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CHAPTER 2.
EVALUATING BACKGROUND NOISE: ASSESSING OFFSITE DATA FROM FIELD SURVEYS AROUND THE ITALIC SANCTUARY OF S.GIOVANNI IN GALDO, LOCALITÀ COLLE RIMONTATO, MOLISE, ITALY[1]

ABSTRACT

This study demonstrates the potential of intensive sampling and offsite analyses to identify evidence of human activity in the past using the offsite data collected around the Italic sanctuary of S. Giovanni in Galdo, Molise, Italy. Rather than employing general and monocausal explanatory models—e.g., large-scale erosion or ancient manuring—to account for offsite material, this study examines ceramic ware variability from surface collections within the local context. It reveals that the ceramic ware variability in samples from low density areas with low visibility can be an important indicator of past human activity. The results of this examination of background noise, or unexplained variability in offsite material, from the Sacred Landscape Project increase the number and types of sites recognized in the surface collections. Furthermore, the analysis reduces the amount of surface material that can be regarded as offsite material and thus changes its composition. The overall results shed new light on the origins of offsite material and whether it should be interpreted as evidence of human activity in historical landscapes.

2.1 INTRODUCTION

In her contribution to the influential POPULUS series on landscape and survey archaeology, Fentress (2000) argues against the trend toward more intensive archaeological field survey. She contends that the increase in time and expense necessary for an intensive survey reduces the amount of surface area that can be studied, which in turn makes it harder to generalize the results to a broader area (Fentress 2000); Blanton (2001) makes a similar argument. This point is taken up by Terrenato (2004), who argues that extensive, rather than intensive, survey permits the study of a larger area in less detail and is more reliable for regional and intraregional investigations because large samples are statistically more significant than small samples. He asserts that the claims made by small-scale intensive survey projects that they retrieve qualitatively superior samples have yet to be verified, particularly with regard to offsite analyses (Terrenato 2004: 38). It seems that these criticisms of an intensive approach are mainly oriented towards research questions that deal with large regions and historical trends, with special attention paid to the comparability

[1] This chapter is based on the article "Evaluating Background Noise: assessing off-site data from field surveys around the Italic sanctuary of S. Giovanni in Galdo, località Colle Rimontato, Molise, Italy", by Jitte Waagen, originally published (20 October 2014) in Journal of Field Archaeology, volume 39-4 (publisher Taylor & Francis) incorporated as Open Access article under the terms of art. 25fa Aw, Taverne amendment (https://www.openaccess.nl/en/events/amendment-to-copyright-act). This article is accessible through this link: https://doi.org/10.1179/0093469014Z.00000000099.

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Figure 2.1. Location of the sanctuary at S. Giovanni in Galdo, località Colle Rimontato, Italy.

Figure 2.2. Research area around the sanctuary at S. Giovanni in Galdo, località Colle Rimontato, Italy.

of survey datasets. However, in the case of research questions that focus on specific historical issues, one can argue that intensive survey is an effective approach. The latter view is supported by studies that discuss the benefits of intensive sampling for our understanding of past land use and settlement systems (Bintliff et al. 2007; Caraher et al. 2006; De Haas 2012).

I contribute to this debate by presenting a detailed analysis of the offsite data collected around the Italic sanctuary of S. Giovanni in Galdo, località Colle Rimontato, Molise, Italy (figs. 2.1, 2.2) as part of the broader Sacred Landscape Project (SLP) (Pelgrom and Stek 2010). In the context of this problem-oriented survey project, I examined variability in archaeological surface collections in their specific contexts rather than applying more general explanatory models such as large-scale erosion or ancient manuring to account for the presence of offsite materials. Based on the results of this study, I argue for the value of offsite sampling by showing how intensive survey permits detailed analyses of background noise, or unexplained variation in offsite materials, which will likely lead to more nuanced interpretations of past human activity.

The goal is to demonstrate that a high diversity of ceramic wares in low density samples of offsite material can reveal traces of past human activity, such as burial and settlement practices. To accomplish this, I first argue that the surface sample collections are likely to contain 'sporadic' evidence, i.e., low frequencies of material remains, of past human activity, and I evaluate these data as a case study. Then, following a discussion of my approach to offsite density areas, I test the validity of one method and discuss the consequences for our understanding of the historical problems that the SLP has sought to investigate. Finally, I show how the analysis of ceramic ware variability in low density areas reveals human activity, which increases the number and types of sites recovered during survey and further refines the analysis of offsite materials.

2.2 SPORADIC EVIDENCE IN OFFSITE ASSEMBLAGES

In the current tradition of intensive surveys, a site is usually defined as an area presenting a higher density of archaeological materials than its immediate surroundings, marking a focus of human activity in the past (Gallant 1986: 408–409; Bintliff et al. 1999: 141; Dunnell and Dancey 1983; Gallant 1986; Bevan and Conolly 2004). Therefore, quantitative, sometimes relative thresholds are often central to the identification of archaeological sites in the field. Qualitative aspects of the surface record can also lead to site identification. Among the most important is the presence of materials that represent typical assemblages for a particular chronological phase or the presence of ancient building materials, including dressed stone, bricks, tiles, and architectural artifacts. (Fentress 2000: 48). Typically, the low densities of surface materials that are documented in areas where sites have not been identified are regarded as offsite materials. Initially, the study of these (usually) low densities of offsite materials was motivated by the need to verify the criteria used to define a site (Gallant 1986: 408–409). However, increasing insight into the nature of offsite materials has led to more direct interpretations of their meaning. It is clear that evidence of human activity would be missed if archaeologists relied solely on the areas traditionally defined as sites (Dunnell and Dancey 1983: 271–272; Caraher et al. 2006: 8).

2.2.1 CULTURAL AND NATURAL EXPLANATIONS OF OFFSITE DISTRIBUTIONS

Studies of offsite materials have produced various theories about their origins. The initial debate arose in response to the manuring hypothesis (Bintliff and Snodgrass 1988). This hypothesis relates to occurrences of relatively dense, continuous, and chronologically consistent carpets of ceramic sherds, which point to the deliberate distribution of organic household debris to fertilize agricultural fields (Bintliff and Snodgrass 1988: 508). In response to the manuring theory, arguments have been made for other, sometimes more locally differentiated origins of offsite material, such as the displacement of artifacts as a consequence of erosion (Alcock et al. 1994; Fentress 2000: 47). Attention has also been paid to cultural processes such as pastoral activity and rubbish disposal (Fentress 2000). Furthermore, the debate involves the occurrence of so-called site 'haloes', which are gradually declining densities of artifacts around settlements and are explained as the result of "waste disposal, garden culture, yard activity and in-field spreading of manure and refuse, as well as localized plough drag and weathering" (Bintliff et al. 2007: 23–24); haloes can be differentiated from manuring practices on rural estates outside of any larger settlement context.

2.2.2 FORMATION PROCESSES AND SITE VISIBILITY

Valid cases have been made for the origins of haloes, the manuring hypothesis, and for the natural and mechanical destruction of sites, which could all explain offsite density patterns on a regional scale. Nevertheless, on a local scale, variation in offsite material is not always easy to explain by applying these rather monocausal models; this encourages further study to understand how the density patterns of offsite materials may relate to human activity in the past. In order to deal with this, it is useful to examine site formation processes (Alcock et al. 1994: 166). Several studies have shown that numerous factors can influence the formation of the archaeological record, as well as the chances of retrieving materials during fieldwork. Any of these factors (discussed below) could result in the marginal presence, or even an absence, of material related to past human activity in a collected sample, and thus have a serious effect on the visibility of sites. Activities that did not occur regularly or over extended periods of time can result in the deposition of small amounts of material. In this context, one may think of burial areas and storage or production sites, which might include field shelters, kilns, animal stalls, and perhaps even the exploitation of beehives (De Haas 2012: 56–60). These activities create patterns of artifact distribution, possibly of a single type or limited range of artifact types and are hard to distinguish when focusing on high densities or general trends. Short-lived settlements that would not have produced large haloes might also be difficult to identify and pottery fabrics that are susceptible to postdepositional weathering processes may be missed entirely (Bintliff et al. 1999). Issues arising from the availability of pottery (Millett 2000: 53) and the diagnostic potential of artifact types can also result in the limited recognition of specific chronological phases or social groups in survey records (Caraher et al. 2006). Subsequent land use, including the removal or the addition of soil or deep-plowing in conjunction with geopedological and geomorphological processes, might produce spatially differentiated effects in the archaeological record, whether buried or at the surface (Barton et al. 1991; Terrenato 2004: 39). Two important destructive postdepositional processes, attrition and displacement, can have a profound influence on the formation of the surface record (Ammerman 1985; Taylor 2000) and are likely to result in the limited perceptibility of sites through surface collections. In relation to the formation of archaeological sample collections, 'visibility' conditions can distort the surface record. This refers to the obfuscation of materials by vegetation, shadows, and dust, which creates bias in collected samples (Ammerman 1985; Ammerman and Terrenato 1996; Verhoeven 1991; Terrenato 2000). When deploying fieldwork strategies based on the selective collection of diagnostic artifacts, fine wares that are hard to differentiate from those of other periods may not end up in samples and, in combination with other factors, even cause entire periods to remain hidden (Bintliff et al. 1999). Finally, the statistical effects of systematic random sampling should be taken into account because they can have an impact on the representativeness of the material collected (Orton 2000).

