Archaeological field survey - methods and problems

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12.2. Archaeological field survey – methods and problems

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1. Background and previous work

The aims of the project "The Cultural Landscape During 6000 Years" are to describe long-term changes in society and in the landscape in southern Sweden, and to analyze the causes behind these changes. Therefore for the subprojects dealing with the Stone and Bronze Ages (subprojects B1–B2 and B3) we sought knowledge of man's use of the landscape for the entire project area (c. 280 sq km) for these periods. We assumed that at least any long-lasting human use of the environment would leave physical traces, some of which are resistant enough to have survived to the present. Such traces can consist of upstanding monuments built to last and presumably meant to convey a message, or they can be the remains of other more mundane activities which leave traces in the ground. Settlement traces can consist of unaltered features at depths not yet reached by modern ploughing, or more shallow materials which ploughing or other activity has disturbed and brought to the surface. The aim of the survey programs for subprojects B1–B2 (M. Larsson) and B3 (Olausson) to be described below was to map such traces in order to gain as accurate a picture as possible of the spatial distribution of the Stone Age and Bronze Age use of the landscape in the project area.

Surface survey as a method is a well-established part of Scandinavian archaeology. One of the earliest programmes of systematic surface reconnaissance was carried out in Denmark by Mathiassen in the 1940s (Mathiassen 1948). Also in Denmark, Thrane has been successful in locating settlement sites from most of the prehistoric periods by repeated surface survey (Thrane 1978; 1985; Jacobsen 1984). In Sweden, surface survey to identify ancient monuments and settlements has been going on since 1938 (Lundberg 1980). From 1985–1987 many of the parishes in the Ystad area were the subject of renewed survey under the auspices of the Board of National Antiquities (Tronde 1987). The fact that this coincided with the intensive survey and excavation work being carried out within the Ystad Project proved beneficial for both undertakings. Experience gained from survey in connection with the natural gas pipeline networks in Denmark (Vorting 1987) and Sweden (*Arkeologi och naturgas* 1985) was valuable, particularly since in these cases many of the surface observations could be followed-up by excavation.

2. Survey methods

2.1. Subproject B1–B2

In order to have an opportunity to direct the course of work on the project, research began in 1982 with an analysis of the then available material. The questions that were asked concerned the following:

* chronological distribution
* chorological distribution
* gaps in the material
* the possibility of discerning a centre/periphery relationship in the project area
* the possibility of identifying habitation sites.

Work began in 1982 when we went through collections and archives at Lund University Historical Museum, the Museum of National Antiquities in Stockholm, Malmö Historical Museum, Ystad Museum, the Antiquarian-Topographical Archives in Stockholm, and the large collections in Stora Herrerstad Local History Museum. The extensive excavations carried out by the southern branch of the Central Board of National Antiquities since the start of the 1970s were of course another important source of information (Tesch 1983; 1988).

When the material from all these institutions and archives had been processed and analysed, it was clear that the information obtained was not sufficient for a detailed study of settlement conditions and the distribution of stray finds. We therefore decided that a programme of field surveys should be carried out. These surveys were also to be complemented with analyses of collections of stray finds.

To begin with, a specific area was selected for what may be described as a pilot study (Fig. 1). The selected area was centred around the bog of Öja/Herrestads Mosse (Larsson & Larsson 1984). It was judged that conditions here were good enough to allow us to evaluate changes in settlement, especially at the transition from Atlantic to Subboreal times. Earlier archaeological surveys and excavations in what is today called Ystad Sandskog had produced good source material for our knowledge of Atlantic settlement by the coast (Althin 1954; Lindahl 1976; Nilsson 1983; Larsson 1986).

Field surveying began with the study of early maps, especially *Skånska rekognosceringskartan* from 1812 and Arrhenius's phosphate map from 1934, to find information about wetlands, suitable places for settlement, and areas with high phosphate values. The latter should preferably occur in places where the high values cannot have been caused by ac-

