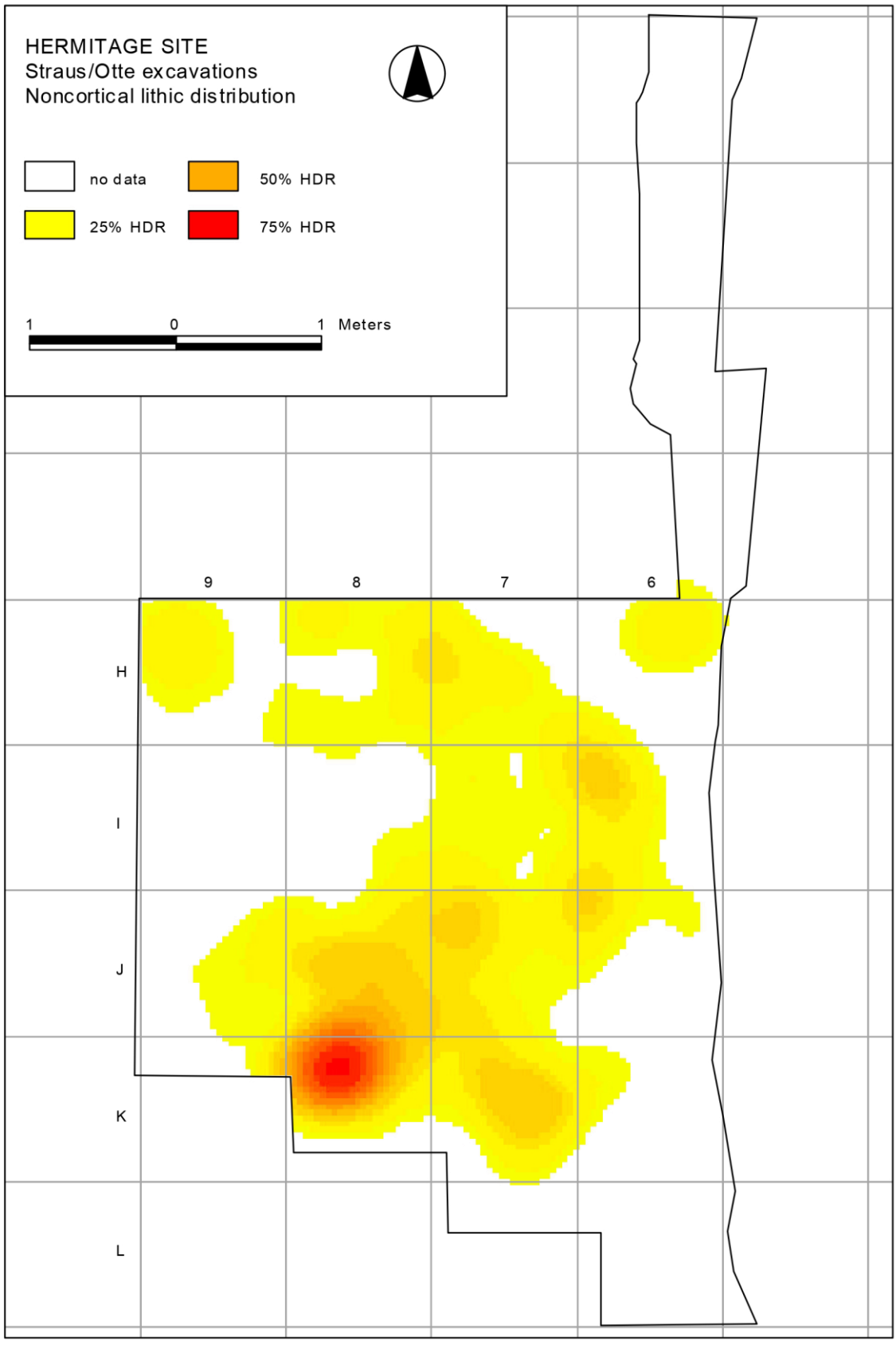
Figure 9.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Straus/Otte excavations
Noncortical lithic distribution
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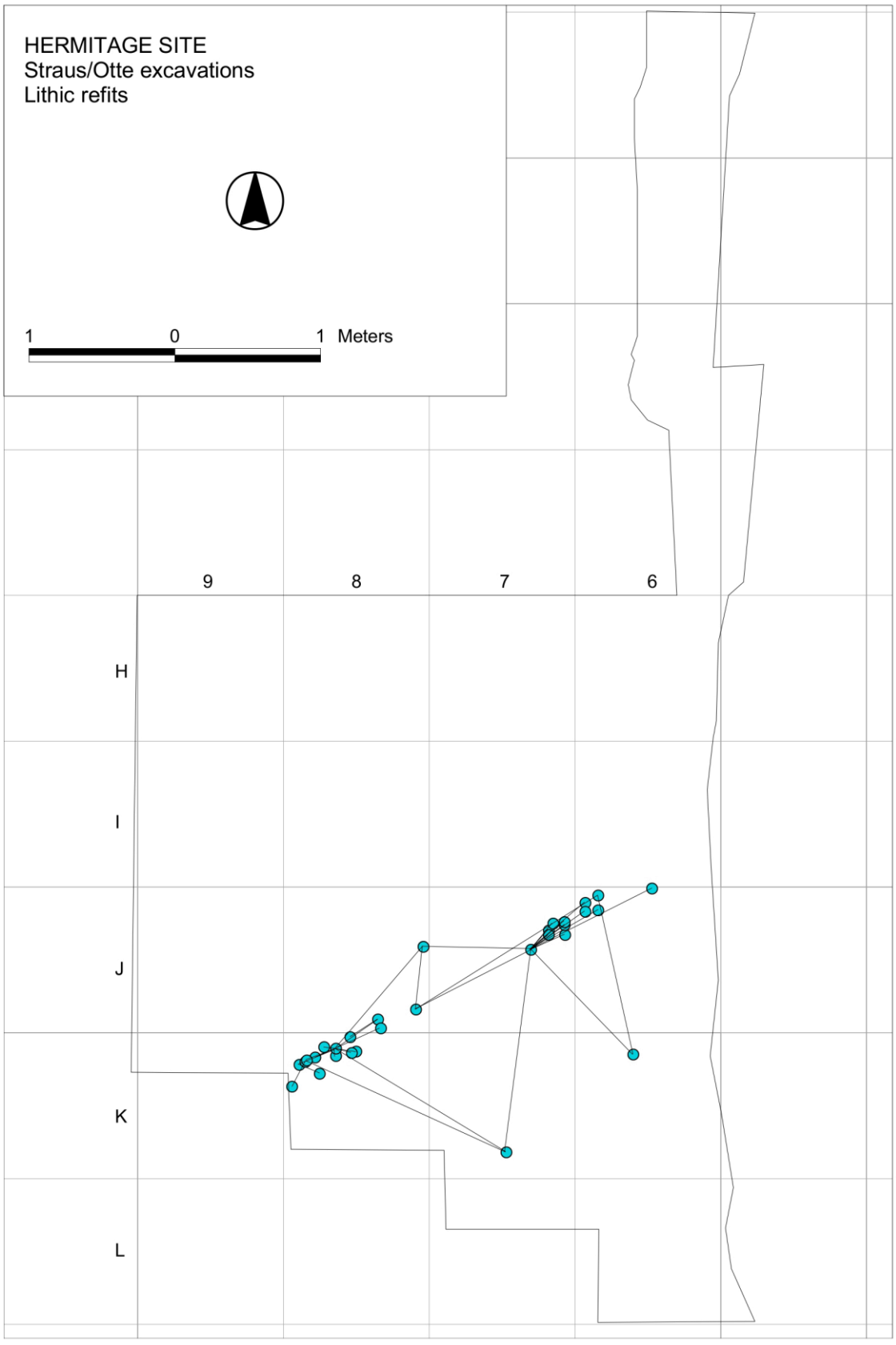
Figure 10.


