# Conclusions

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## Occupation and exploitation of a Neolithic levee site (c. 4300-4000 cal. BC)

Edited by D.C.M. Raemaekers & J.P. de Roever

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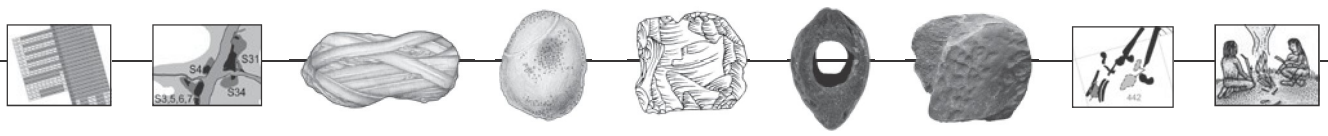

# Conclusions

D.C.M. Raemaekers[1] & J.P. de Roever[2]

## 10.1 Introduction

In this final chapter, we bring together the results of the previous chapters. The recent work at Swifterbant S4 was carried out within an explicit research framework, with the ambition to contribute to the main research topics that had been left unanswered by the fieldwork and by the analyses carried out previously. Here, we will focus on the gains of the project, using the three themes identified in chapter 1 as the storyline.

## 10.2 Theme 1: Landscape, exploitation and site function

Swifterbant S4 is a site located on the creek bank of small river system, on the freshwater side of an estuary that was connected to the North Sea (Schepers & Woltinge; chapter 2). While the clay that built up the area is of marine origin, all botanical and zoological data indicate that S4 was only under brackish influence during storm events. The rest of the time, it was a freshwater system. Reeds and various club species grew along the creek bank, while the natural vegetation of the creek banks was dominated by willow carr and alder carr (Schepers & Bottema-Mac Gillavry; chapter 6).

Human impact on the natural vegetation resulted in a ruderal vegetation in which arable weed communities developed, while the water meadows turned into a grazing zone dominated by grasses. The cereal cultivation practiced was based on two types of cereals, emmer wheat and naked barley. Both are present in many of the sampled squares, implying that cereal cultivation and consumption took place on a regular basis. However, it remains difficult to assess the proportion of cereals in the diet. Other plant resources were exploited as well, such as hazelnuts, acorns, roots of lesser celandine and sea club-rush, and crap apple (Schepers & Bottema-Mac Gillavry; chapter 6). A similarly broad spectrum of animal resources was exploited. The domestic animals cattle, pig, sheep and dog are all represented, of which cattle was probably the most important in terms of contribution to the diet. Hunted animals include beaver, red deer, wild boar and otter. Although it is difficult to determine the relative importance of the animal species found, the small number of bird bones may indicate the restricted importance of fowling. Fish and bird remains are probably underrepresented in our assemblage due to both the relatively poor preservation and the recovery techniques used (Kranenburg & Prummel; chapter 7).

The settlement function of the site is attested by various find categories, including the many broken and burnt bones (Kranenburg & Prummel; chapter 7), the many ceramic sherds (Raemaekers *et al.*; chapter 3) and the wide variety of flint and stone tools (Devriendt; chapters 4 and 5). While site function can be proposed on the basis of the remains from S4 proper, it is more useful to discuss this topic in a comparative way, in which the other three excavated river bank sites (S2, S3 and S51) are incorporated into the analysis as well (table 10.1). This comparison indicates that S3 and S4 are nearest neighbours, both in terms of spatial proximity and in terms of site aspects. S3 and S4 are located along the cross-roads of a secondary and tertiary creek, whereas S2 and S51 are located along the primary creek. During the analysis of the S4 finds, this impression of similarity became so strong that we initiated a dedicated coring campaign to try to find out whether the small creek branch between the two sites may post-date the occupation and whether S3 and S4 should thus be considered a single site. This question could not be answered (Schepers & Woltinge; chapter 2). Here, we conclude that S3 and S4 may *de facto* have functioned as a single site. The interpretation of S4 (and S3) can be based on various aspects of these two sites, with S2 providing the counterpart of the comparison. The contribution of S51 to this comparison is limited due to its small assemblage size and restricted area of excavation.