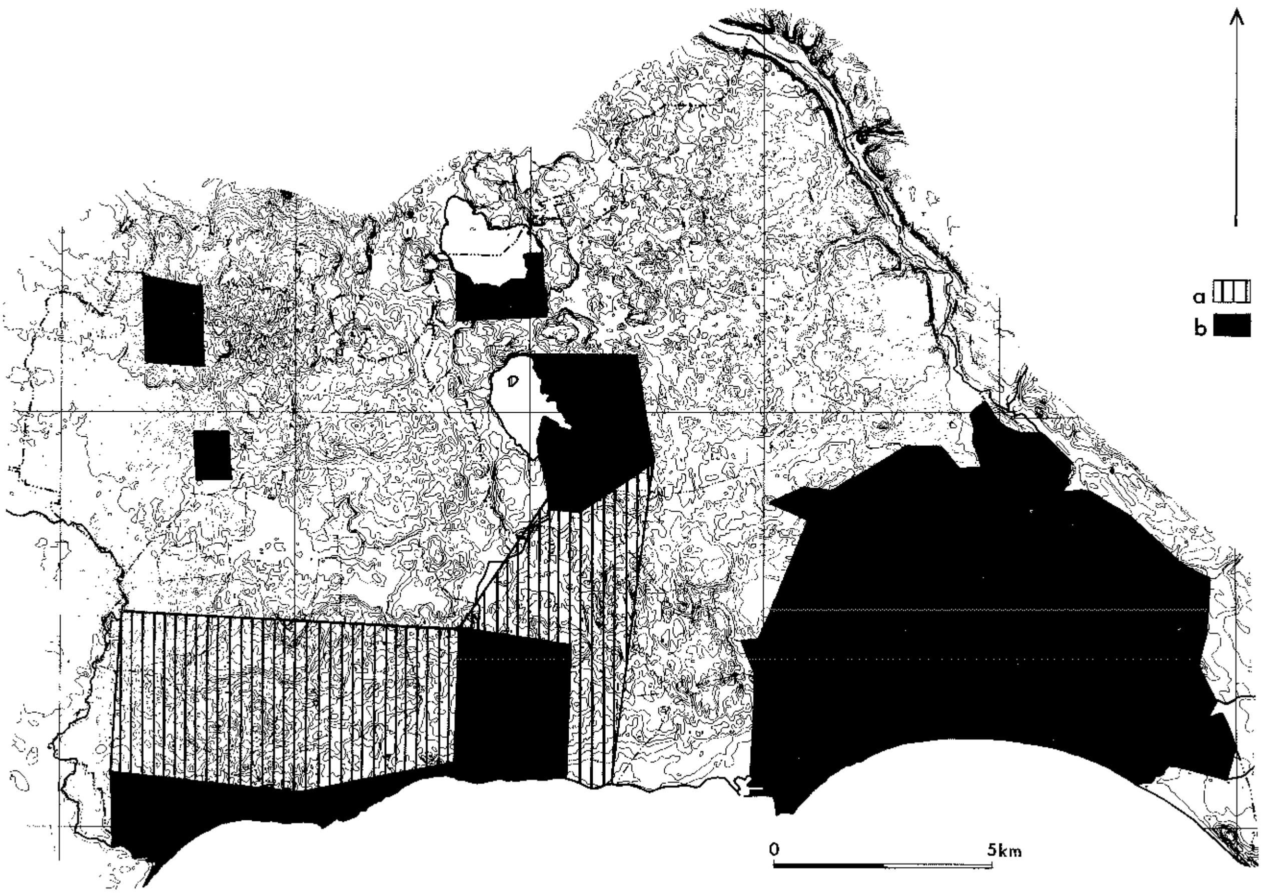

Fig. 1. A map showing the areas surveyed for subprojects B1–B2 and B–3. a=extensive survey, b=intensive survey.

tivities from recent times, for example, around the bog. One such area is located near Fredriksberg Farm and has been described as *svarta jorden* "black soil" (Tesch 1983; Larsson & Larsson 1986). The primary survey area in the autumn of 1982 and spring of 1983 comprised the three parishes of Stora Herrestad, Stora Köpinge, and Öja (Fig. 1).

The aim was that all accessible arable land should be surveyed. A significant initial problem was the area around Fredriksberg, which is now used as a military exercise ground and also as pasture. Only a small part of this area could be surveyed, and we had to make do with information provided by the people living nearby. In this way some habitation sites were identified. With the aid of the soil thrown up in molehills, we also found flint chips which indicated habitation sites. The great problem was to determine the boundaries of the sites that were discovered in this way. To help us we had a simple kind of probe by which occupation layers could be identified.

The work was organized as follows: five people worked in two groups, each of which was assigned specific areas. For the survey of the open lands the surveyors walked 2–3 metres apart. Observations that were made included, for example, worked flint, fire-cracked stones, ploughed-up hearths, and occupation layers. These were recorded in a notebook and on the large-scale Economic Map (1:10,000). To give a better overview, the information was also recorded on the small-scale Topographical Map (1:50,000). Concentrations of worked flint were delimited and the extent of specific areas was recorded.