HERMITAGE SITE
Straus/Otte excavations
Lithic refits
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L

Figure 11.

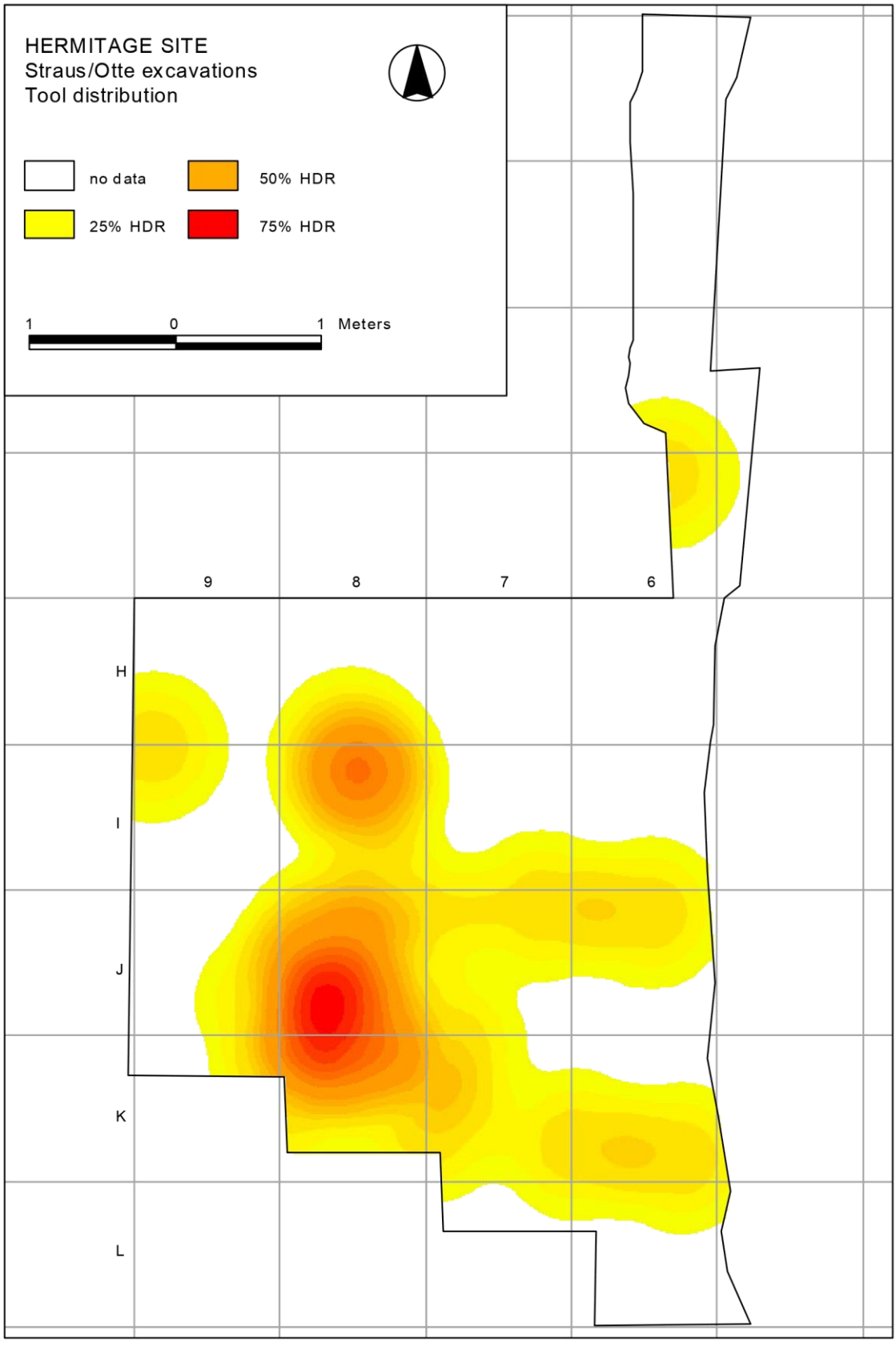
HERMITAGE SITE
Straus/Otte excavations
Tool distribution
no data
50% HDR
25% HDR
75% HDR
1
0
1 Meters
9
8
7
6
H
I
J
K
L

Figure 12.

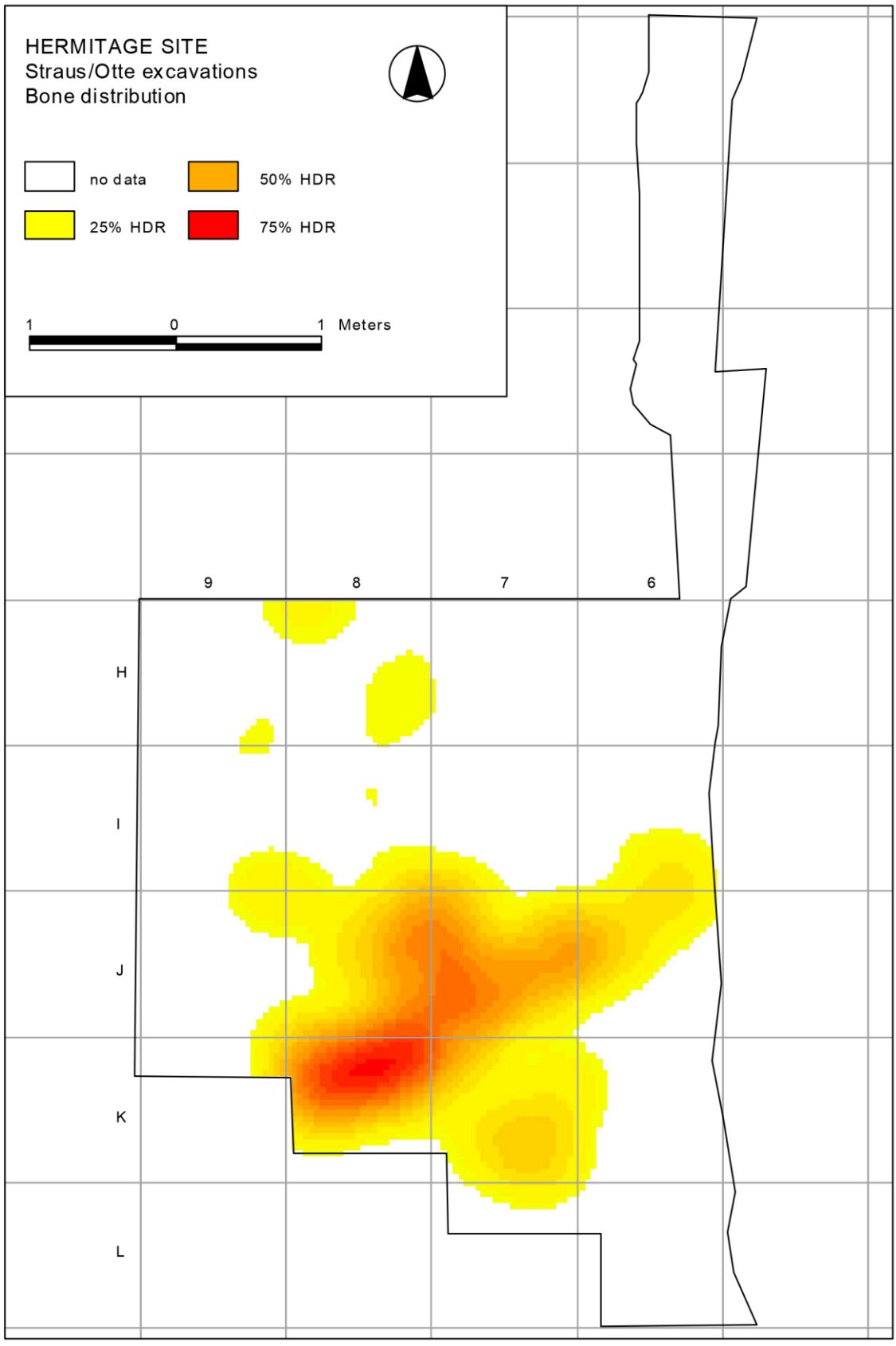
HERMITAGE SITE
Straus/Otte excavations
Bone distribution
no data
50% HDR
25% HDR
75% HDR
1 0 1 Meters
9
8
7
6
H
I
J
K
L