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**Table 10.1** A comparison of site characteristics of S2, S3, S4 and S51. Based on the various chapters in this volume and the reference cited therein.

| | | S2 | | S3 | | S4 | |
|---|---|---|---|---|---|---|---|
| **Zoology** | | **Number** | **%** | **Number** | **%** | **Number** | **%** |
| dog | | | | 3 | 1.0 | 22 | 3.3 |
| domestic pig | | 6 | 14 | 59 | 19.7 | 99 | 14.6 |
| cattle | | 1 | 2 | 8 | 2.7 | 163 | 24.1 |
| sheep and sheep/goat | | 4 | 9 | | | 29 | 4.3 |
| domestic pig/wild boar | | 4 | 9 | 85 | 28.3 | 92 | 13.6 |
| cattle/aurochs | | | | | | 17 | 2.5 |
| beaver | | 17 | 39 | 65 | 21.7 | 85 | 12.6 |
| otter | | 3 | 7 | 11 | 3.7 | 25 | 3.7 |
| wild boar | | 3 | 7 | 55 | 18.3 | 41 | 6.1 |
| red deer | | 6 | 14 | 13 | 4.3 | 96 | 14.2 |
| aurochs | | | | | | 1 | 0.1 |
| other wild mammals | | | | 1 | 0.3 | 6 | 0.9 |
| **Total identified mammals** | | **44** | **100** | **300** | **100.0** | **676** | **100.0** |
| **Ceramics** | | **Number** | **%** | **Number** | **%** | **Number** | **%** |
| **Temper** | Stone grit & plant | 129 | 36 | 110 | 28 | 963 | 67.9 |
| | Stone grit | 69 | 19 | 19 | 5 | 318 | 22.4 |
| | Plant | 153 | 43 | 259 | 67 | 84 | 5.9 |
| | Rest | 0 | 0 | 0 | 0 | 52 | 3.7 |
| **Coiling** | Coiling visible | 119 | 31 | 68 | 17 | 346 | 24.4 |
| | U-joins | 94 | 79 | 56 | 82 | 119 | 34.4 |
| | Hb-joins | 25 | 21 | 12 | 18 | 227 | 65.6 |
| **Body** | Body sherds | 380 | | 400 | | 1241 | |
| | Decorated body sherds | 8 | | 41 | | 44 | |
| | Body decoration | | 2 | | 10 | | 3.5 |
| | Of which on shoulder | 8 | 100 | 27 | 65 | 20 | 45 |
| **Rim** | Rim sherds | 7 | | 74 | | 114 | |
| | Decorated rim sherds | 3 | | 43 | | | 45 |
| | Rim decoration | | 43 | | 58 | | 40 |
| | Of which on inner face | 3 | 100 | 22 | 61 | 48 | 42 |
| | Of which on upper face | | 0 | 3 | 8 | 56 | 49 |
| | Of which on outer face | | 0 | 9 | 25 | 5 | 4 |
| | Of which on more than one face | | 0 | 2 | 6 | 8 | 7 |
| **Totals** | | **380** | | **400** | | **1418** | |

The comparison of the zoological data (Kranenburg & Prummel; chapter 7) makes clear that the same taxa were found at all sites. If we focus on pig and cattle (wild and/or domestic), it is clear that their abundance varies greatly across the three sites compared in table 10.1. The near absence of cattle bones at S2 is in stark contrast with their abundant presence at S4, where more than a quarter of the mammal bones identified are of cattle. This may be an important functional difference, which begs for further analysis on the cattle skeletal elements found across the sites. Such an analysis may indicate a difference in consumption versus butchering activities.