2.2.3 ANALYZING SPORADIC EVIDENCE IN BACKGROUND NOISE

The unifying element in all of these formation processes is that they can result in low or variable survival rates for artifacts related to a particular human activity, often depending on local conditions. Certain artifacts can be expected to be present in surface materials in differing degrees of quantity, quality, and variety (discussed below). This can lead to a certain probability that our database will contain only sporadic evidence of specific types of activities or chronological periods, or, as Terrenato states, "a pale and partial reflection that reaches us through various distorting mirrors" (2004: 46). Therefore, it is valuable to develop methods to retrieve this kind of information.

The evidence often escapes our attention because the material does not meet the criteria for site identification and is likely to disappear into more general explanations regarding the formation of the surface record. Any variability in offsite material is likely to be explained as background noise (Gallant 1986; Mattingly 2000: 11). The broad nature of such explanations may draw attention away from local variability in artifact patterns. In publications of survey results that generally show maps using dots to indicate identified sites and contours or hatches to register significant concentrations of offsite materials, such variability disappears. On the basis of the insights presented above, I argue that this variability in the background noise should be examined thoroughly to determine whether more of this evidence can be traced. Hence, this warrants a narrower approach that examines the material and its context at the local level, regarding specific ceramic types, assemblage characteristics, and spatial patterns in the offsite record. Here I concentrate on the potential of a detailed evaluation of offsite material.

2.3 THE SLP DATASET

The SLP involved intensive, problem-oriented surveys devised to shed more light on the role of two sanctuaries, one at S. Giovanni in Galdo, località Colle Rimontato and one at Gildone, località Cupa (Campobasso, Molise), in their local historical contexts (fig. 2.1) (Stek and Pelgrom 2005; Stek 2009; Pelgrom and Stek 2010). The field recording strategy was primarily based on previous experience gained from large-scale surveys carried out in the context of the Regional Pathways to Complexity Project, a diachronic comparative study of three regions in Italy undertaken by VU (Vrije Universiteit) University Amsterdam and the University of Groningen (Attema et al. 2010).

2.3.1 SAMPLING STRATEGY

Unless physically obstructed (e.g., by houses, roads, etc.), the research area around the sanctuary of S. Giovanni in Galdo was completely gridded in tracts; surface samples were then collected from these tracts (fig. 2.3). A grid following the existing cadastral organization of cultivated fields was adopted, rather than a grid consisting of equal area units. Although the latter is sometimes preferred for optimal quantitative comparability of samples, such a grid often cuts through areas with variable geomorphology and/or variable find conditions related to natural and cultural formation processes (e.g., vegetation, plowing). Since these contextual parameters are important for the interpretation of the samples, ensuring that they remain constant is essential for the consistency of a single sample. As a result of this sampling strategy, the grid was occasionally irregular (i.e., not all tracts had the same size and shape). Large fields were artificially divided and tracts kept at a maximum of approximately 50×100 m, resulting in sample units of approximately .5 ha.

The surface of each unit was sampled in transects with a coverage of 20%. Each field walker was positioned 10 m from the next and collected surface material within a 2 m-wide swath. All of the material was collected, washed, and classified. If there were more than 10 ceramic tile fragments per m^2, they were only collected in sample units of 1 m^2, enough to permit an estimate of the total quantities. The collected samples were separated by transect and sampling unit.

2.3.2 DOCUMENTING THE LOCAL CONTEXT

The local context for each sample was described thoroughly. First, visibility conditions were recorded on an ordinal scale from 1 (low) to 5 (high). Together these were used to determine the final visibility score, which is an overall score for each sample unit (Attema et al. 2010: 19–20). The second set of documented parameters included the physical aspects of the sampled area (e.g., geomorphological classifications, slope class/gradient, anthropogenic interventions including modern constructions, surface leveling with the removal or addition of soil). In other words, the parameters included conditions that might be significant for understanding the formation of the archaeological surface record. After fieldwork, the data were (digitally) processed immediately and corrected for errors, inconsistencies, and completeness. Knowledge about the local context of finds can be greatly enhanced by digital modeling processes that reveal what might have influenced the visibility and the quality of the surface record (Waagen 2010). Modeling data from various sources produces a comprehensive digital environment, with rasters representing surface properties such as elevation, slope, and aspect with a spatial resolution of 10 m (fig. 2.4). The most useful product was the hydrological model, which provides insight into the movement of material along slopes and alluvial areas, thus influencing the archaeological surface record. The mean steepness of slope in the research area is 10°, however, slope is highly variable owing to the hilly terrain resulting in areas where artifact displacement by slope erosion under high-energy conditions is frequent (Winther-Jacobsen 2010: 47). Interestingly, the information yielded by the hydrological model, such as the alluvial areas, corresponds with an erosion map of the region and therefore can tentatively be considered a validation of our model (map acquired from the Servizio Statistico e Cartografico, Centro di Ricerca Cartografica Regionale, Regione Molise).