In conjunction with the field surveys, we also went through the private collections belonging to local landowners that were available at the same time as the surveying was done. This considerably increased our knowledge of the distribution of stray finds. In the parishes of Stora Herrestad and Stora Köpinge especially, a great deal of previously unknown material was found. Remarkably, however, it was only to a limited extent that habitation sites could be localized on the basis of these collections. Another unfortunate discovery was that the private collections in other parts of the area were nowhere near as large as those in Stora Herrestad and Stora Köpinge. This situation naturally involves problems of source criticism in the analysis of the material; these problems have been examined in a research paper presented at the Institute of Archaeology in Lund (Hellerström 1988).

The experience gained during the intensive surveying in Stora Herrestad and Stora Köpinge was then used to plot a strategy for an extensive survey campaign to sample the rest of the project area. During the spring of 1984 and 1985, extensive survey work was concentrated on project areas where prehistoric settlement might be expected (Fig. 1).

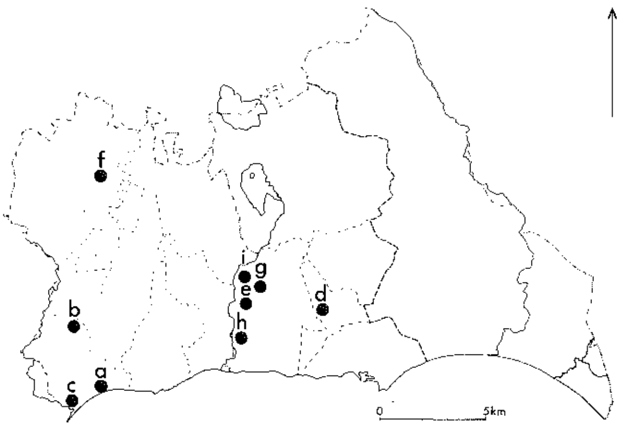

Fig. 2. Map showing locations of some of the sites mentioned in the text. a=Mossby 12:11,12:12, b=Krågarp 4:30, c=Mossby 10:4A, d=Hedeskoga 5:1, 8:1, e=Bjäresjö 19:17, f=Trunnerup 4:2, g=Bjäresjö 2:1, h=Ruuthsbo site, i=Sulebjär. Two inland lakes are shown: Ellestadsjön, the northernmost lake, and Krageholmssjön, c. 2 km south.

2.2. Subproject B3

Survey work for subproject B3 was confined to the western part of the project area, where knowledge of the Bronze Age use of the inland areas was very slight when the project started. Survey fieldwork for this subproject was initiated in the spring of 1985, when Olausson joined the team from B1–B2. Three places were identified as possible Bronze Age habitation sites during this season: Krågarp 4:30. Mossby 12:11, and Mossby 10:4A (Fig. 2:a,b,c). Surface indications were: Krågarp: a concentration of worked flint of indeterminant age; Mossby 12:11: an auger boring indicating occupation soil, plus worked flint at the surface; and Mossby 10:4A: one ploughed-up hearth plus worked flint. Excavation at these sites the following autumn yielded remains from the Neolithic period and later Iron Age, but no Bronze Age settlements were found.

During the following spring, Olausson carried out independent survey at several spots around the village of Bjäresjö and at the coast. This survey campaign resulted in 3.3 kg of worked flint, including one intact hollow-ground axe blade of flint. However the only evidence for possible Bronze Age activity was one hearth containing a single sherd of late Bronze Age ware (Fig. 2:i).

The results from spring survey were therefore not encouraging for finding Bronze Age settlement, and we decided to try a different approach. Adopting procedures followed by Erland Porsmose on the island of Funen, a study of 18th and 19th century cadastral maps from the three core areas west of Ystad was initiated (Olausson 1988). Survey was then carried out during December, and efforts were concentrated to the edges of wetlands as they are marked on these early maps. Survey in December proved to yield much better results than spring survey, at least in clay soils (Olausson 1988, Table 1). Late November or December to February is the optimum time for this type of survey. The furrows turned by autumn ploughing are still fresh, and the autumn rains have wet down the surface and washed artifacts (Plate 12.2/1). Winters are usually mild in Scania and snow is seldom a problem at this time.

3. Stone Age habitation sites – a problem of definition

Several factors are of greater or lesser importance for our chances of finding Stone Age habitation sites: the season, the soil, the topography, the occurrence of natural flint, and so on. At an early stage in the survey work it was obvious that there were numerous problems. A decidedly positive factor is the almost total lack of natural flint in the area. This meant that when we found flint we could be sure that it was worked.