The ceramic assemblages from S2, S3 and S4 are quite varied (Raemaekers *et al.*; chapter 3) within the general framework of the Swifterbant culture (cf. De Roever, 2004). The ceramic characteristics listed in table 10.1 do not provide clues concerning differentiation in site function.

The same holds true for the stone artefacts: The assemblages have similar percentages of non-flint stone tools and similar percentages of the different types of non-flint stone tools (Devriendt; chapter 4). In contrast, the flint artefacts differ (Devriendt; chapter 5). S4 and S3 have a higher percentage of debitage material, suggesting that tool production and re-tooling was more common there. In contrast, at S2 and S51, more emphasis is found on the use of tools. The flint tool assemblages again place S3 and S4 together, with a similar proportion of scrapers. Intriguingly, S51has an even higher proportion of scrapers, suggesting that hide working was a relatively important activity to take place there. At S2, scrapers are not the most abundant tool type, but, rather, tools created on blades. Differences in another tool type stand out as well. Borers are relatively common at S2, but rare at S4 and S3 and absent at S51.

**Table 10.1** Continued.

| | S2 | | S3 | | S4 | | S51 | |
|---|---|---|---|---|---|---|---|---|
| **Stone artefacts** | **Number** | **% ≥ 3 g** | **Number** | **% ≥ 3 g** | **Number** | **% ≥ 3 g** | **Number** | **% ≥ 3 g** |
| **Debitage material** | **192** | **36.2** | **951** | **42.2** | **167** | **30.0** | **24** | **47.1** |
| **Tools** | **37** | **7.0** | **244** | **10.8** | **51** | **9.2** | **10** | **19.6** |
| | Number | % | Number | % | Number | % | Number | % |
| Hammers | 6 | 29 | 95 | 36 | 13 | 28 | 3 | 33 |
| Anvils | 6 | 29 | 102 | 38 | 19 | 40 | 3 | 33 |
| Grinding stones | 9 | 43 | 68 | 26 | 15 | 32 | 3 | 33 |
| **Total** | **21** | **100** | **265** | **100** | **47** | **100** | **9** | **100** |

| **Flint artefacts** | **Number** | **%** | **Number** | **%** | **Number** | **%** | **Number** | **%** |
|---|---|---|---|---|---|---|---|---|
| **Debitage material** | **505** | **49.2** | **11147** | **68.9** | **918** | **61.9** | **83** | **54.6** |
| **Tools** | **198** | **19.3** | **1420** | **8.8** | **163** | **11.0** | **27** | **17.8** |
| Scrapers | 28 | 14.1 | 435 | 30.6 | 49 | 30.1 | 13 | 48.1 |
| Borers | 12 | 6.1 | 27 | 1.9 | 3 | 1.8 | | |
| Rounded pieces | 9 | 4.5 | 41 | 2.9 | 10 | 6.1 | | |
| Trapezoid pieces | 7 | 3.5 | 40 | 2.8 | 6 | 3.7 | 2 | 7.4 |
| Transverse arrowheads | 1 | 0.5 | 6 | 0.4 | | | | |
| Tools on flake | 23 | 11.6 | 205 | 14.4 | 14 | 8.6 | 2 | 7.4 |
| Tools on blade | 59 | 29.8 | 209 | 14.7 | 24 | 14.7 | 5 | 18.5 |
| Tools on other blanks | 7 | 3.5 | 53 | 3.7 | 5 | 3.1 | | |
| Indet. tools | 4 | 2.0 | 14 | 1.0 | 5 | 3.1 | 1 | 3.7 |
| Indet. tool fragments | 38 | 19.2 | 247 | 17.4 | 44 | 27.0 | 2 | 7.4 |
| Retouched chips | 10 | 5.1 | 143 | 10.1 | 3 | 1.8 | 2 | 7.4 |

| **Other site characteristics** | **Number** | **%** | **Number** | **%** | **Number** | **%** | **Number** | **%** |
|---|---|---|---|---|---|---|---|---|
| Burials | 9 | | 0 | | 1 | | 0 | |
| Number of post holes | 10 | | 650 | | 70 | | 0 | |
| Number of house plans | 0 | | 1 | | 0 | | 0 | |
| Number of hearths | 0 | | many | | 14 | | 1 | |