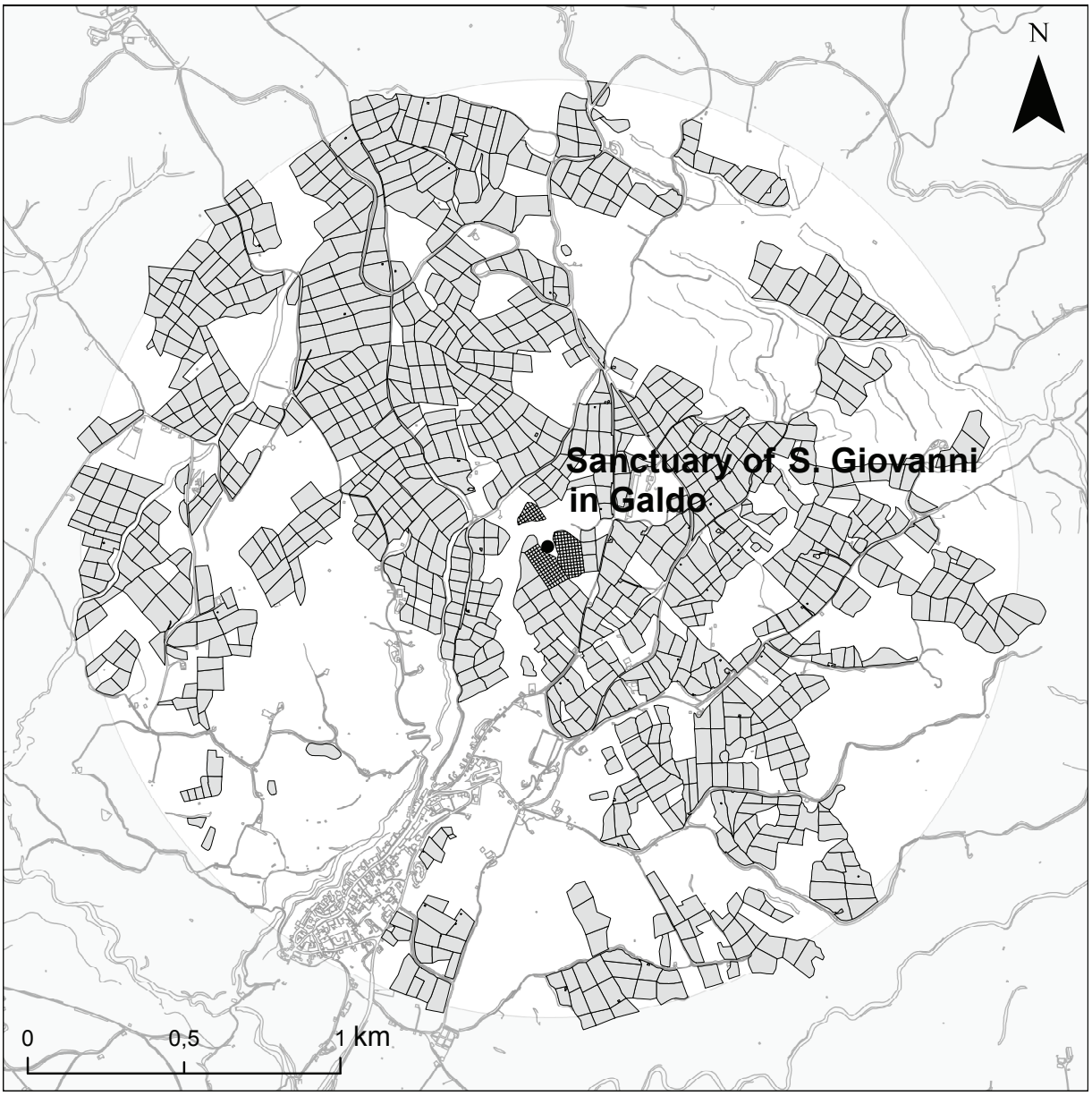

Figure 2.3. Surface collection units around the sanctuary of S. Giovanni in Galdo. The circle defines the sampling area.

2.3.3 SITE IDENTIFICATION

Although the surface record was documented as a continuous distribution of artifacts, sites were also identified. This step seemed conceptually valid as long as the site definition was treated as a base hypothesis, and it was also justified from a practical point of view because the contrast between low densities and sudden concentrations of material within a limited area was fairly clear. The contrast might be explained by the local geomorphology; the majority of the sites were identified on gently sloping terrain (mean steepness 8°), where light soils might be washed away leaving the artifact concentrations exposed. A similar effect has been observed in the case of 'lagged deposits' in Boeotia (Bintliff et al. 1999: 144). In providing the rules for the identification of sites, it was essential that they be consistent and critical so that the site definition can be reassessed at a later stage, an idea expressed by Gillings and Sbonias (1999: 35) with respect to archaeology and GIS. Generally, a five sherds per m^2 threshold was employed for site identification, although relative contrasts in densities were also considered to be highly indicative, taking into account the qualitative aspects of the sample and its local context. Wherever a site was identified, additional samples were collected, which were kept separate from the unit samples. Furthermore, the contours of the con-

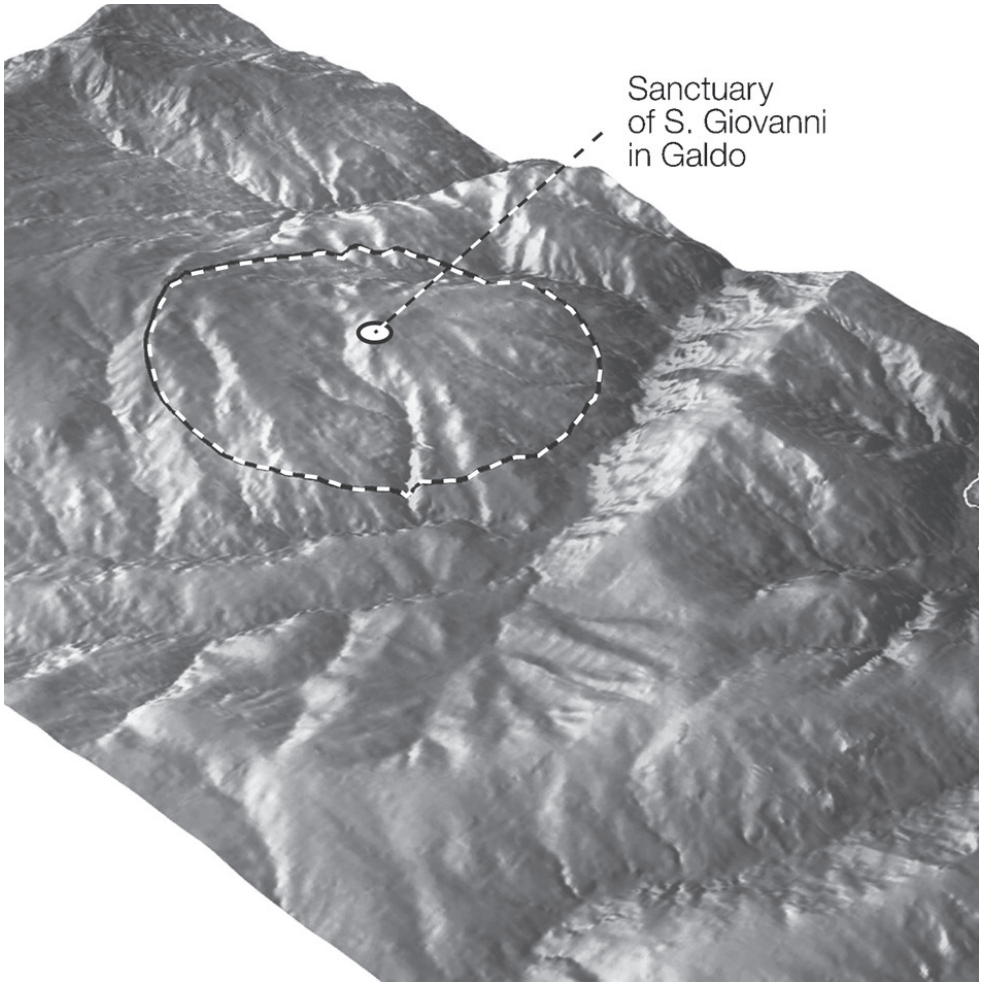

Figure 2.4. View from the southwest on the DEM. The circle defines the sampling area.

centration were mapped and any observed in situ architectural remains or redeposited/collapsed building materials were mapped and photographed. A crucial point is that the goal of mapping was to record the spatial configuration of the surface materials, a synthetic unit, which does not necessarily reflect the extent of the buried remains or the original focus of human occupation. The goal was to map the material considered to be related to the site, whether this included artifacts in their more-or-less original area of deposition, ploughed-up deposits, or material displaced as a consequence of agricultural activity or natural processes. In several cases, electrical resistivity and geomagnetic prospection techniques were used to verify the presence of buried archaeological remains with promising results (Kerckhaert 2005; Pelgrom and Stek 2010). All sites documented in 2004 were revisited in 2005 and some were revisited again in 2008 and 2009. All of the concentrations of surface material appeared to be stable within this time span.

2.3.4 DATA VISUALIZATION

To facilitate detailed analyses, surface samples from each unit are displayed in a map showing the extent of the units (fig. 2.5). The map presents densities of ceramic sherds (counts) per ha, classified into the main categories of wares and displayed in pie charts; the size of each pie chart is proportional to the amount of material. The classification of the ceramic material is based on conventional ware taxonomy. This taxonomy includes the most frequent wares, tiles, coarse wares, plain wares, black gloss, impasto, glazed wares, roman bricks and tiles, african red slip, italian terra sigillata, various types of doliae (storage vessels), and flint (Roccia 2005; Pelgrom and Stek 2010: 61). Displaying the samples in this way is a rough approach that was adopted in order to visualize the main categories of wares for each period, showing sample size and ware variability in one graph. The number of unidentified artifacts can be taken as a rudimentary indication of the degree