When the project began, certain criteria had been set up as necessary to indicate a habitation site: the occurrence of tools, fragments of polished axes, waste flakes, fire-cracked stone,or ploughed-up hearths. Pottery is naturally another important constituent in this connection, but since it is relatively unusual to find large quantities of pottery by field-walking, this category was not included as an absolute necessity. For discussing the chronology and dating of individual sites, the absence of pottery is of course a great handicap. Support for datings had to come instead mainly from finds of large fragments of polished axes. It was really only on the light sandy soils near the coast, and at a few places inland, that pottery was discovered. In the Kabusa area east of Ystad such a considerable quantity of decorated pottery was found in the various sites that hypotheses about changes in settlement could be proposed even before the final excavations (Larsson 1987; 1988).

An important factor in this connection is how the extent of a habitation site is to be determined. This often had to be estimated on the basis of the spread of worked flint. From the very beginning it was evident that the sites were small, by which we mean with an area of less than 1,000 sq m. Larger habitation sites were exceptional. In the Kabusa area we noted that the dispersal of finds recorded by field survey agreed well with the results obtained by excavations. This shows that careful field survey is an important support for continued investigation.

3.1. The localization of habitation sites

Earlier studies had shown a close connection between Early Neolithic settlement and light sandy soils, but they also pointed out a change towards the end of the period to a greater tendency to localize settlement on clayey soils (Larsson 1984).

It turned out that there are both similarities and differences in the localization of settlement between south-west Scania and the Ystad area. It is interesting that the change observed in south-west Scania between EN I and EN III could not be attested in the Ystad area. The restructuring of settlement here did not occur until the late Funnel Beaker Culture (MN IV–V).

What then are the typical features in the localization of settlement? To study this more closely, two maps have been of particular value: *Skånska rekognosceringskartan* from 1812 and the soil maps of the area produced by the Geological Survey of Sweden. The former map in particular has been of great assistance in the reconstruction of the original topography. It is especially important to obtain an idea of the extent of wetlands before the large-scale drainage of the mid 19th century.

A characteristic feature of the Early Neolithic habitation sites in particular is that they are located on sandy soils, in south-facing positions on well-drained, gentle rises, near wetlands (Plate 12.2/2). The latter factor appears to have been most important in the earliest phase of the Early Neolithic, something which has also been observed in south-west Scania (Larsson 1984).

The clayey soils in the outer hummocky zone give a distinct impression of having been used only on a marginal basis. A problem in this area, however, is the topography. There is the possibility that habitation sites on hills have been destroyed by erosion hastened by the increased mechanization of agriculture. The marginal importance of this area is nevertheless underlined by the fact that there are extremely few stray finds in private ownership compared with the sandy soils of the coastal region.

It is interesting that the inner hummocky landscape between Ellestadsjön and Baldringe was evidently a more attractive settlement site. In this area, with its much greater ecological variation, a relatively large number of settlement sites have been recorded (Hellerström 1988). It is interesting that these are mostly from the Early Neolithic. Sites from EN I are attested by finds of pointed-butted axes and thin-butted axes. The sites are without exception on sandy soil near watercourses or wetlands, and they are small, rarely more that 600 sq m. In one case, Trunnerup in Villie Parish, we can see how Neolithic settlement moved within a very limited area, in this case on a noticeable ridge with a small area of sandy soil. The settlement can be dated chiefly to the Early Neolithic and some time into the early Middle Neolithic. After this we found traces of settlement from the Late Neolithic/Early Bronze Age (Fig. 2:f).

A similar area was found south of Ellestadsjön: Ebbarp in Sövestad Parish. This area is unlike Trunnerup in that only Mesolithic and Early Neolithic settlement can be attested, but at Ebbarp we can see the same pattern as at Trunnerup: the dwelling was regularly moved a few hundred metres, so that we find a number of habitation sites close together.

This landscape, the inner hummocky zone, must be seen as part of the belt of hummocks and lakes which can be followed to the west and north-west. A similar settlement pattern has been observed at several places in this area. In the Häckeberga area, for example, not more than 10 kilometres north-west of the Ystad area, several settlement sites have been found in similar locations to those at Trunnerup and Ebbarp.

4. Field survey as a means of locating remains from the Bronze and Iron Ages in a cultivated landscape

Remains of at least 70 ploughed-up hearths/cooking pits (it is impossible to distinguish between these alternatives from surface indications; Plate 12.2/1) and a number of concentrations of fire-cracked rocks were observed during the December survey, and 418 g of pottery were recovered. As much charcoal as possible was collected from each hearth for radiocarbon dating. In twelve cases there was sufficient charcoal for dating the hearth. Five hearths could be dated to the Bronze Age and seven to the late Iron Age. In addition, five hearths could be dated to the late Bronze Age by the pottery they contained. Other finds included a Viking Period bead and a Vendel Period bronze fibula.