More contrast is seen in the features. The most striking aspect of S2 are the nine burials – a site characteristic not documented at S3 and S51. The single burial from S4 (Smits; chapter 8) deviates from 'textbook' Swifterbant burials: It concerns the only child burial at the sites in the Swifterbant area in which burial remains from an adult are absent (Raemaekers *et al.*, 2009). The occurrence of postholes again stresses the singular position of S2: This site lacks the scatter of postholes found at S3 and S4. Instead, it has a single row of 10 postholes. The postholes scatter at S3 comprises a house plan (ca. 4.5 × 8 m; De Roever, 2004: 34); probably a series of wooden constructions was built at this spot during the site's occupation (Devriendt, 2013: 189-197). The posthole scatter at S4 is too limited in extent and number to interpret.

We conclude that most site characteristics indicate that settlement activities took place at all four sites. We might call all sites settlement sites, but we would like to stress that while at S3 and S4 all site characteristics are related to settlement activities, at S2 and S51 this is not the case. While S51 is poorly known, the dominance of scrapers suggests that this site was important for hide working. At S2, the burials, in combination with the absence of a posthole scatter, suggest a more episodic occupation. Visits were certainly related to the burial activities, but one might also envisage that the finds scatter results from site visits, rather than extended periods of use.

## 10.3 Theme 2: Temporal developments in site function

The site function of S4 is relatively complex and varied through time (Schepers & Woltinge; chapter 2). The build-up of the site indicates that the site's biography started with the deposition of reed materials, in which typical settlement debris was found. This layer became covered with a clay layer, which was subsequently used as a cultivated field. The major anthropogenic layer on top of this field was the main focus of the excavation and yielded almost all the finds and features presented in this volume. It is evidence of recurrent practices that can comfortably be labelled settlement activities. During this phase of its build-up and use, the site was also used for (a single) burial (Smits; chapter 8). The soil micromorphological analysis proposes that several additional cultivation levels are embedded in the layer (Huisman *et al.*, 2009). One additional cultivated level was documented above the anthropogenic layer, suggesting that this particular exploitation of the site (i.e. its use as a cultivated field) continued after its abandonment as a settlement


**Fig. 10.1** The S2 cultivated field, as documented in 1964. The caption reads (our translation) "Research of the prehistoric settlement at plot G42 [=S2]. Random mix of the black culture layer [=layer 5] with the grey river bank clay [=layer 4], at the contact area of both, in the western part of the excavation trench. 6-11-'64" (collection Batavialand).

site (Huisman & Raemaekers, 2014). This interplay between site functions is not restricted to S4, but can also be found at S2 and S3. At S3, where the site stratigraphy is very similar to S4, a well-preserved cultivated field was documented in the same stratigraphic position (Huisman & Raemaekers, 2014). At S2, a cultivated field was documented in 1964 but not recognised as such at the time (fig. 10.1).

The 50 cm thick anthropogenic layer 5 was excavated in 5 cm spits, which allowed us to determine that the ceramic characteristics change from bottom to top. These trends suggest that the mixing of finds as a result of trampling was not complete (Raemaekers *et al.*; chapter 3). With all other find categories, we studied trends in terms of three spatial units (each comprising three spits) to see if there were developments in site function during the build-up of layer 5. The results are rather limited. No trends were observed in the stone artefacts, while a refit from a rare diabase axe comprised only fragments from the top unit, strengthening our idea that these units might be helpful in the study of trends (Devriendt; chapter 4). The flint artefacts do not provide any evidence for changes in site function (Devriendt; chapter 5). The botanical analysis does show a significant change: Starting with spit 4, emmer wheat is present in a larger proportion of the samples than in the lower spits. This increase may be interpreted in terms of a change in the local environment favouring emmer wheat cultivation and/or in (the increase of) the import and consumption of emmer wheat (Schepers and Bottema-Mac Gillavry; chapter 6). We do not consider this change to indicate a change in site function. The zoological material also shows one intriguing change: the proportion of bones from beaver increases from ca. 4% in units 2 and 3 to ca. 22% in unit 1, at the top of layer 5, suggesting that in this last stage of occupation the exploitation of beaver became more important. On the basis of the observation of cut marks on beaver bones from S3, it was proposed that these animals were exploited for their fur (Zeiler, 1987). A similar specialised activity is proposed here. In all, there is little evidence for changes in site function during the build-up of layer 5.