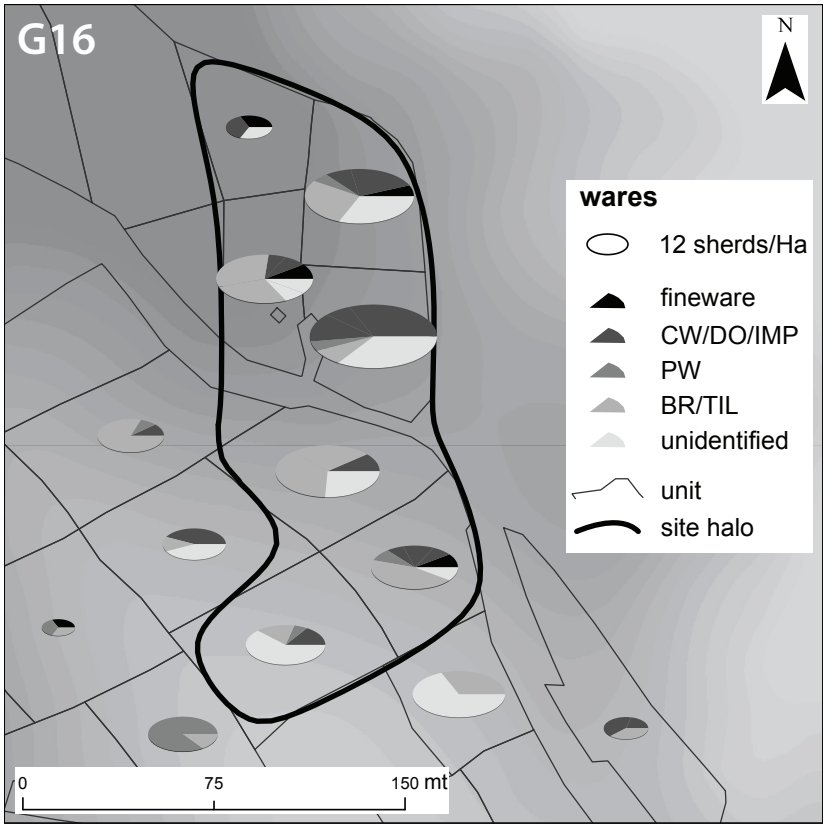

Figure 2.5. Pie charts showing the size and composition of the samples collected in the units on and around site G16, a farm dating to the Roman period. Gray shading represents elevation. CW=coarse ware; DO=dolium; IMP=impasto; PW=plain ware; BR/TL=brick/tile.

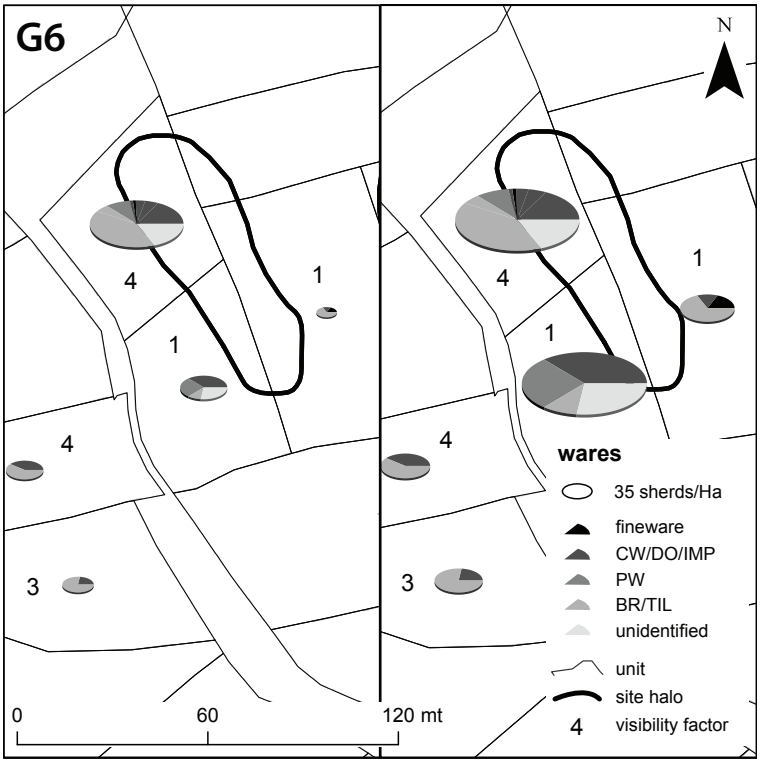

Figure 2.6. Pie charts showing the size and composition of the samples collected in the units on and around site G6, a farm dating to the Imperial period. Left density is unweighted; right density is weighted for visibility. CW=coarse ware; DO=dolium; IMP=impasto; PW=plain ware; BR/TL=brick/tile.

of weathering. Elevation differences, or aspect, are visualized with gray shading, which provides information on predominant slope wash directions (fig. 2.5) and the numbers (1–5) indicate the final visibility values (fig. 2.6). These contextual factors are regarded as the most significant for the analyses presented here.

2.4 DEFINING THE OFFSITE RECORD

In evaluating offsite material, it is important to recognize the existence of site haloes (Bintliff et al. 2007: 23–26) and define the extent of the haloes, so that material that is likely to be connected to the halo can be separated from the other transect samples. Contours of sites were established in the field through relative contrasts in densities of surface material. However, in some cases the ceramic composition of a sample from a nearby sample unit resembled that of the site and might be related to that location (fig. 2.5). In the case of site G16, a farm dating to the Roman period identified in the northern three sample units (with pie charts inside the site halo), the material in the southern three sample units (with pie charts inside the site halo) probably originates from the site as well and might be the result of lateral displacement of material (e.g., from erosion, plowing, etc.). Apart from such effects, visibility is highly likely to affect the identification of sites and haloes. There is a weak but significant positive correlation between visibility conditions (x) and densities (y) ($r^2 = .02$, $p = .100$) and all identified sites are found in zones of high visibility (3–4).

To estimate the effect of visibility on the quantities of material, a map with weighted densities was used alongside a map with raw artifact counts (fig. 2.6). The weighting was based on two variables, the coverage and the visibility factor, represented in the following formula: corrected number of sherds = recorded number of sherds ([100 / % coverage] / [visibility x .2]). The recorded number of sherds was multiplied by the inverse of the coverage score and the inverse of the visibility score to arrive at the hypothetical number of sherds that would have been present with full coverage and optimal visibility; e.g., if the recorded number of sherds is 10, coverage is 20%, and visibility is 4, the corrected number of sherds = 10 x (100 / 20) / (4 x .2) = 10 x (5 / .8) = 10 x 6.25 = 62.5.

Examining the weighted densities paved the way for establishing whether the site and the haloes extended into areas with low visibility. For example, in the case of site G6, a farm dating to the Imperial period, the halo does seem to continue into the field covered by the southern sample unit although this observation was difficult to discern in the field because of the poor visibility conditions (fig. 2.6). In such a manner, a set of quantitative and qualitative criteria were systematically applied to all sites in the surface record in order to distinguish between site/halo and offsite material. The haloes were regarded as the abovementioned spatial configuration of site material and were therefore distinguished from offsite material. The result is presented in a map showing densities and contours indicating site haloes (fig. 2.7).

2.4.1 EVALUATING THE OFFSITE RECORD

It was of interest to determine whether general explanations of offsite distributions were potentially valid for this dataset. It appeared that low density areas did not exhibit the patterns that would be expected as a result of large-scale ancient manuring. This hypothesis implies a chronologically homogeneous (at least regarding the periods in which manuring practices take place) and evenly distributed, continuous carpet of material (Bintliff and Snodgrass 1988), which is not evident in the SLP data. The offsite material shows spatial variation in quantity as well as in time period (fig. 2.8). A similar impression of variable quantities of material is given by the indicators of central tendency and spread (unweighted samples offer a median of 10 finds, first interquartile 4 and 23; weighted samples offer a median of 206, first interquartile 79 and 525). Since many of the bricks and tiles, as well as the unidentified material in the offsite sample collection are probably recent materials, this variability may be even higher for the earlier periods.

In order to explain this variability, it may be useful to study postdepositional processes and other types of past human activity as explanations for the origin of offsite material outside our site haloes. The geomorphological context of the material provides some clues, which are clearly observable in two site haloes. The influence of erosion on the displacement of material is clear in the case of site G18, where considerable densities of finds indicate movement of archaeological material on the surrounding slopes. On a more