Survey in the spring, while favorable for finding Neolithic sites, proved to be less successful for locating Bronze and Iron Age remains in clay soils. Worked flints are virtually indestructible and the presence of datable types in the ploughsoil has proved to be a viable means of locating Stone Age sites, as we have seen above. However, Bronze and Iron Age sites are more elusive. One reason may be that Bronze Age flintwork is difficult to distinguish from poor quality Stone Age work, so that some sites classified as Stone Age may in fact be of Bronze Age date (cf. Thrane 1985, p. 146; Mathiassen 1959, p. 45; Stenberger 1979, p. 289). Other indications of prehistoric activity which can occur on the surface include ploughed-up hearths and cooking pits, occupation layers, fire-cracked rocks, pottery, and ploughed-over Bronze Age barrows (Plate 12.2/3)

Hearths and cooking pits. During December survey, we often noted how autumn ploughing in clay soils had turned over a subsurface hearth virtually intact. Clear boundaries, soot and charcoal, fire-cracked rocks and occasionally pottery were evident in the furrow (Plate 12.2/1) Up to 4 g of charcoal was recovered from some of these, and most yielded sufficient charcoal for dating by tandem accelerator.

Excavation was conducted at Bjäresjö 19:17 (Fig. 2:e). Survey had revealed four hearths and a large sooty circle which looked like a pit-house. When the topsoil was removed we found that the hearths were in fact cooking pits, which were radiocarbon dated to the early and late Bronze Age. Such pits, normally 0.5 to 1 m deep and containing 150–250 liters of fire-cracked rock plus soot and charcoal, are likely to be visible for many seasons of ploughing, and they generally date to the Bronze Age. Another characteristic of cooking pits which makes them valuable for finding Bronze Age settlement is that they often occur in large numbers. Eskildsen has suggested that this is because it was easier to dig a new pit that to remove the stone from an old one (1979, p. 16). Extrapolating from 302 pits at the partially excavated site of Rønninge Sørgård, Thrane estimated there should have existed 500 pits there (Thrane 1974, p. 103). Where they occur in concentrations, ploughed-up cooking pits are therefore a promising means of identifying Bronze or Iron Age settlement (Thrane 1974, p. 96).

Ploughed-up hearths and cooking pits are likely to be more evident in December than after the snow has melted in the spring. While they can be visible in the spring, winter precipitation most often washes away the dark soot and makes boundaries of the features much more diffuse and difficult to spot.

Graves. A special category of remains is graves. For the Bronze Age these can consist of upstanding barrows or more modest flat-earth burials. During December survey we examined in the field features marked on the early maps as "hög" or "backe" (="hill"). In most cases these proved to be natural hills, but a few could be determined from their shape to be probable ploughed-over barrows (Plate 12.2/3).

Flat-earth burials from the Bronze Age should be difficult to spot by surface survey. Often they are not marked by any stone monument. They consist of cremated bones and soot, buried with or without an urn, and with or without a stone packing or stone cairn around the grave. Traces of soot and/or pottery present in the ploughsoil may theoretically represent ploughed-up flat-earth burials. The presence of fire-cracked rock indicates hearth or cooking pit rather than burial, however. Cremation graves have been found by surface survey on Funen (Jacobsen 1984, p. 195) and in England (Richards 1985, p. 35). None of the remains found during December survey was interpreted as a burial, however. While single burials might well be missed during survey, whole cemeteries could hardly be mistaken for anything else.

An occupation layer can appear as a diffuse patch of dark, sooty soil with an admixture of lighter ash, fire-cracked rock, pottery, etc. Contrary to Porsmose's experience on Funen (Porsmose, pers. comm.), we found it difficult to recognize this phenomenon during December survey. The dark clay soils inland provided inadequate contrast for occupation soils, especially in the poor light of December. The clearest example of ploughed-up occupation soil was at a location called Norra Villie, where ploughing and erosion had exposed a large part of a late Iron Age occupation layer. Presumably winter snows would further wash out occupation soil coloring and make the phenomenon even harder to spot in the spring. Occupation soils can indicate Stone Age settlement as well, and without other datable finds they cannot be used as an indication of Bronze or Iron Age settlement.