Figure 13.

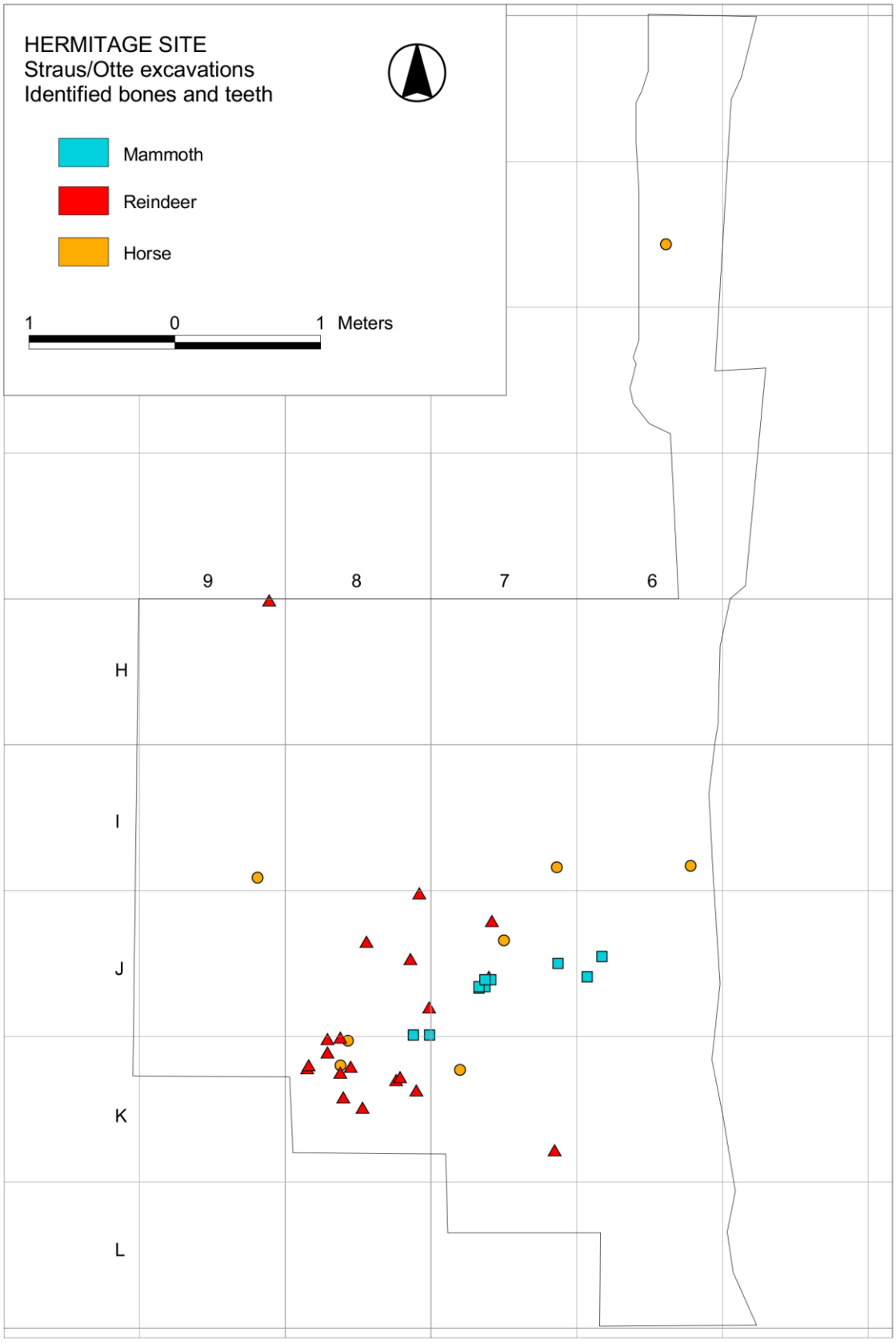
HERMITAGE SITE
Straus/Otte excavations
Identified bones and teeth
Mammoth
Reindeer
Horse
1 0 1 Meters
9
8
7
6
H
I
J
K
L

Figure 14.

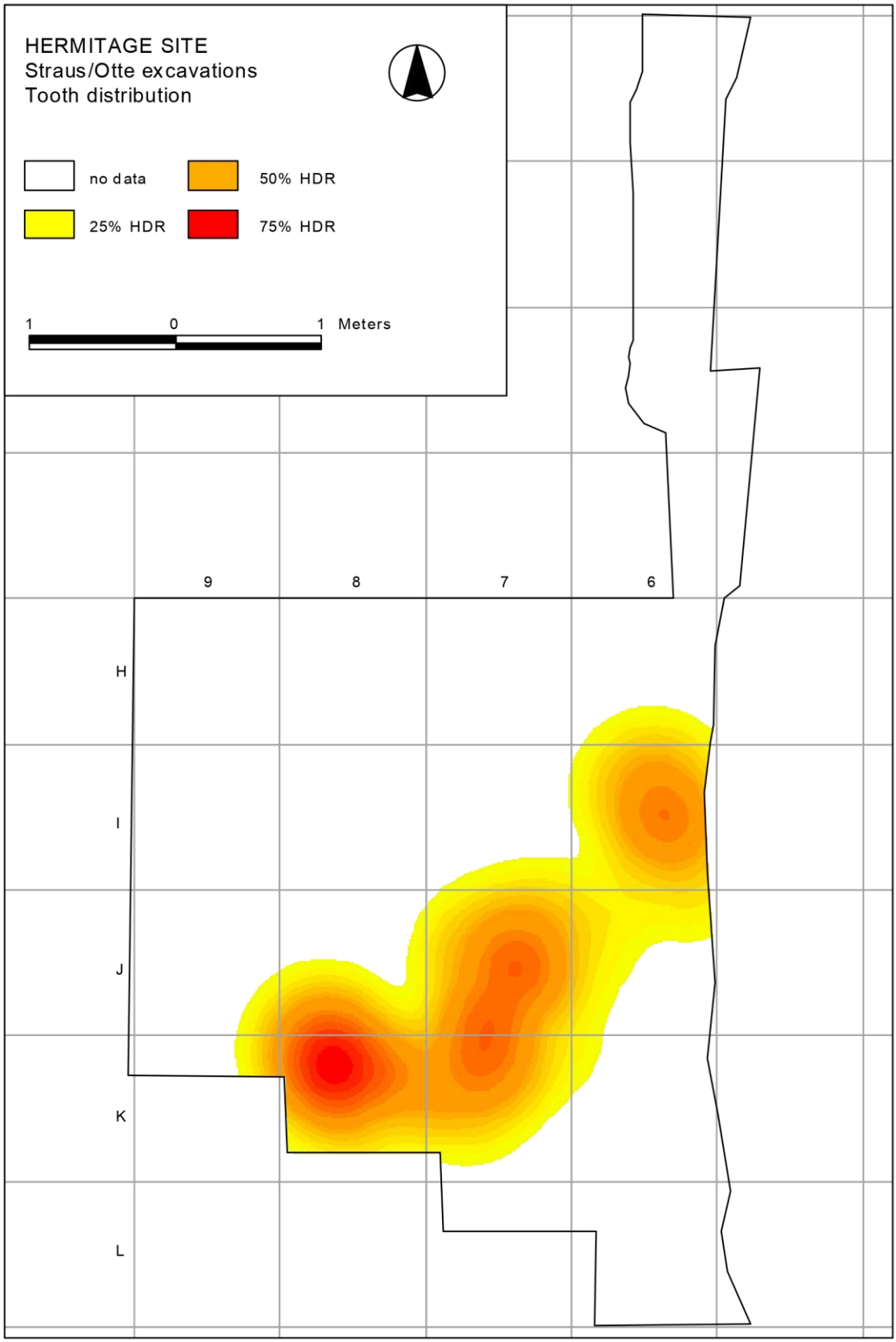
HERMITAGE SITE
Straus/Otte excavations
Tooth distribution
no data
50% HDR
25% HDR
75% HDR
1 0 1 Meters
9
8
7
6
H
I
J
K
L