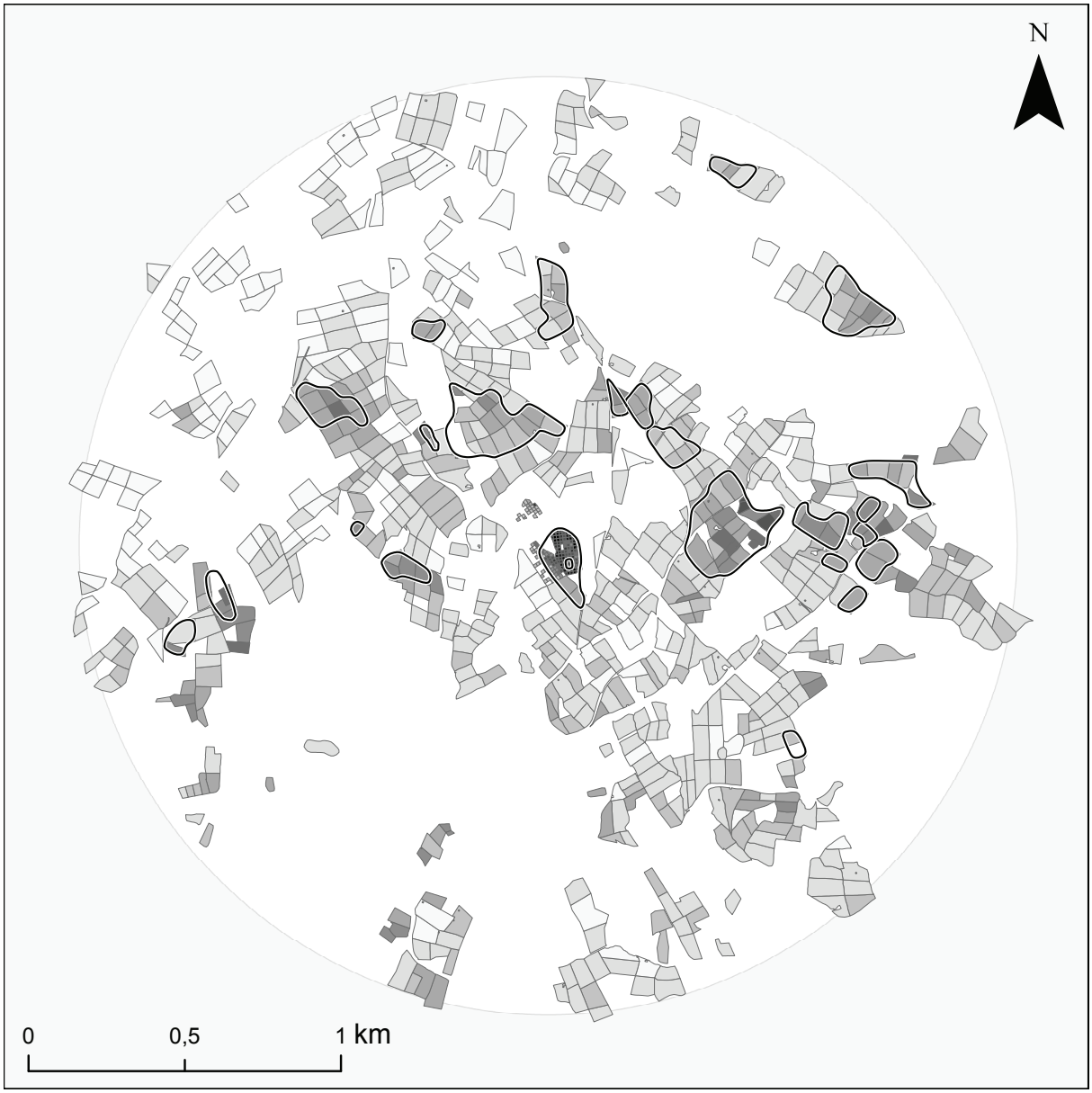

Figure 2.7. Surface sample units showing densities of artifact counts (gray shading indicates range of 0–10/ha to >5000/ha). Black lines indicate site haloes.

local scale, the effect of erosion is visible at site G23. Here, we documented pottery and bricks on the top of a small hill in a location where the materials could not have been transported by natural processes. The presence of a large amount of unidentified material at the foot of the hill suggests that ancient deposits were washed downhill. Apparently, in the case of steep slopes (>12°), material does wash down as a result of slope processes such as surface erosion.

However, in conditions where erosion is not estimated to have had a large impact on the surface record (e.g., in areas with moderate slopes, <12°), patterns in our offsite material are more difficult to explain. For example, throughout the research area we documented small concentrations or individual artifacts that are clearly ancient. Among these artifacts are italian terra sigillata and black gloss pottery (e.g., sample unit 2291, a nearly flat field). These are fine table wares that are usually found in domestic activity areas, burials, and sanctuaries. Because of their relatively isolated position in nearly flat fields, they are not likely to have been displaced from the identified sites. Therefore, they could represent sporadic evidence of past human activity, which is likely to exist in, or even result in offsite distributions.

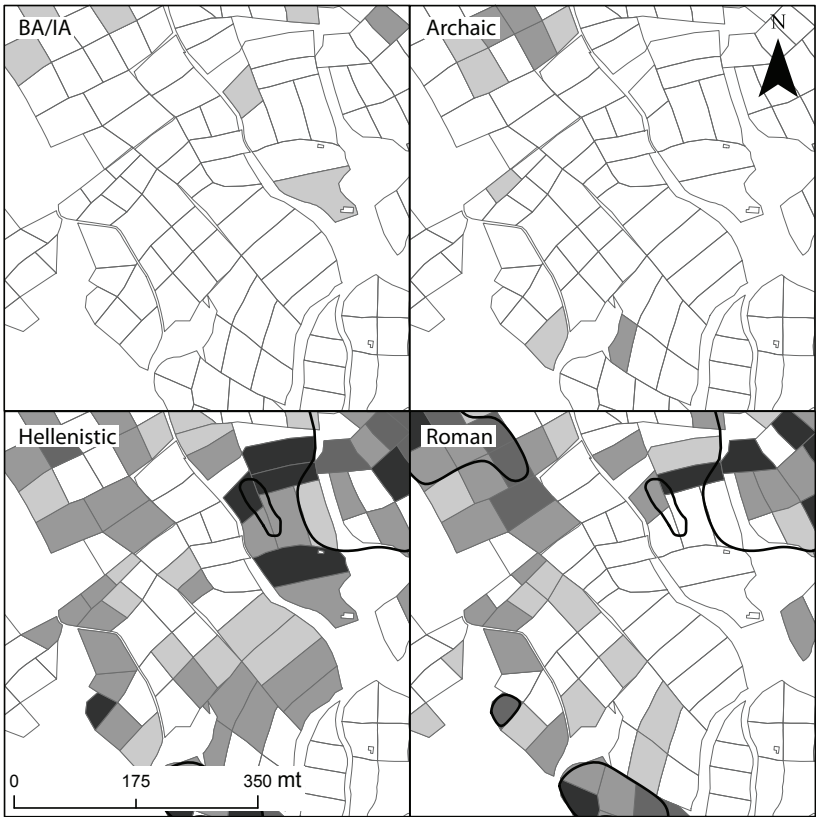

Figure 2.8. Surface sample units northwest of the sanctuary showing densities of artifact counts per period (10% gray=1–2/ha, 30% gray=3–10/ha, 50% gray=11–20/ha, 70% gray=21–50/ha).

To conclude, the offsite materials in our dataset are highly variable and cannot be explained by general processes alone. Local conditions are likely to be equally influential. The variability in the low density areas of the surface record should therefore be evaluated in relation to local conditions. The following section presents a case study using such an approach.

2.5 DETAILED ANALYSIS OF THE OFFSITE RECORD

Obviously, the main limitation for offsite analyses is the small amount of material with which to work (Terrenato 2004). There are too many possible reasons for the presence of a small number of sherds from fine table wares in our offsite samples to permit a direct interpretation. To designate such a pattern as a focus of human activity would be highly speculative. Therefore, I suggest applying hypothetical deduction to define and test anomalies and their potential explanations. Approaching the dataset in this manner, it is imperative to define a hypothesis, in this case about the formation of this dataset, that will allow the identification of an anomaly, reveal the anomaly in the dataset, and verify or refute the hypothesis by assessing the anomaly in the field.