Fire-cracked rock. Large quantities of fire-cracked rock are generaly associated with Bronze or Iron Age occupation sites. Fire-cracked rock was an extremely common occurrence in the fields of the Ystad area. Since fire-cracked rock can be spread in connection with manuring (Gustawsson 1949, p. 154), fire-cracked rock was only plotted where it occurred in larger concentrations in a limited area and/or where there was soot or charcoal mixed in. On one occasion we noted an area of sooty, fire-cracked rocks about two meters in diameter, which from a distance appeared to be a hearth. Closer inspection showed that the soil itself bore not the slightest sign of soot or charcoal, however. The impression of black earth came from the numerous blackened, brittle-burnt stones. The observation led us to believe that in many cases limited concentrations of fire-cracked rock are locations for ploughed-up hearths or cooking pits which have been in the ploughzone for several seasons. The soot and charcoal in the soil have disappeared as a result of ploughing and weathering, and only the blackened stones remain. Larger concentrations of fire-cracked rock with clear boundaries, especially those with soot and charcoal, are likely indicators of prehistoric settlement (Rentzhog 1967, p. 74). Two factors speak in favor of dating such features to the Bronze Age: the Bronze Age cairns of fire-cracked rock north of Scania (T. Larsson 1986, p. 8; Kjellén & Hyenstrand 1977, pp. 22 ff.), and the assumption that most of the fire-cracked rock was produced in cooking pits, the majority of which date to the Bronze Age (Thrane 1985, p. 148). However, fire-cracked rock is not uncommon on Iron Age sites as well (e.g. Jensen 1967, p. 105), so that dating on the basis of fire-cracked rock alone is not possible.

Pottery. All of the surface indications described above yield very uncertain chronological information, unless charcoal in hearths can be radiocarbon dated. The only surface indication adequate for dating Bronze Age sites is datable pottery which has been brought to the surface. Unfortunately, however, prehistoric pottery is one of the more fragile remains, and it disintegrates rapidly when exposed on the surface. This is one of the main reasons why December survey is superior to spring survey for finding Bronze Age sites, particularly in clay soil. Olausson has suggested elsewhere (Olausson 1988, p. 109) that the expansion and contraction of water-soaked clay soils during the winter causes the rapid deterioration of prehistoric pottery which may occur in such a matrix. Pottery in well drained sandy soils is not as affected by freeze/thaw cycles and is more likely to survive until spring. Callmer (1986, p. 171) and Jacobsen (1984, p. 189) have also noted prehistoric pottery's vulnerability to winter weather.

Even during December survey, pottery was not a frequent occurrence, however. Pottery was found at 10 of the 70 points plotted (Olausson 1988, Table 1). In almost all cases it was found in a hearth.

Thrane has made a similar observation from the southwest Funnen Project. Thrane noted 389 flint scatters plus 48 late Neolithic /early Bronze Age sites, compared to 8 pottery sites (Thrane 1985, p. 146). On the bright side, Thrane has also noted that if more fragile remains, such as pottery and fire-cracked rock are present on the surface, the chances are good that the site has not been destroyed (Thrane 1978, p. 114). Since pottery is fragile and does not travel well, large concentrations are more likely to represent a site *or* manuring (Crowther 1985, p. 65; Vorting 1984, p. 202).

4.1. Conclusions and recommendations

Intensive or extensive survey. Since all survey involves sampling, it is necessary at the outset to decide on a conscious strategy. Vorting (1984, p. 201) distinguishes between two strategies. Intensive reconnaissance means that an area is evenly reconnoitered at a steady speed, regardless of the terrain and frequency of finds. Extensive reconnaissance involves passing lightly over unlikely places but carrying out a more thorough search in locations where finds are expected. The Swedish Ancient Monuments Survey is an example of the latter strategy (Gren 1986, p. 52). Larsson used the results from intensive reconnaisance of the Stora Köpinge area to carry out extensive survey in the rest of the project area. Survey by Olausson was extensive, being concentrated to the edges of former pasture. Cherry and Shennan have estimated that intensive field survey requires at least 4–12 man-days per square km (Cherry & Shennan 1978, p. 22). With a project area of 280 sq km, this means 1112 to 3336 days for the Ystad area. Surveying 40 days per year for four years, we would have needed a work force of 7 to 20 people to cover the whole area by intensive survey.