One unexpected side effect of this analysis is that various other trends were found, not related to site function. These trends primarily concern the increase in find density of both stone and flint artefacts (Devriendt; chapters 4 and 5). This pattern was also found at S3, where it was interpreted as a consequence of a sequence of freezing and thawing that resulted in the upwards movement of artefacts (De Roever, 2004: 33). Various aspects of the bone

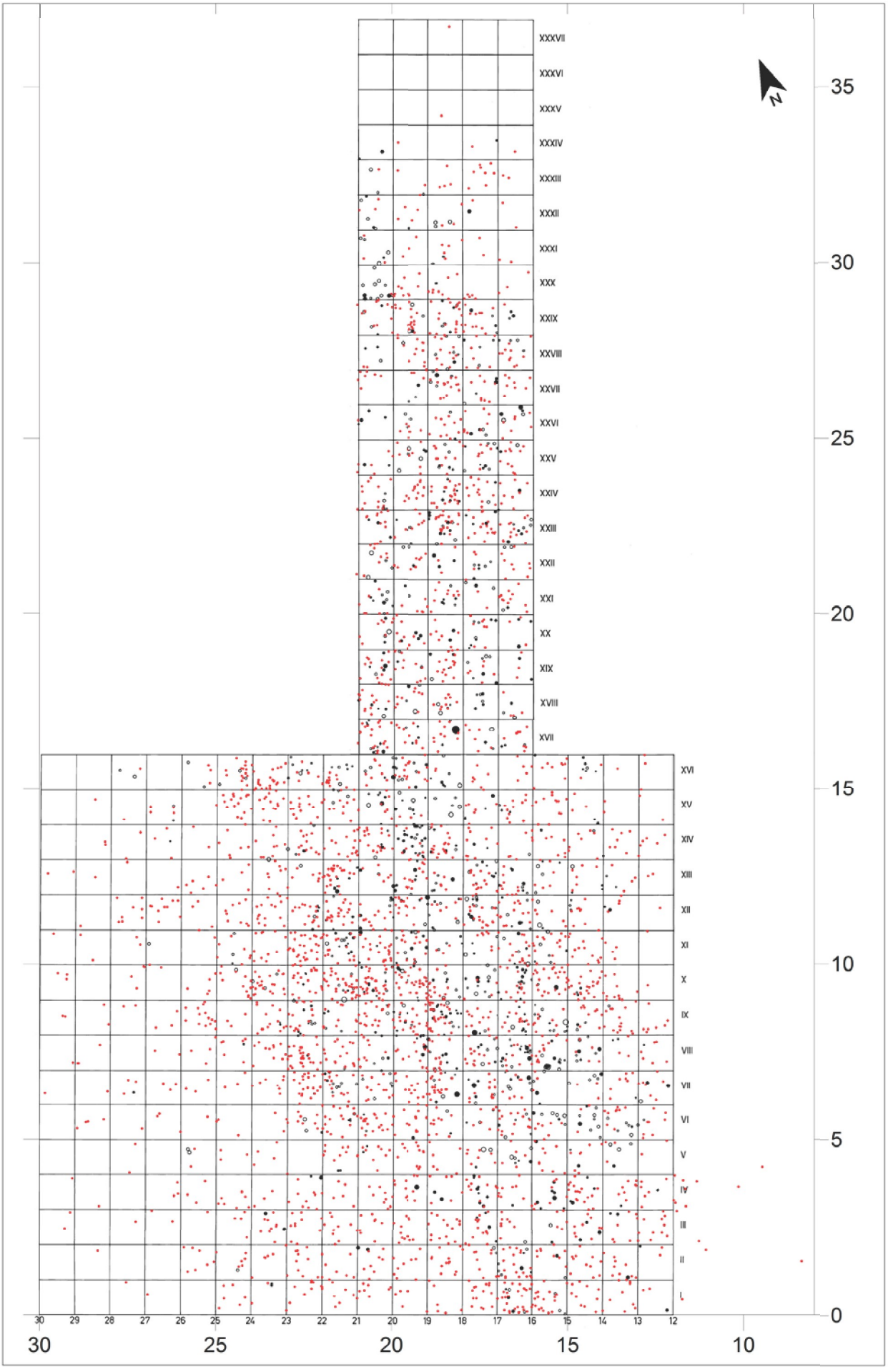


**Fig. 10.2** Distribution of 3D documented stone artefacts and postholes at Swifterbant S3 (Devriendt, 2013: fig. 4.28).

assemblage also show trends (Kraneburg & Prummel; chapter 7). There is variation in the density of the identified bone remains, the average bone weight, and the proportion of calcined and weathered bones. All these observations may be related to changes in the intensity with which the site was used, changes in the speed of the build-up of layer 5, or both.

## 10.4 Theme 3: The use of space

The use of space has been analysed on the basis of the distribution patterns of various find categories (Geuverink; chapter 9). Due to the fragmented character of our excavation – resulting from the 'disturbance' of the 1974 excavation and the test trenches in trench 2 – this analysis suffered from edge effects and has not produced meaningful insights into the use of space. The general conclusion is that the density of finds correlates with the density of features, suggesting that there was a central part of the site where most activities took place and that the frequency of activities decreased in the periphery of the site.

We are limited in our interpretations by the poor quality of our dataset for spatial analysis. We note that Swifterbant sites with more potential for spatial analysis also display an intriguing lack of spatial structure. Activity areas are not easily discerned, and all sites give the impression of a continuous spread of material culture, without distinct artefact clusters that can be related to specific activities (figs 10.2-10.5). It may well be that this lack of spatial structure is a cultural characteristic of the Swifterbant culture.

## 10.5 Looking ahead

The S4 excavation was carried out on the basis of the research questions we had set ourselves. The excavation methodology we adopted has allowed us to address some issues to a great extent, but future fieldwork could make use of our experiences to develop a better excavation strategy. We propose three improvements. The main shortcoming of the S4 excavation is that it did not allow meaningful spatial analysis. With hindsight, we realize we should have orientated our grid to follow the orientation of the 1974 excavation trench and that we should have extended the excavation in trench 2 to include the areas between the excavated strips. This would have greatly improved the extent and reliability of our spatial analysis. The second improvement would be to sample for soil micromorphology to study the temporal relation between the grave and the find scatter. As it is, it remains an open question whether the grave was dug during the build-up of layer 5 or was, instead, dug into this layer after its build-up had ended.