Figure 15.

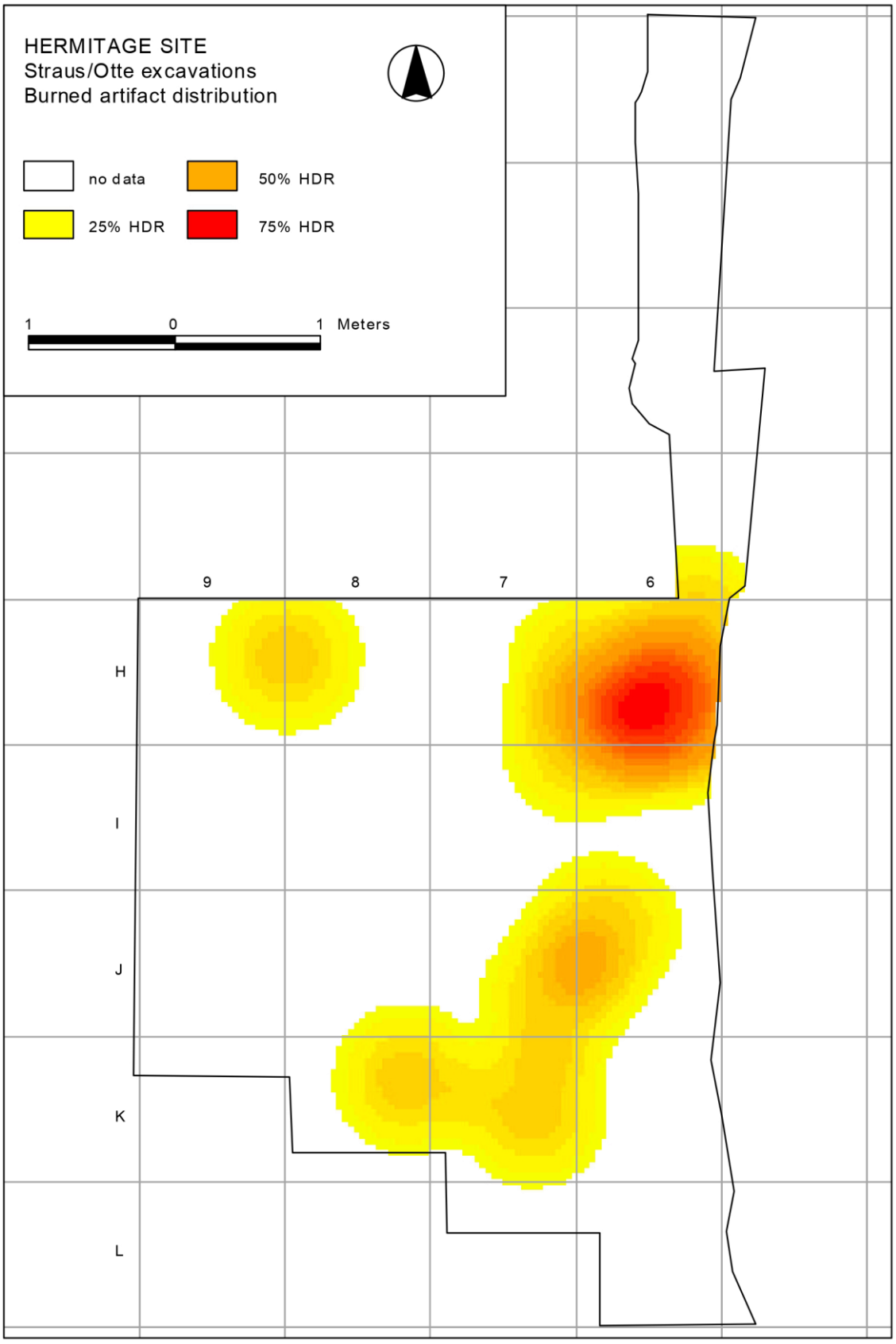
HERMITAGE SITE
Straus/Otte excavations
Burned artifact distribution
no data
50% HDR
25% HDR
75% HDR
1
0
1 Meters
9
8
7
6
H
I
J
K
L

Figure 16.


HERMITAGE SITE
Straus/Otte excavations
Lithic distribution
1
0
1 Meters
Q
R
S
26
25
View to north
Horizontal scale = 1 meter
Vertical scale = 0.10 meter
View to west
Horizontal scale = 1 meter
Vertical scale = 0.10 meter

Figure 17.

