THE HOLOCENE PEAT AND ALLUVIAL STRATIGRAPHY OF THE UPPER BRUE VALLEY IN THE SOMERSET LEVELS BASED ON SOIL SURVEY DATA OF THE 1980S

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In the 1980s the Soil Survey of England and Wales undertook a re-survey of the peat moors of the Somerset Levels as part of the National Lowland Peat Inventory. The intention was to cover the region using hand-driven boreholes at a 0.5 km resolution based on the Ordnance Survey's National Grid. Although some of the new information was summarised in two publications (Burton and Hodgson 1987; Cope 1987) full details were never published. Examination of the available stratigraphic records presents a picture of the Holocene lithology of a hitherto relatively unstudied area of peat moorland in the Upper Brue encompassing Queen's Sedgemoor, Godney Moor and Glastonbury Heath. The borehole coverage is sufficient to allow the mapping of a number of sub-surface organic and alluvial lithological units. What emerges is the palaeogeography of a dynamic wet lowland landscape, mostly characterised by wood fen carr and sedge fen interspersed with muddy detrital watercourses and limited raised bog development, covered in places by extensive riverine deposits, at times influenced by high groundwater levels and estuarine alluviation.

Introduction

Although the Somerset Levels and Moors have been the focus of palaeo-ecological attention since the 19th century, the concentration of interest has been far from even. Commercial peat cutting from about 1870 meant that most research centred on the raised bogs and heaths of the Middle Brue Valley, with many studies being instigated because of archaeological discoveries. As has been observed by Aalbersberg (1996), the alluvial fringes have not had the same level of interest as some other parts of the Levels, and the same could be said of the sedge fen and fen-carr areas of the Upper Brue. These more inland reaches of the Brue are not entirely unknown however, as demonstrated by the studies of Aalbersberg (1996), Godwin (1955), Housley (1988; 1995), and Somerset County Council (1992). When a hitherto barely reported study came to light that comprised a large number of boreholes from just such an area, the opportunity was too good not to investigate further.

The story began in the early 1980s with the publication of the Somerset 'Thickness of Peat' Map (1:50,000 scale, Cope and Colborne 1981). In 1983 the Soil Survey of England and Wales began to re-survey the agricultural peatlands of the Somerset Levels as part of the National Lowland Peat Inventory. At that time the Field Officers responsible took the decision to extend the level of information to be recorded beyond that previously gathered (the thickness of the peat, the type of peat, and the thickness of clay over peat) to address new concerns. The new survey therefore adopted the Tröels-Smith (1955) peat description system[1] as the main recording tool on the understanding that it would facilitate better comparison with data collected by other workers. Additionally, the new programme of work also collected samples of peat for pH analysis, as this would provide information on whether the peats, if drained, would form acid or alkaline arable soils. Such data were deemed important in assessing the future agricultural potential of the region. Although some of the new information was summarily referred to in two subsequent publications (Burton and Hodgson 1987; Cope 1987) a considerable amount of information was never made public. In particular, the detailed stratigraphic profiles produced by the Soil Survey Field Officers remained unreported. This paper presents the field investigations of one former employee of the Soil Survey of England and Wales – David Cope - examined in the context of subsequent studies, and interpreted in the light of similar investigations from adjoining areas (Housley 1988; 1995).

Limitations of the Study

The Soil Survey National Lowland Peat Inventory

1 A method by which stratigraphic layers are described in terms of components of a layer, their degree of humification and physical properties. The components are estimated on a 25% basis on a scale of 1 to 4, with 1 representing 25% composition and 4 100%. Within the scheme the main organic components are *Turfa* (telmatic and terrestrial peats), *Detritus* (allochthonous material), and *Limus* (organic particles arising from the productivity of lakes and fine input into drainage basins). Inorganic components include clay, silt and sand all differentiated on the basis of particle size. Components pertinent to this study are outlined in more detail in Table 1.