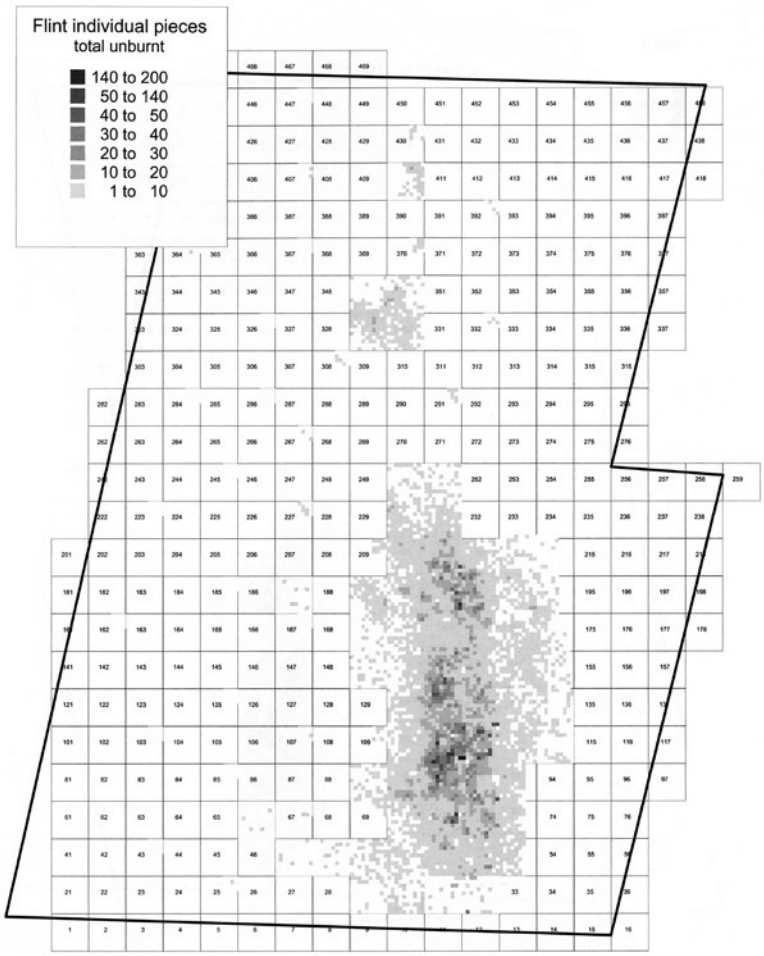


**Fig. 10.3** Density distribution of unburnt flint >10 mm at Hoge Vaart-A27 (from Peeters, 2007: fig. 4.22).

Any future excavators in the Swifterbant region will be quite fortunate because they will be able to build on the great research history in the area, which allows a very detailed estimation of its future potential. This potential can be developed through new fieldwork, but also through more detailed analysis of the existing dataset. For the most part, we used relatively traditional approaches, which may be summarised as identification. But one can do so much more with ceramics, stone and flint artefacts and botanical, zoological and human remains. Such detailed analysis is already underway at GIA. Özge Demirci carried out lipid analysis on a selection of S4 ceramics. Her analysis gives more insight into the meals produced in the pots, thus bringing together the ceramic, botanical and zoological datasets.[3] A new project focuses on the start of animal husbandry in the area of the Swifterbant culture,

3 Her PhD project (2016-2019) is part of a Marie Sklodowska-Curie European Joint Doctoral Training Program, funded by the European Union's EU Framework program for Research and Innovation Horizon 2020 under Grant Agreement No 676154 (ArchSci2020 program).