2.5.1 CERAMIC WARE VARIABILITY IN SAMPLE ASSEMBLAGES

The case study I present here involves ceramic ware variability in low density samples. As demonstrated above, there is a high possibility that small samples are the result of unfavorable find conditions such as poor visibility. Statistically, this poses an interesting problem. All conditions being equal, small samples are biased because they tend to display less variability than larger samples (i.e., the well-known sample size effect) (Baxter 2001: 716). Consequently, unfavorable visibility conditions can result in an underrepresentation

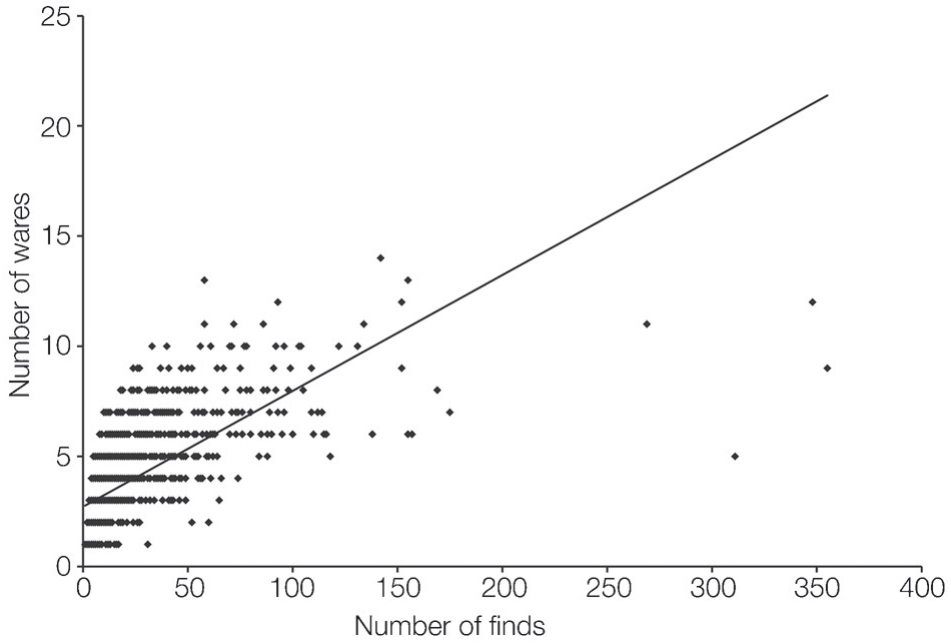

Figure 2.9. Scatter plot of regression analysis between number of finds and number of wares.

of artifact types. This presents specific problems for the comparison of surface-collected samples because it is difficult to distinguish an absence of material owing to formation processes from an absence of material owing to the lack of past human activity (Caraher et al. 2006: 26–34). This is even more problematic when the samples are weighted. Correcting for visibility conditions involves multiplying the numbers of artifacts, thereby increasing the size of the sample but not its diversity.

In other words, sampling reduces the probability of retrieving the original types of artifacts that are potentially present in the surface record, particularly with low density samples. This effect is discernible in our database (fig. 2.9): there appears to be a moderate and highly significant positive correlation between the size of the sample (x) and the number of different ceramic wares (y) ($r^2 = .67$, $p = .000$). The reduction is particularly likely to occur if the low densities in our database are biased by postdepositional processes and visibility conditions; in such cases, the collected samples may only represent a small portion of the original surface record. This effect can have a profound impact on the eventual representation of different types of artifacts when assessing the potential of low density analyses for underrepresented chronological periods; "visibility biases our interpretation of the surface assemblage towards the predominant component in all assemblages" (Caraher et al. 2006: 30).

Although this limits the potential of probability modeling methods in relation to low densities, I suggest that there is also a positive side to this statistical theorem. It can be inferred that it is highly unlikely that a small sample will contain a relatively large number of different artifact types. Furthermore, since it is reasonable to assume that small samples that were collected under unfavorable visibility conditions or with clear indications of postdepositional distortions represent only a limited part of the original surface record, a low density with a high variability in ceramic wares might represent the tip of the iceberg. Consequently, small, diverse samples containing household pottery might offer merely a glimpse of the actual surface record present. Hence, it seems that on account of the effects of random sampling, a surface record with high ceramic ware variability might appear as a low density area. As explained above, the identification of sites is partially based on the composition of the sample because in the case of long-term occupation, a site will result in a larger number of deposited artifacts than its surroundings, which increases the chance of retrieval of a broader range of artifact types during survey. This is even more probable in the case of freshly ploughed-up deposits because these materials will have been less exposed to weathering. Variability in small samples under unfavorable visibility conditions or with clear indications of postdepositional distortions could therefore be considered as an indicator of a site. To explore this hypothesis, I developed a spatial query that identified the correlation of these variables in the database and distinguished these anomalies in the surface record.

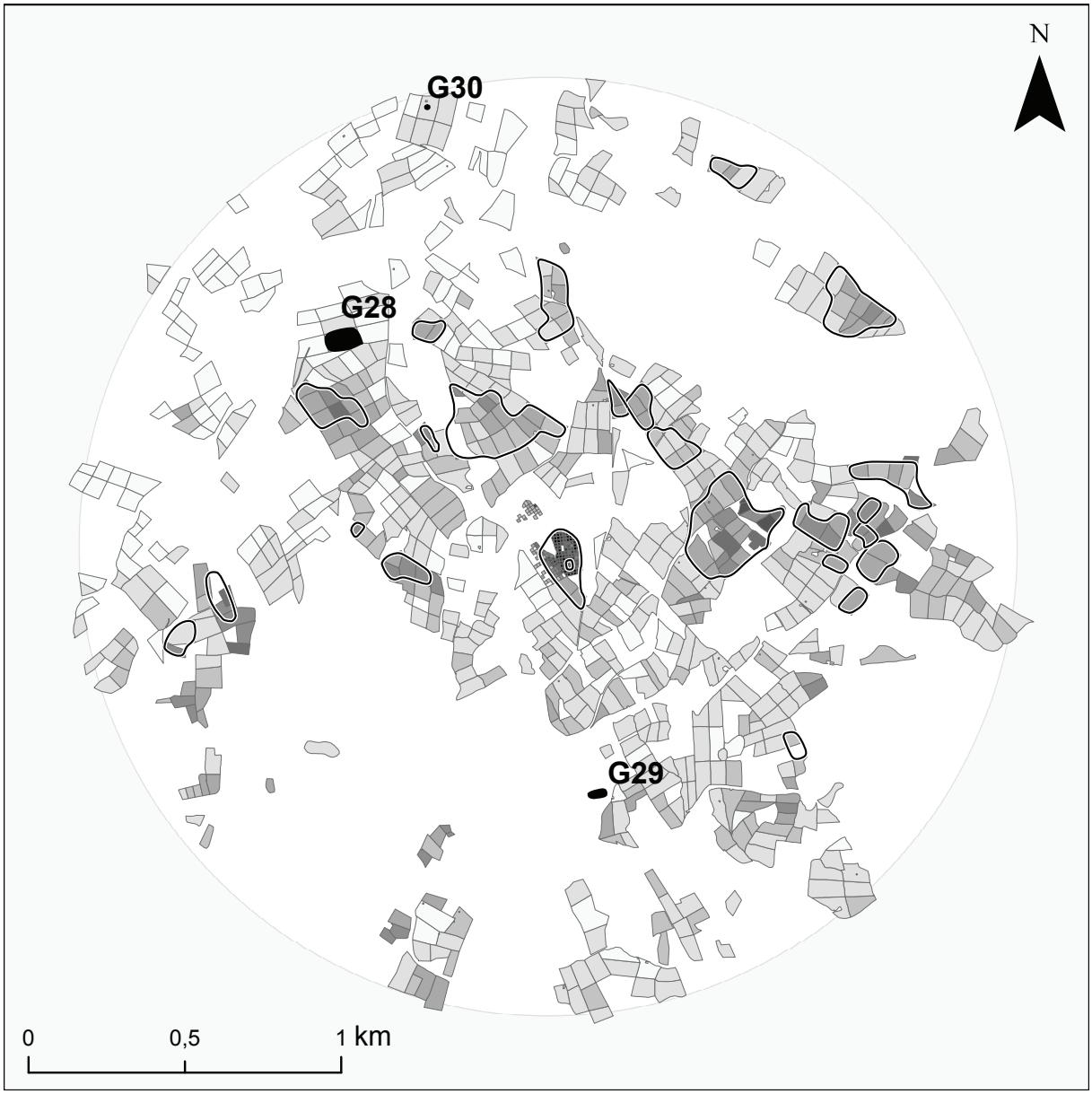

Figure 2.10. Surface sample units showing densities of artifact counts (gray shading indicates range of 0–10/ha to >5000/ha). Black lines indicate site haloes of sites attested during survey. Solid black shapes labeled G28–30 indicate sites found during revisits.