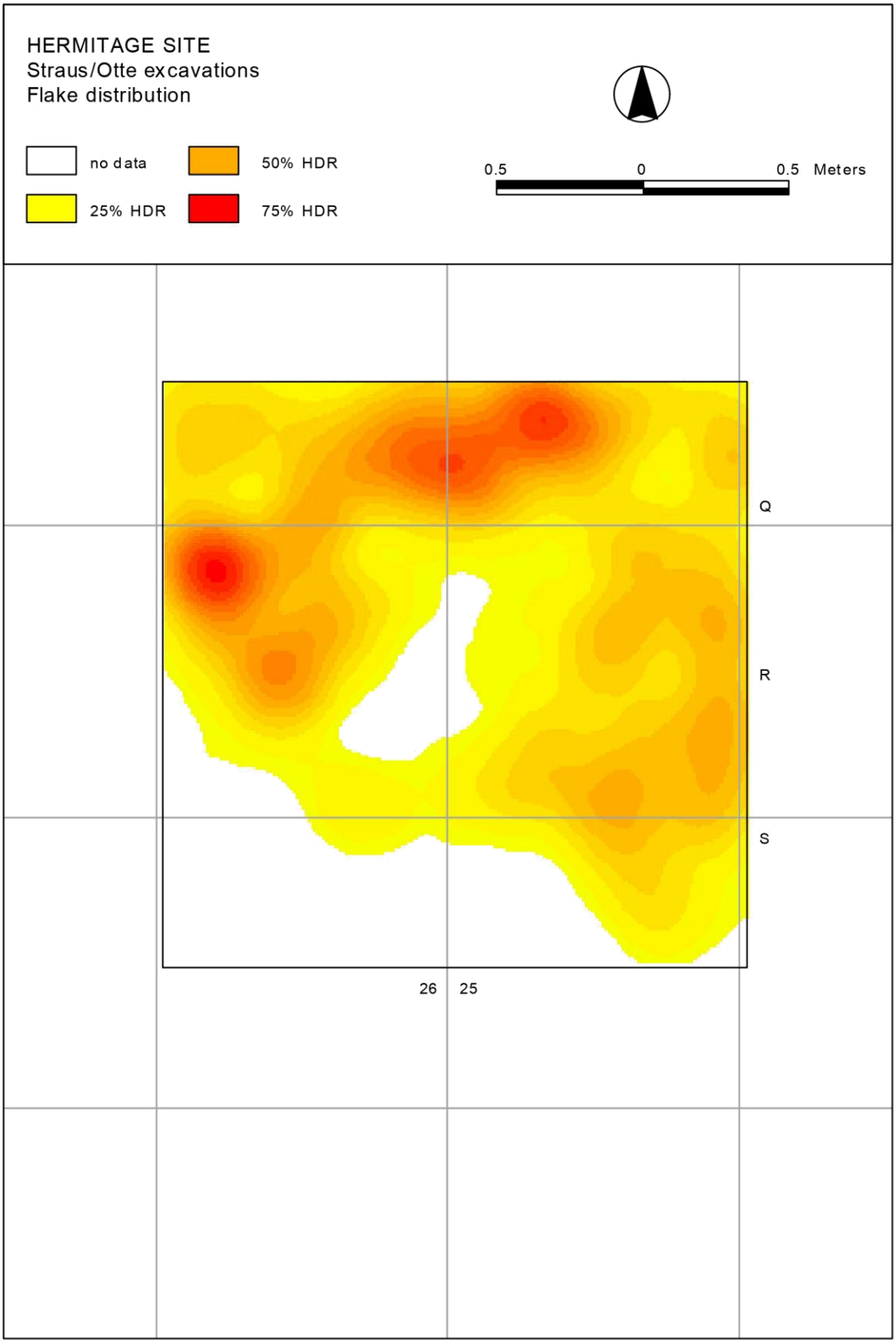
HERMITAGE SITE
Straus/Otte excavations
Flake distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 18.

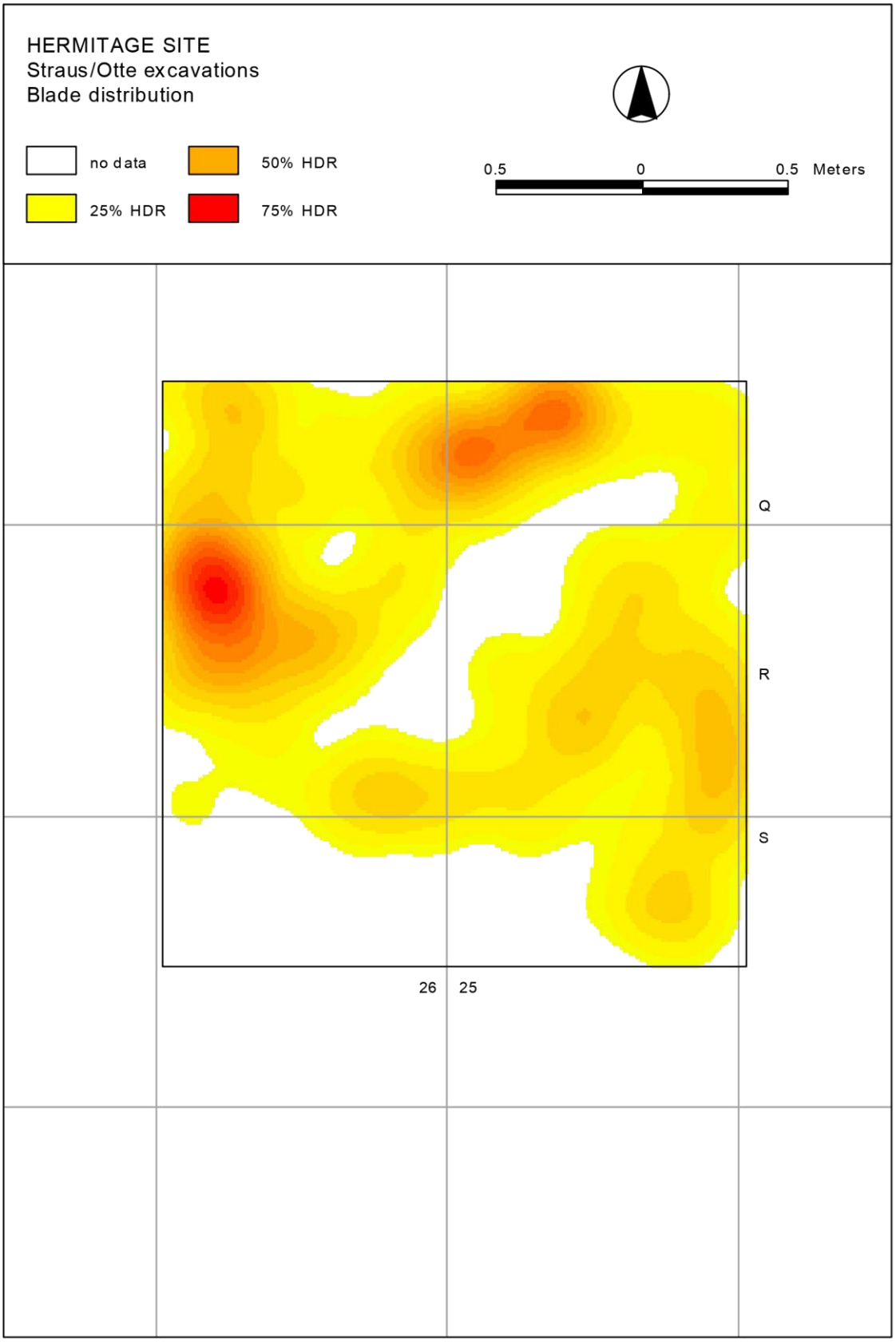
HERMITAGE SITE
Straus/Otte excavations
Blade distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 19.