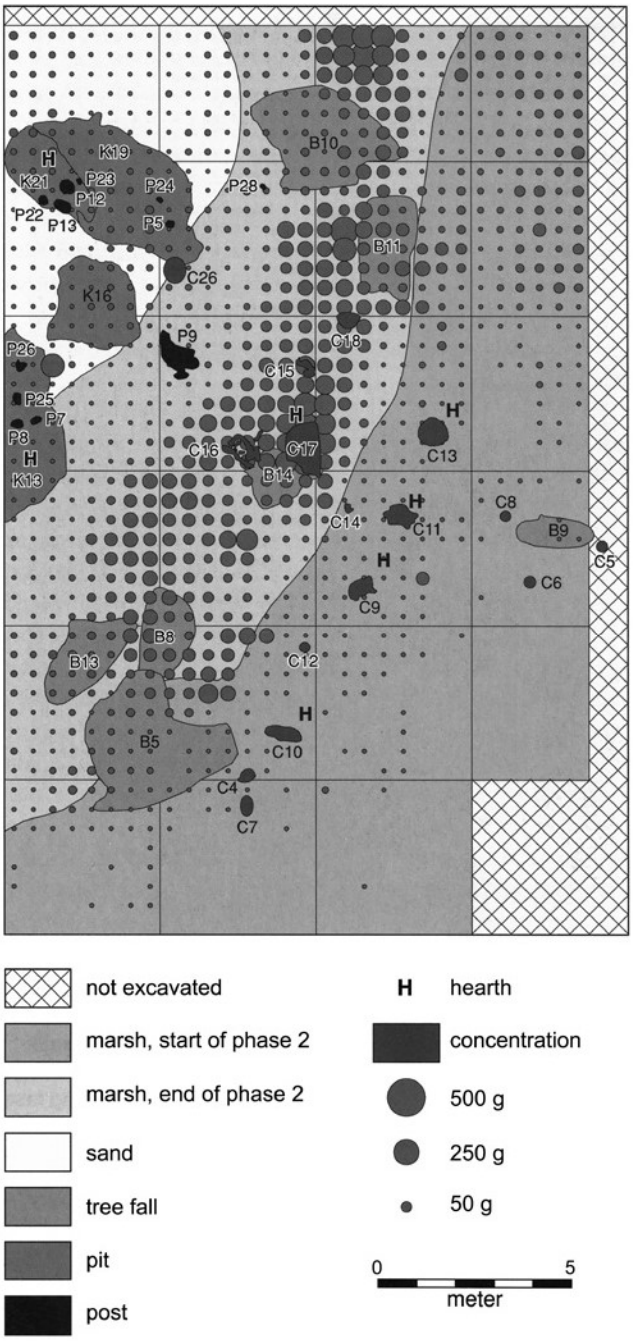


**Fig. 10.4** Density distribution of charcoal at Hardinxveld-Giessendam De Bruin phase 2 (dots) (from Louwe Kooijmans, 2001: fig. 14.5).

with sub-projects dealing with a higher resolution of site chronologies, aDNA analysis of cattle and pig remains, and isotopic analysis of remains of the same species in order to gain more knowledge about their diet and mobility.[4] The future of Swifterbant research is already underway.

4 This project (2020-2022) is financed by the Dutch Science Foundation/Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO) and comprises two PhD's (sub-projects 1 and 2) and a postdoc (sub-project 3), project number 406.18.HW.026.

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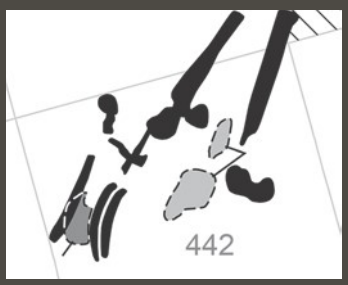
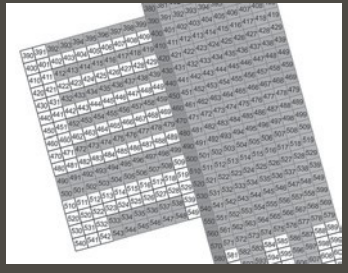
This publication presents the results of the 2005–2007 excavations at Swifterbant S4, carried out by the Groningen Institute of Archaeology. S4 is a well-preserved Neolithic wetland site (c. 4300–4000 cal. BC) located within the Swifterbant river system in the Netherlands. We present the landscape setting, the various finds categories and the spatial patterns with three research themes in mind. Theme 1 concerns the environmental setting, subsistence and site function. We conclude that the Swifterbant hunter-gatherer-farmers exploited a mosaic-type landscape. Theme 2 deals with developments in site function during the occupation and exploitation history of the site. This analysis leads to the observation that episodes of cultivation and settlement alternated at S4. Theme 3, the use of space, was difficult to study due to the fragmented nature of the excavation plan. This site monograph makes Swifterbant-S4 the most comprehensively published site of the Swifterbant river system.







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