2.5.2 TESTING THE CERAMIC WARE VARIABILITY HYPOTHESIS

The query used to test the hypothesis identified samples in the SLP dataset based on three parameters: high variability (number of ceramic wares), size (total number of collected artifacts), and samples collected under unfavorable visibility conditions (1 or 2). Initially the query was defined by absolute values, though it turned out to be more interesting to look at the relative proportion of ceramic wares and sample size. As stated, the hypothesis must be verified by collecting new samples. Therefore, the anomalies identified by the query were the principal objective of research during a revisitation program carried out in 2008. After a quick inspection of the research area, five out of a total of 10 identified anomalies were selected, favoring those where visibility conditions were likely to be different from the original sampling during 2004 and 2005. Sampling intensity was the same as the first visit. In three cases (sample units 2062, 2398, 2399, and 2602), resampling resulted in the identification of previously unidentified sites (fig. 2.10) (Pelgrom and Stek 2010). In one case (sample units 2080 and 2083) the revisit did not produce any new evidence for the presence of a site and in another case (sample unit 2362) difficulty in establishing the original field and its extent hindered the experiment.

Sample unit 2062
The sample collected in unit 2062 during the first visit in 2005 produced seven sherds, which were classified into five distinct wares. Visibility conditions were poor. Before the revisit, the field had been ploughed thoroughly during the last agricultural season, which unearthed a considerable amount of fresh material (Taylor 2000). A large sample was collected that was diagnostic of a small Hellenistic or Early Roman site. The presence of newly exposed building material, which had been removed and piled up at the edge of the field after plowing, was particularly striking. This anomaly can therefore tentatively be interpreted as a small Samnite farm (site G28 in the site catalogue) (Pelgrom and Stek 2010).

Sample units 2398 and 2399
In the case of sample units 2398 and 2399 there was also a small sample from 2005 (n=18 sherds) presenting a variety of contemporaneous material mainly consisting of fine wares (a total of six types). An important criterion for defining this area as an anomaly was the sharp contrast in the density of surface materials with the surrounding fields, which generated only half the number of ceramic wares or less. Upon revisiting these sample units, the field appeared to have been ploughed recently, which brought up large stone slabs indicating the presence of tombs. Again, the composition of the new sample suggested the presence of a site; this one is probably a small cluster of graves (site G30).

Sample unit 2602
The sample collected from sample unit 2602 in 2005 contained 27 sherds classified as eight different wares. Again, there were poor visibility conditions. Upon revisiting the sample unit in 2008 the field had been lightly ploughed. In the southern part of the field there was a high density of material (>5 artifacts per m^2) consisting of tiles, dolium, and coarse wares. As with sample unit 2062, the assemblage could be interpreted as a farm (site G29) of uncertain date.

Sample units 2362, 2080, and 2083
Sample unit 2362 was selected because of a local peak in the diversity of wares, five wares in a sample of seven sherds, that were collected under poor visibility conditions. Because there was some uncertainty about the exact location of the field, this case could not be properly tested. The visibility conditions during the first visit to sample units 2080 and 2083 were favorable, nevertheless, these sample units were selected because of the small sample sizes (n=12 and 10 sherds, respectively) that exhibited high variability (six and four wares, respectively). Upon revisiting these sample units, however, the fields presented poor visibility conditions; less than 5% of the surface was visible owing to vegetation. The second sample was comparable to the original visit in 2005 so no further conclusions about the anomaly could be made.

2.5.3 DISCUSSION

For the revisits with positive results, plowing activity is primarily responsible for an increase in artifacts brought up from the subsoil since the initial sampling (ceramic sherds, building materials, and tomb slabs). The negative results from sample units 2080 and 2083 involved poorer visibility conditions than during the campaigns in 2004 and 2005. These results might also be attributable to tillage conditions because the area had not been ploughed previously for several years. Admittedly, revisiting research areas under different visibility conditions is already a common strategy for validating results in many survey projects and sites can appear to be going "on and off like traffic lights" (Lloyd and Barker 1981, paraphrased in Terrenato 2004: 40). Therefore, offsite areas are often revisited to test previous results. The revisits conducted here are different, however, because they are targeted to specific areas based on an analysis of the samples (instead of randomly). Furthermore, they are not merely used to verify results but are aimed at retrieving new evidence from offsite densities. The results tentatively support the hypothesis that under poor visibility conditions a high variability of artifact types in low density samples can be regarded as an important indicator for a site.

The type of analysis performed here might be elaborated. For example, the significance of variability for site identification implies a second indicator: identifying distinctive assemblages. The search for ware variability in small samples could be oriented toward identifying combinations of wares that are diagnostic of known site categories, such as those in recent publications by Winther-Jacobsen (2010) and De Haas

(2011). Furthermore, relative proportions of ceramic wares in assemblages could be taken into account. This is based on the assumption that these proportions might show a certain patterning. For example, the typical assemblage for Samnite farms includes mainly tiles and coarse wares almost always associated with smaller amounts of plain wares and fragments of cooking pots and storage vessels, and fine table wares are often present in small amounts. If these patterns can be established to some statistically significant degree they can be used as criteria to identify sites. The advantage of adopting such an approach would be that anomalies could be distinguished based on more specific quantitative and qualitative properties. These are not the only examples of potential analyses that could be undertaken. An interesting possibility for pattern recognition is offered by the changes in the spatial homogeneity of distributions under varying densities and the consequences for their interpretation as site or offsite material (Bevan and Conolly 2004: 128–132).

2.6 IMPACT OF THE OFFSITE ANALYSES ON THE OVERALL PROJECT

The study of offsite materials in the context of the SLP has so far led to the identification of three more sites (n=30 total). Apart from the increase in the number of sites, the revisits also added to the typological diversity of sites, with the discovery of a small cluster of graves. Site definition is essential for the formation of archaeological survey databases and determines our view of the landscape and its inhabitants in antiquity. Identifying sites is the general goal of most surveys and interpretations of the results are based on the density, typology, and hierarchy of the observed patterns. Therefore, improving insight into the number and types of sites in a research area will yield more information on the development and differentiation of human occupation and activity. Furthermore, the increase in the number of sites as a result of more detailed study may contribute to the discussion of site retrieval rates, which deals with the discrepancy between historical demographic information and survey data with regard to population densities in antiquity (Pelgrom 2008).

Two of the three sites identified as a result of this study are attributed to the Hellenistic and Roman periods and support general trends, namely, a substantial intensification in rural settlement in the Late Hellenistic phase and the continuity of this pattern into Roman times (Pelgrom and Stek 2010: 51–53). This pattern becomes even more interesting in relation to the local historical context of the sanctuary. With the new sites, the occupation density rises above five sites per sq km for the Hellenistic period. This strengthens the interpretation of the sanctuary as being embedded in a local pattern of settlement and burial activity, and addresses one of the main research questions of the SLP (Pelgrom and Stek 2010). Compared with the results from other surveys in the area, this is a high density of sites and it would be interesting to make more detailed comparisons (e.g., with the Biferno Valley Project) (Barker 1995).

The evaluation of offsite materials demonstrates that it is possible to identify anomalies and refine interpretations of the surface record. Extracting anomalies from the background noise decreases the amount of surface-collected material that can be regarded as offsite material. It would be interesting to study this modified offsite record. Models that explain offsite depositional patterns as the result of specialized taskscapes or land-use practices, as defined by Hayes (1991) and tentatively applied by De Haas (2011, 2012), provide one possible approach.

2.7 CONCLUSIONS

This study reveals that a detailed evaluation of background noise can produce valuable information about the history of a given research area. A review of the literature supports the position that a detailed assessment of offsite material can reveal greater insights about past human activity, beyond frequent explanations involving general processes such as manuring and erosion. The examples presented here show how postdepositional processes and sampling procedures affect the formation of the archaeological record. By looking more carefully at site formation processes, archaeologists can identify sporadic evidence of human activity, which may be overlooked when relying on general explanations.

I used my research on the surveys around the sanctuary of S. Giovanni in Galdo to show how a detailed assessment of background noise can lead to the extraction of sporadic evidence from the database. Using a critical approach to the definition of sites and haloes, the site/halo material was separated from the offsite material, and it was determined that offsite material is probably not exclusively a result of general processes such as manuring or erosion. Local postdepositional processes and sampling conditions influence the formation of surface assemblages and collected samples. I suggest that archaeologists should identify, verify, and explain the anomalies of high ceramic ware variability and low visibility in their data because these can indicate past human activity. The result of this exercise was an increase in the number and types of sites and additional refinement of the analyses of offsite materials, both of which influence our understanding of the historical landscape.