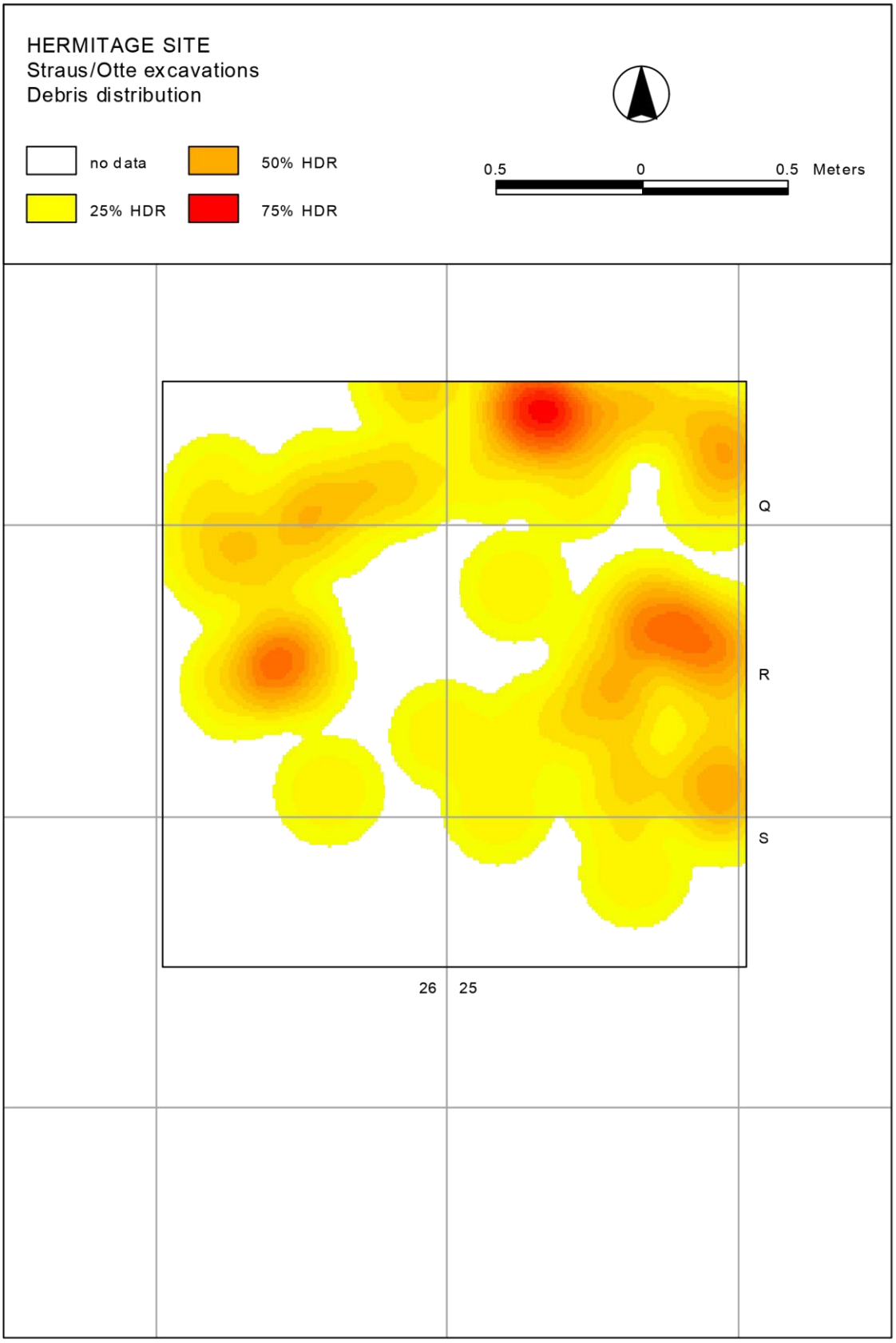
HERMITAGE SITE
Straus/Otte excavations
Debris distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 20.

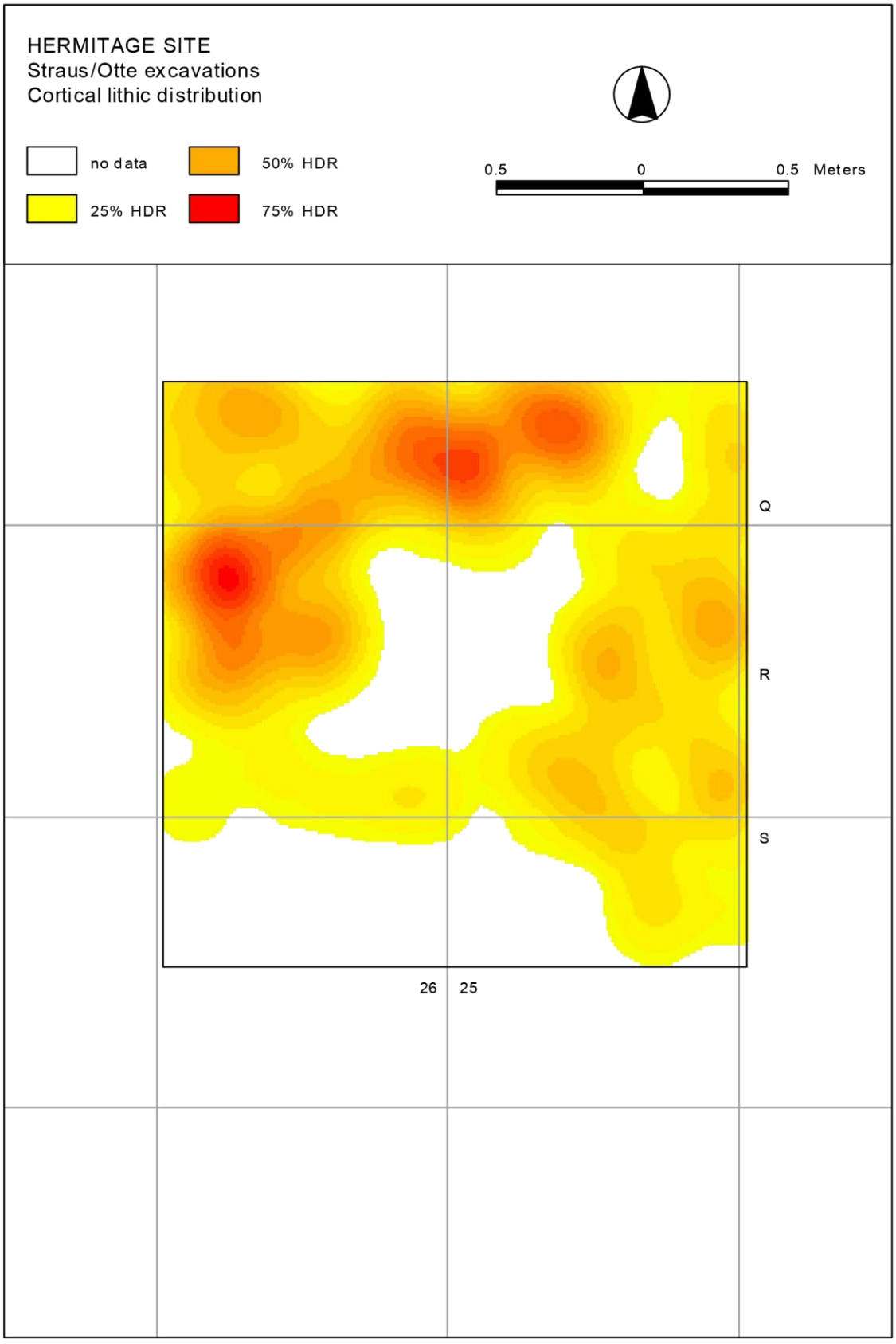
HERMITAGE SITE
Straus/Otte excavations
Cortical lithic distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 21.