There is risk of circular argument where only extensive survey is carried out. By surveying only those areas considered to be likely settlement sites, one eliminates other areas from consideration. Finding sites in these "likely locations" confirms an already established pattern, but is not a test of the truth of that pattern. Where economy or time preclude intensive survey of the whole area, the best strategy is to carry out unbiassed intensive survey on smaller areas whose characteristics are representative of all parts of the larger area. Results of this survey can be used in directing extensive survey in the rest of the area (McManamon 1984, p. 279). Intensive survey is time-consuming, and when results are poor, psychologically trying (Cherry & Shennan 1978, pp. 24 f.), but it is the only means of establishing the prehistoric use of the landscape with some degree of certainty.

Soils, modern agriculture, and topography. The type of soil plays a large part in the success of fieldwalking. In general, objects are more difficult to spot in clay soils (cf. Vorting 1984, p. 200; Jacobsen 1984, p. 191: Mathiassen 1948, p. 7), and this is especially true of pottery. Another disadvantage of clay soils is that they require more thorough working for agriculture, which is apt to destroy archaeological remains (Callmer 1986, p. 196).

Fields in fallow or in pasture are the bane of the fieldwalker's existence. Paradoxically, while it steadily destroys archaeological remains year after year, the plough is at the same time the major tool by which we can see what lies under the surface. Kristiansen (1985, p. 9) has noted that mechanization, deeper ploughing, and a rapidly growing interest in settlement research mean that more settlements have been found since the 1940s than were found previously. Thrane (1985, p. 146) points out that if the same plough layer has been cultivated for several generations, the less resistant objects such as metal and pottery will disappear from the topsoil. Only when the ploughing depth is increased will layers with new contents of pottery and other objects be churned up. Each year some of these will be destroyed by weathering until the original situation is restored. Ploughing has also been blamed for lateral displacement of artifacts, although estimates vary as to how serious this effect is (Olausson 1988, p. 111). Ploughing and erosion in undulating terrain mean the removal of high-lying constructions and the veiling of low-lying ones. Intensive modern manuring can also obscure surface features, even in flat terrain (see Chap. 12.3, this volume; Jacobsen 1984, p. 191).

Best results are obtained when the soil has been ploughed and/or harrowed fairly recently. Once plant growth has begun it is difficult to observe coloration or artifacts, and experience has shown that it is not worthwhile to survey fields where stubble is standing or has been turned by the plough (Mathiassen 1948, p. 7; Thrane 1978, p. 111; Foard 1978, p. 362; Jacobsen 1984, p. 191; Hodder & Malone 1984, p. 128; Vorting 1987, pp. 21 f.).

Time of year for survey. A very important consideration is the time chosen for field surveying. Experience from survey efforts in Subproject B1–B2 clearly shows that by far the best time for finding Stone Age sites is in spring – March and April – before the spring sowing and the cultivation of the land. Surveying in the autumn, after the harvest, worked well enough in sandy areas but not on clayey soil because of the effects of recent cultivation.

When looking for Bronze Age remains in clay soils, however, survey after autumn ploughing but before winter snows is to be recommended, for the reasons elicited above. However, conditions set by weather (i.e. snow fall and snow melt) and the high-pressured modern agricultural time-table often mean that fields are open and available for survey for only a few weeks during the year (Plate 12.2/4).

Light. Strong sunlight should be avoided, since the glare lowers visibility (Hodder & Malone 1984, p. 130; Gren 1986, p. 58). Light conditions during December survey were difficult – on sunny days the low angle of the sun caused long shadows, while on cloudy days it was sometimes too dark to see color changes.

Humidity. Dry conditions are a disadvantage during survey, in that dust can cover the surface and obscure features. Optimal conditions are after a period of c. 14 days or more of rain, when features and artifacts have been washed clean. Light rain is no hindrance during survey, although even a light covering of snow makes observation impossible (Olausson 1988, p. 110) (Plate 12.2/4).

Personnel. Both natural talent and training are required of survey personnel. A good knowledge of modern agricultural practices, soil conditions, and of course the ability to recognize the archaeological traces which can be expected are required of the surveyor. It is evident from these results that it is worthwhile to undertake specialized survey, aimed at looking for particular traces.

Repetition. This is extremely important when the goal is complete survey of an area. Conditions for survey are seldom ideal: fields are in various states of agricultural treatment, surveyors are tired, the sun is too weak, the weather is too dry, etc. Due to such difficulties, the surface survey of a region should ideally be carried out over a period of several years for the most complete coverage. Fields should be revisited several times and under varying conditions. Many times during our surveys we returned to a site where we had previously noted taces of interest, and had difficulty rediscovering the spot (cf. Hodder & Malone 1984, p. 125).