Alcock, S., Cherry, J. and Davis., J. 1994. "Intensive survey, agricultural practice and the classical landscape of Greece." In: Morris, I. (ed.) *Classical Greece: ancient histories and modern archaeologies*. Cambridge University Press, 137-170.
Ammerman, A. 1985. "Plow-Zone Experiments in Calabria, Italy" *Journal of Field Archaeology* 12-1, 33-40.
Ammerman, A. and Terrenato, N. 1996. "Visibility and Site Recovery in the Cecina Valley Survey, Italy" *Journal of Field Archaeology* 23-1, 91-109.
Attema, P., Burgers, G. J. and Van Leusen, P.M. 2010. *Regional pathways to complexity. Settlement and land-use dynamics in early Italy from the Bronze Age to the Republican Period*. Amsterdam Archaeological Studies 15.
Barker, G. 1995. *A Mediterranean Valley: Landscape Archaeology and Annales History in the Biferno Valley*. Leicester University Press.
Barton, C.M., Bernabeu, J., Emili Aura, J. and Garcia, O. 1991. "Land-use dynamics and socioeconomic change: an example from the Polop Alto Valley" *American Antiquity* 64-4, 609-634.
Baxter, M.J. 2001. "Methodological Issues in the Study of Assemblage Diversity." *American Antiquity* 66, 715–725.
Bevan, A. and Conolly, J. 2004. "GIS, Archaeological Survey, and Landscape Archaeology on the Island of Kythera, Greece" *Journal of Field Archaeology* 29-1/2, 123-138.
Bintliff, J. and Snodgrass, A. 1988. "Off-site Pottery Distributions: A Regional and Interregional Perspective" *Current Anthropology* 29-3, 506-513.
Bintliff, J., Howard, P. and Snodgrass, A. 1999. "The Hidden Landscape of Prehistoric Greece" *Journal of Mediterranean Archaeology* 12-2, 139-168.
Bintliff, J., Howard, P. and Snodgrass, A. (eds.) 2007. *Testing the Hinterland: The work of the Boeotia Survey (1989-1991) in the Southern Approaches to the City of Thespiai*. McDonald Institute for Archaeological Research.
Blanton, R.E. 2001. "Mediterranean myopia" *Antiquity* 75, 627-629.
Caraher, W.R., Nakassis, D. and Pettegrew, D.K. 2006. "Siteless Survey and Intensive Data Collection in an Artifact-rich Environment: Case Studies from the Eastern Corinthia, Greece" *Journal of Mediterranean Archaeology* 19-1, 7-43.
De Haas T.C.A. 2011. *Fields, Farms and Colonists. Intensive Field Survey and Early Roman Colonization in the Pontine Region, Central Italy.* Groningen Archaeological Studies 15. Groningen: University of Groningen.
De Haas, T.C.A. 2012. "Beyond Dots on the Map: Intensive Survey Data and the Interpretation of Small Sites and Off-Site Distributions." In: Attema, P.A.J. and Schörner, G. (eds.) *Comparative Issues in the Archaeology of the Roman Rural Landscape: Site Classification Between Survey, Excavation and Historical Categories* (Journal of Roman Archaeology Supplementary Series 88): 55–79. Portsmouth: Journal of Roman Archaeology.
Dunnell, R.C. and Dancey, W.S. 1983. "The Siteless Survey: A Regional Scale Data Collection Strategy" *Advances in Archaeological Method and Theory* 6, 267-287.
Fentress, E. 2000. "What are we counting for?" In: Francovich, R. and Patterson, H., eds. *Extracting Meaning from Ploughsoil Assemblages*. The Archaeology of Mediterranean Landscapes 5. Oxbow Books, 44-52.
Gallant, T.W. 1986. ""Background Noise" and Site Definition: A Contribution to Survey Methodology" *Journal of Field Archaeology* 13-4, 403-418.
Gillings, M. and Sbonias, K. 1999. "Regional Survey and GIS: The Boeotia Project" In: Gillings, M., Mattingly, D., and van Dalen, J. (eds.). *Geographical Information Systems and Landscape Archaeology.* The Archaeology of Mediterranean Landscapes 3. Oxbow Books, 36–54.
Hayes, P. 1991. "Models for the Distribution of Pottery Around Former Agricultural Settlements" In: Schofield, A. (ed.) *Interpreting Artifact Scatters. Contributions to Ploughzone Archaeology.* Oxbow Monographs in Archaeology, 81–92.
Kerckhaert, K.-J. 2005. "Een geofysische-survey in Italië." *AWN-Zeeland*, 9–26.
Lloyd, J. A. & Barker, G. 1981. "Rural settlement in Roman Molise: problems of archaeological surveys." In: G. Barker & R. Hodges (eds.), *Archaeology and Italian Society*, British Archaeological Reports, International Series 102, Oxford, 289 - 304.
Mattingly, D. 2000. "Methods of collection, recording and quantification" In: Francovich, R. and Patterson, H. (eds.) *Extracting Meaning from Ploughsoil Assemblages*. Series: The Archaeology of Mediterranean Landscapes 5. Oxbow Books, 5-15.
Millett, M. 2000. "Dating, Quantifying and Utilizing Pottery Assemblages from Surface Survey." In: Fran-

covich, R. and Patterson, H., eds. *Extracting Meaning from Ploughsoil Assemblages*. The Archaeology of Mediterranean Landscapes 5. Oxbow Books, 53–59.
Orton, C. 2000. *Sampling in Archaeology*. Cambridge University Press.
Pelgrom, J. 2008. "Settlement Organization and Land Distribution in Latin Colonies Before the Second Punic War." In: de Ligt, L. and Northwood, S. J. (eds.) *People, Land and Politics. Demographic Developments and the Transformation of Roman Italy 300 BC–AD 14*. Boston: Brill, 333–372.
Pelgrom, J. and Stek, T.D. 2010. "A landscape archaeological perspective on the functioning of a rural cult place in Samnium: field surveys around the sanctuary of S. Giovanni in Galdo (Molise)" *Journal of Antique Topography* XX, 41-102.
Roccia, M. 2005. "Osservazioni sui materiali" (Appendix) In: Stek, T.D., and Pelgrom, J. "Samnite Sanctuaries Surveyed: Preliminary Report of the Sacred Landscape Project 2004" *BABesch 80*, 65–71.
Stek, T.D. 2009. *Cult Places and Cultural Change in Republican Italy: A Contextual Approach to Religious Aspects of Rural Society After the Roman Conquest*. Amsterdam Archaeological Studies 14. Amsterdam: Amsterdam University Press.
Stek, T.D. and Pelgrom, J. 2005. "Samnite Sanctuaries Surveyed: preliminary report of the Sacred Landscape Project 2004" *BABesch* 80, 65-71.
Taylor, J. 2000. "Cultural depositional processes and post-depositional problems." In: Francovich, R. and Patterson, H. (eds.) *Extracting Meaning from Ploughsoil Assemblages*, Series: The Archaeology of Mediterranean Landscapes 5. Oxbow Books, 16-26.
Terrenato, N. 2000. "The visibility of sites and the interpretation of field survey results: towards an analysis of incomplete distributions" In: Francovich, R. and Patterson, H. (eds.) *Extracting Meaning from Ploughsoil Assemblages*, Series: The Archaeology of Mediterranean Landscapes 5. Oxbow Books, 60-71.
Terrenato, N. 2004. "Sample Size Matters! The paradox of global trends and local surveys" In: Alcock, S. and Cherry, J.F. (eds.) *Side-by-side survey*. Oxbow Books, 36-48.
Verhoeven, A. A. A. 1991. "Visibility Factors Affecting Artifact Recovery in the Agro Pontino Survey." In: Voorrips, A., Loving, S. H. and Kamermans, H. (eds.) *The Agro Pontino Survey Project*. Universiteit van Amsterdam, Instituut voor Pre- en Protohistorische Archeologie Albert Egges van Giffen, 87-96.
Waagen, J. 2010. "Digital Modeling and Data Processing" (Appendix) In: Pelgrom, J. and Stek, T.D. "A Landscape Archaeological Perspective on the Functioning of a Rural Cult Place in Samnium: Field Surveys Around the Sanctuary of S. Giovanni in Galdo (Molise)." *Journal of Antique Topography 20*, 41–102.
Waagen, J. 2014. "Evaluating background noise: Assessing off-site data from field surveys around the italic sanctuary of S. Giovanni in Galdo, località Colle Rimontato, Molise, Italy." *Journal of Field Archaeology* 39–4, 417– 429.
Winther-Jacobsen, K. 2010. *From Pots to People. A Ceramic Approach to the Archaeological Interpretation of Ploughsoil Assemblages in Late Roman Cyprus. BABesch Supplement* 17. Leuven: Peeters.