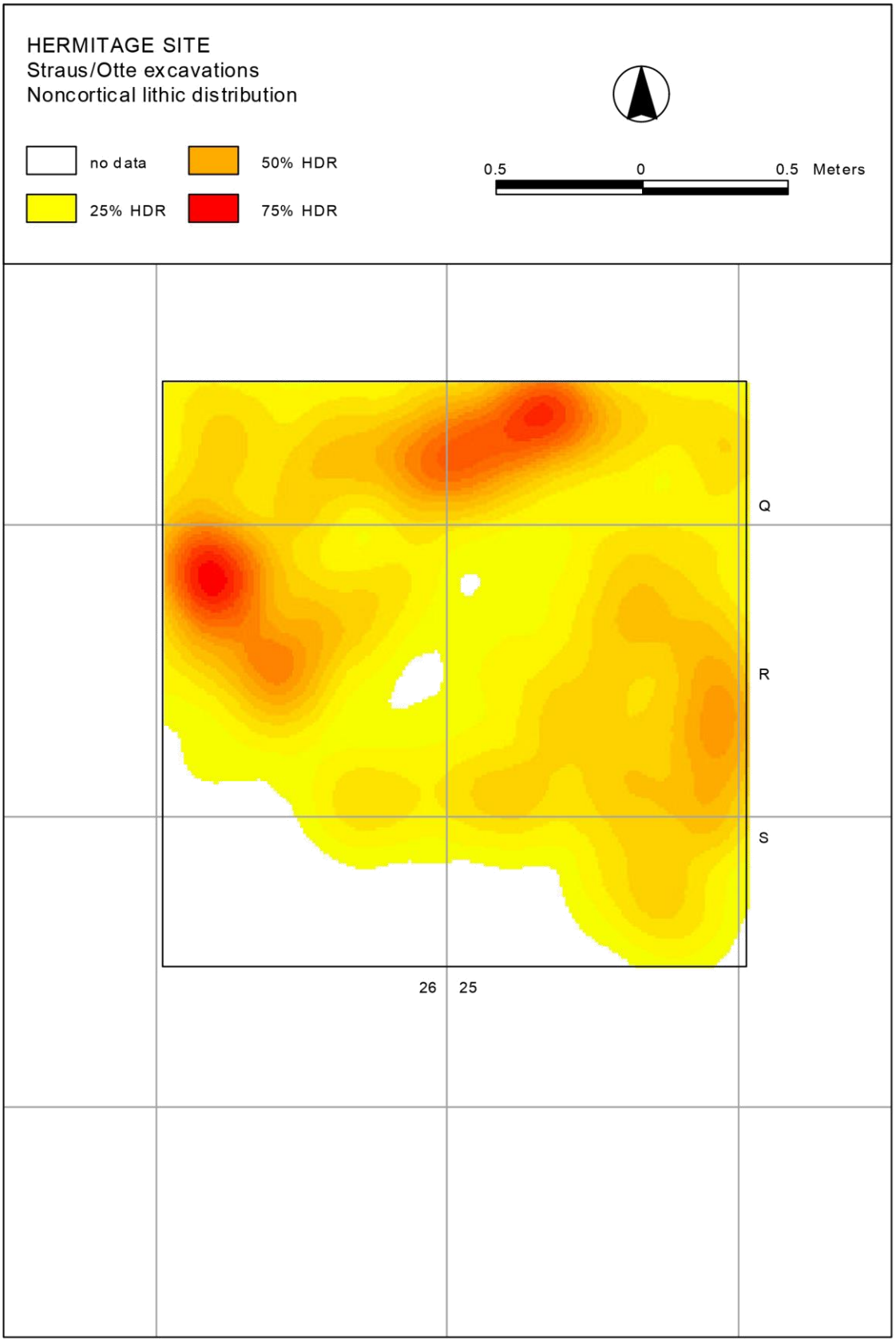
HERMITAGE SITE
Straus/Otte excavations
Noncortical lithic distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 22.

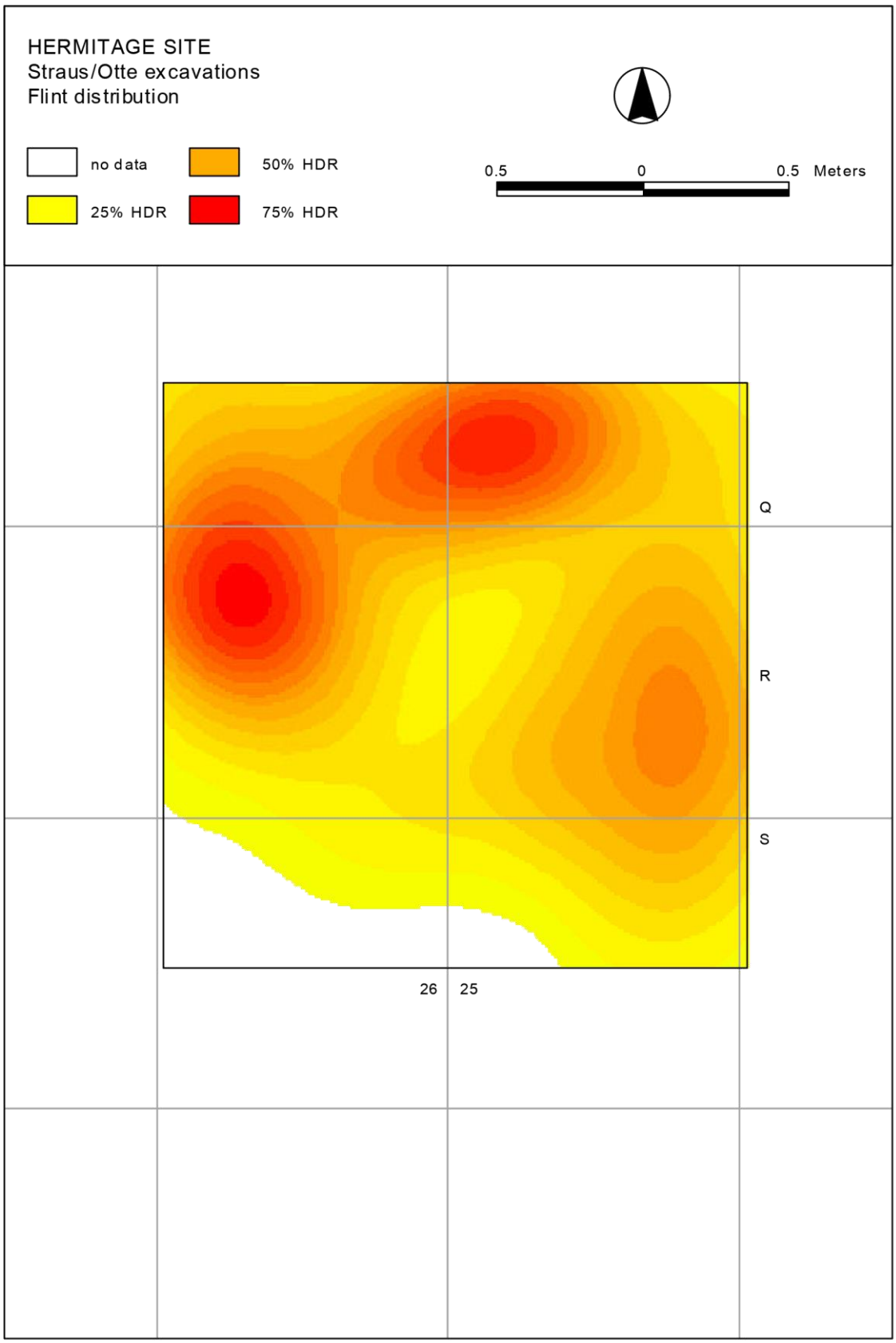
HERMITAGE SITE
Straus/Otte excavations
Flint distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 23.