Surface survey and ancient monuments. In the cultivated landscape of Scania, the high rate of agriculture since the Iron Age obliterated many of the archaeological traces that are still visible on the surface, principally as monuments, in less heavily cultivated parts of Sweden. Widholm noted in 1980 that 2/3 of the rescue excavations carried out by the Southern Branch of the CBNA in Scania were of remains which were uncovered during topsoil removal for development; i.e., sites which had not been visible above ground and were not listed in the Register of Ancient Monuments (Widholm 1980, p. 44; Tesch 1983, p. 21). However, ancient monuments can and should be used as a starting point for survey, as they can serve as indicators for the intensity of prehistoric settlement in a given area (Vorting 1984, p. 203). Following the central Swedish model, the original survey of Ancient Monuments in Sweden concentrated on monuments, i.e. , burials. However the revision being carried out currently attempts to include evidence for settlements as well (Tronde 1987). The discovery of settlement sites is probably the greatest contribution fieldwalking can make, as such sites can hardly be discovered by any other means of survey other than phosphate testing. The cultivated landscape is to be preferred when looking for settlement, where traces consist of buried small objects or soil coloration which must be brought to the surface to be seen, rather than upstanding monuments which survive best in an undisturbed landscape. We can expect that settlements will be overrepresented vis-à-vis grave monuments in surface survey in a cultivated landscape, while the reverse should be true in a non-farmed landscape.

Ploughzone archaeology. Richards has commented on a strange paradox: on the one hand archaeologists have an awareness of the usefulness of the ploughzone for recovering artifacts and locating sites, while on the other, when it is time to excavate we often strip the site of its ploughzone without exmining what it contains (Richards 1985, p. 29). The question of to what extent the contents of the ploughzone reflects undisturbed layers underneath is of course of fundamental importance for survey. The answer seems to be that surface collections are safe indicators of location, but less reliable for establishing the date, extent and type of a site (Jakobsen 1978, p. 81; Jacobsen 1984, p. 195). Furthermore, reliability is greatest for Stone Age sites, but seems to decline for later periods. This is tied to the fact that pottery is the main type of artifact for identifying these later periods (Gren 1986, p. 54) and as we have noted above, pottery can be hard to date and disappears easily. Also, late Bronze Age and Iron Age sites are apt to contain little pottery, at least as compared with early Iron Age sites (Vorting 1987, p. 24; Näsman 1987, pp. 69 ff.; Mathiassen 1948, p. 96; Hvass 1985, p. 195).

There is no necessary correlation between the quantity of finds on the surface and the size of the site beneath the ploughzone. Jakobsen has described a particularly uncomfortable example from Jutland, where three sooty patches with pottery were the only visible surface traces of a settlement which excavation revealed to be more than 8000 sq m with 200 features, two houses, traces of iron working and huge quantities of pottery (Jakobsen 1978, p. 80). If anything, the relationship is likely to be negative rather than positive: the more surface traces are visible, the less of the site is intact (Redman & Watson 1970, p. 285). This is logical,since more artifacts and features are brought to the surface as the plough goes deeper each year, but deeper ploughing at the same time means that earthbound features are ploughed away.

There is also the problem that even when earthbound features date to the same general period as artifacts in the ploughsoil, many of the latter may derive from accumulations on top of, or in, old ground surfaces, and not from primary subsoil contexts at all (Haselgrove 1985, p. 16; Richards 1985, p. 34). Also, one activity which is responsible for a significant proportion of the artifacts in modern ploughsoils is the spreading of occupation refuse as manure in areas which were also cultivated in earlier periods (Haselgrove 1985, p. 14; Foard 1978, p. 363).

5. Antiquarian aspects

These results of the field surveys carried out by subprojects B1, B2, and B3 mean a significant increase in our knowledge of how the landscape was utilized by people in the Stone Age, Bronze Age, and Iron Age. They have shown, for example, that it is possible to establish the limits of Neolithic habitation sites, which is extremely valuable from the antiquarian point of view. It is also clear that a discussion of the chronological and chorological distribution of Neolithic settlement requires a very good knowledge of the available source material, private collections, and artefact types and pottery styles.

Our experience from the Ystad area also shows that there is only a small possibility of localizing Neolithic settlement with the aid of ploughed-up hearths and fire-cracked stone, since it has often been shown that these can be dated to the late Bronze Age/Iron Age.

Surface survey as a method is still in the developmental stages. As techniques are perfected and personnel are trained, we have no doubt that its potential for archaeological research will be recognized. With all its shortcomings, "walking the furrows" is an unsurpassed (and relatively inexpensive) means of gaining information about the buried prehistoric landscape.

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