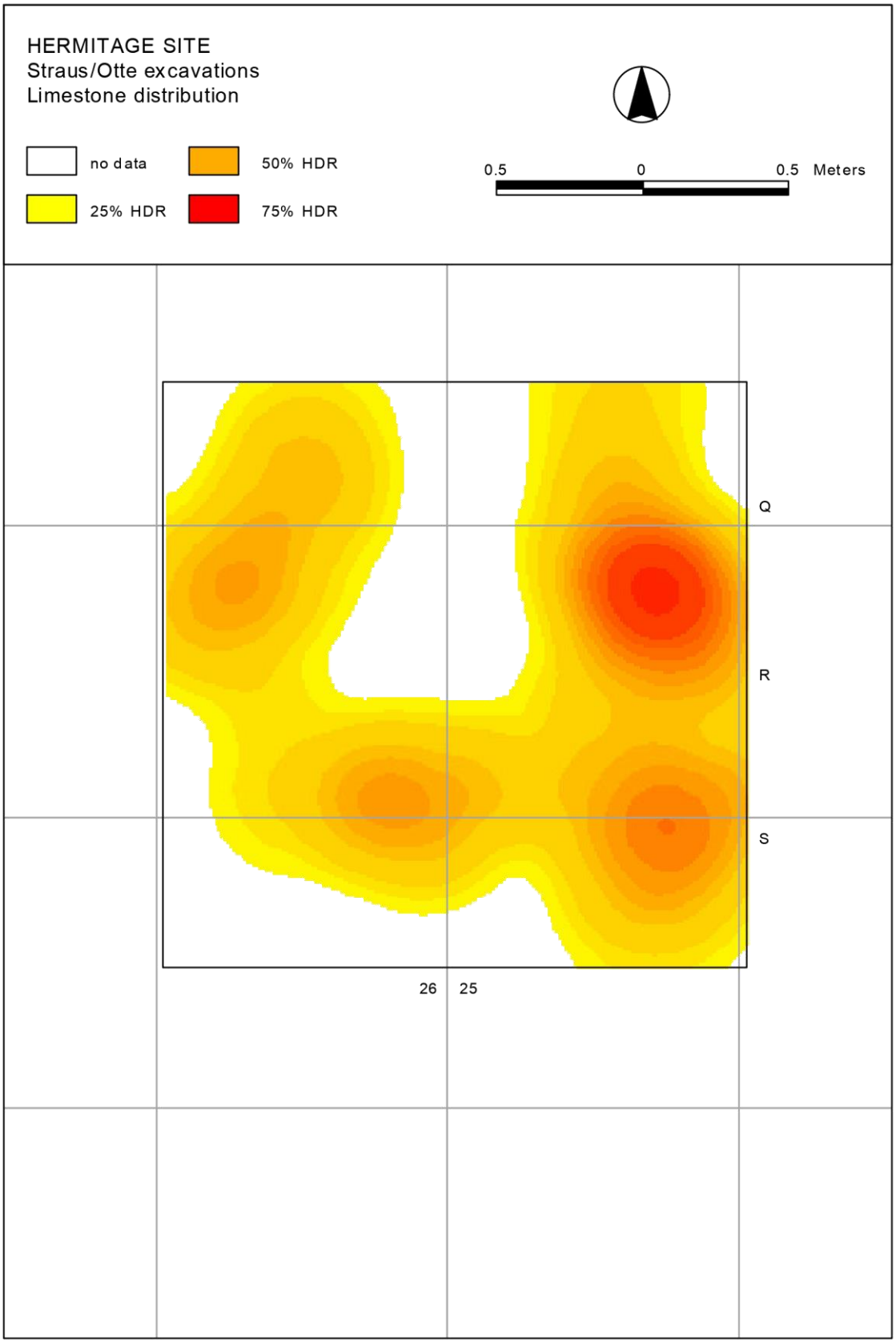
HERMITAGE SITE
Straus/Otte excavations
Limestone distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 24.

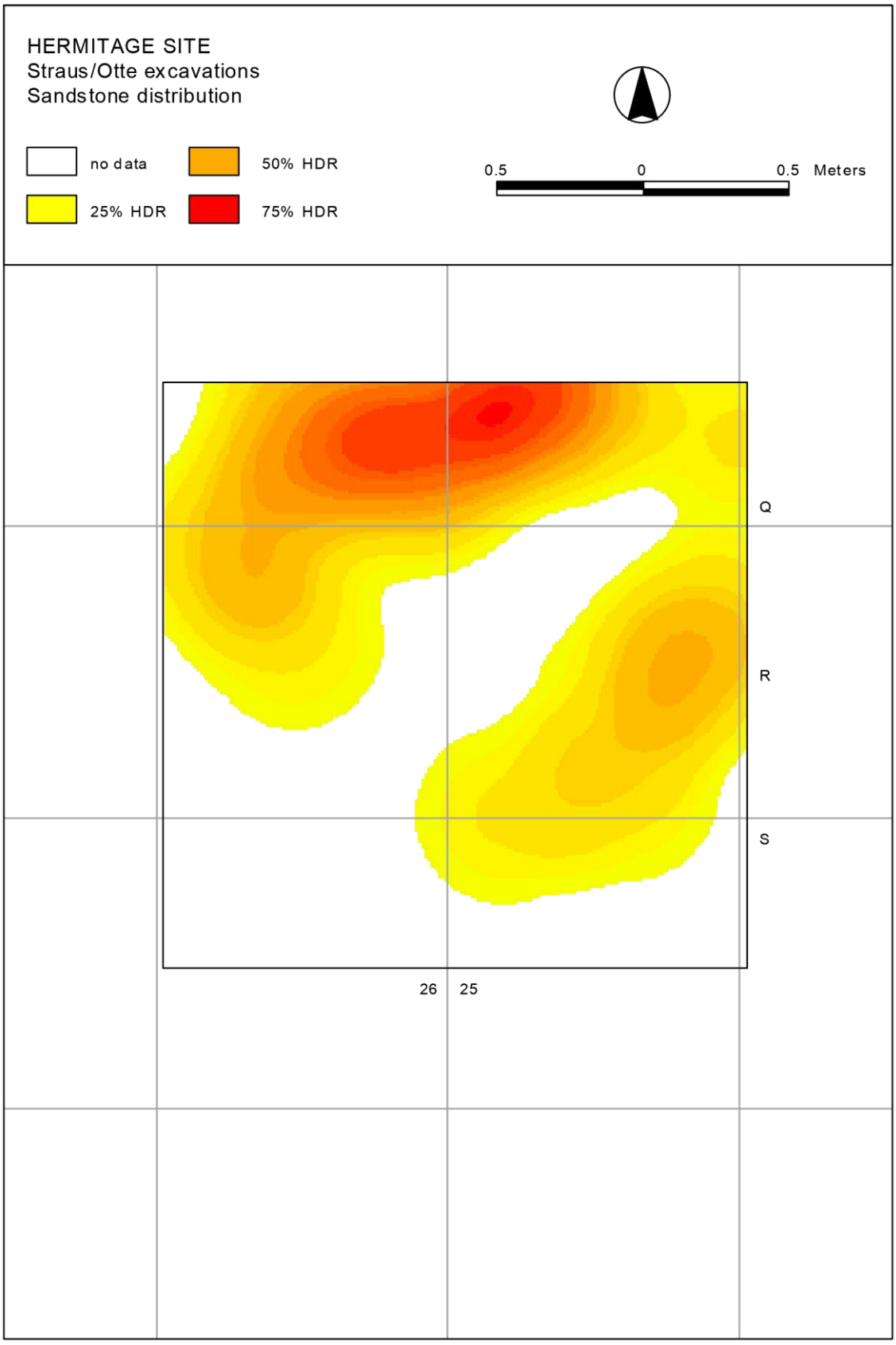
HERMITAGE SITE
Straus/Otte excavations
Sandstone distribution
no data
50% HDR
25% HDR
75% HDR
0.5
0
0.5 Meters
Q
R
S
26
25

Figure 25.