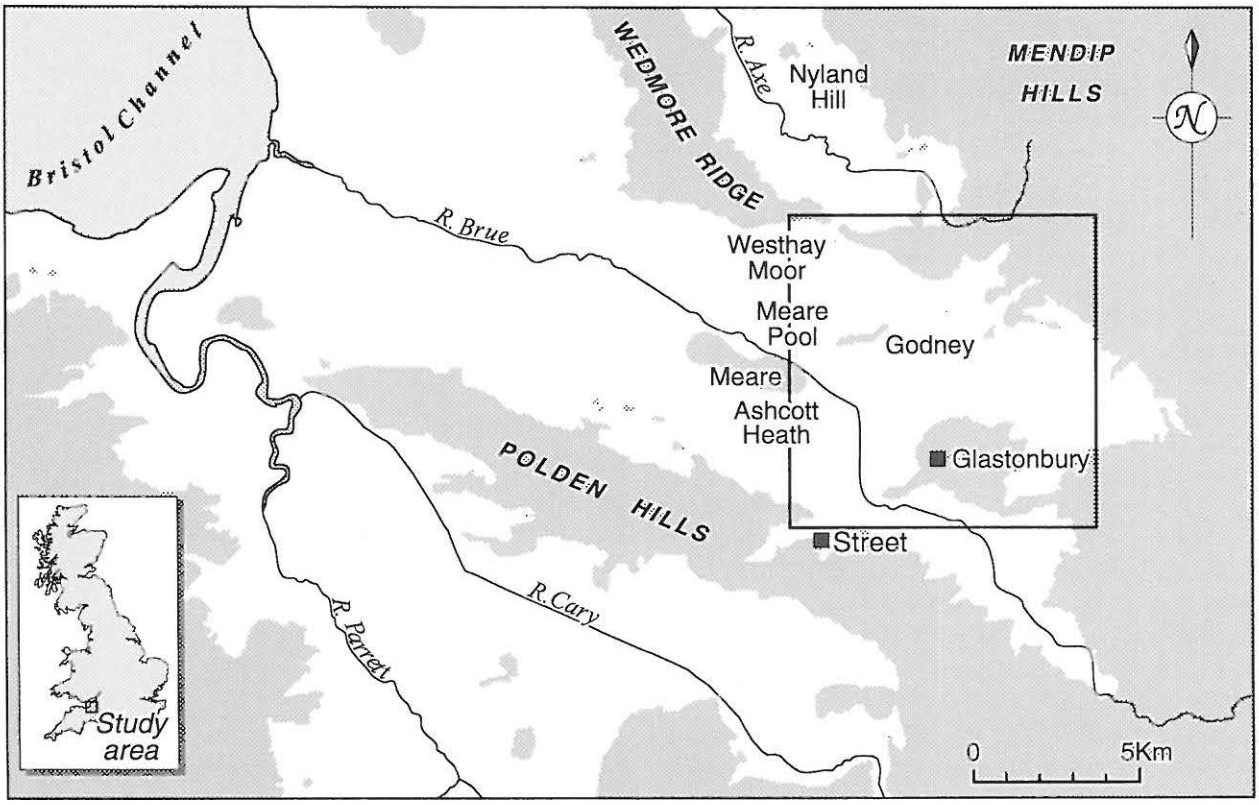


Figure 1: Location map of the study area.

had intended to map the Somerset Moors using hand-driven boreholes at a resolution of 0.5 km based on National Grid lines. However the new survey only targeted 0.5 km grid lines between points already surveyed for the *'Thickness of Peat'* map. Choice of borehole sites was further adjusted for local conditions of access. We are confident that we have located the borehole records for the new sites with more than 0.4 m of peat at the surface. The Soil Survey classed these localities as peat soils *sensu stricto*, the records of which we were given access to. Information was not supplied for borehole sites with more than 0.4 m of clayey alluvium in that they are not part of the Peat Inventory. Nor were borehole data available for localities with under 0.4 m of peaty topsoil over thick calcareous alluvium. However these data have been used to define the edge of the peat in Figures 9-11 for the Field Officers did have access to this information when the originals were compiled.

Despite differential coverage, sufficient data were obtained to present a fairly detailed stratigraphic record of the Holocene deposits of inland moors of the Upper Brue Valley. Not withstanding some limitations, the degree of coverage achieved by the Soil Survey of England and Wales in the 1980s and the level and standard of recording is such that we felt it would be a pity if future researchers were not given access to the information.

The six transects (Figure 2, five in a north-south direction, and one profile west-east) herein described are based on about 40 boreholes into the peat and alluvium areas of the Somerset Levels – primarily Queen's Sedgemoor but also adjoining areas of Godney Moor, Common Moor and Glastonbury Heath. Almost all the records are based on field descriptions made by David Cope, though the fact that three transects overlapped with areas investigated by Housley (1988; 1995) has allowed a fuller understanding of the data. In particular, the availability of OD heights for Housley's transects that bisect those of the Soil Survey, have been especially invaluable for interpreting the latter profiles since none of the Soil Survey's data points were levelled to OD. This is unfortunate, and we acknowledge that the absence of good vertical control is a severe limitation to this study. It is important to clearly spell out how the elevations presented here were arrived at for there are potential errors inherent in the methodology. Where the profiles undertaken by Cope bisected areas investigated by Housley, altitudinal control was quite good in that correlations could be made and these formed the basis for deciding the relative height of the profiles. However, where the borehole transects lay beyond such areas (particularly in Queen's Sedgemoor) it was necessary to make extrapolations. This was achieved by using the height of a key stratigraphic contact - the Lower Wentlooge

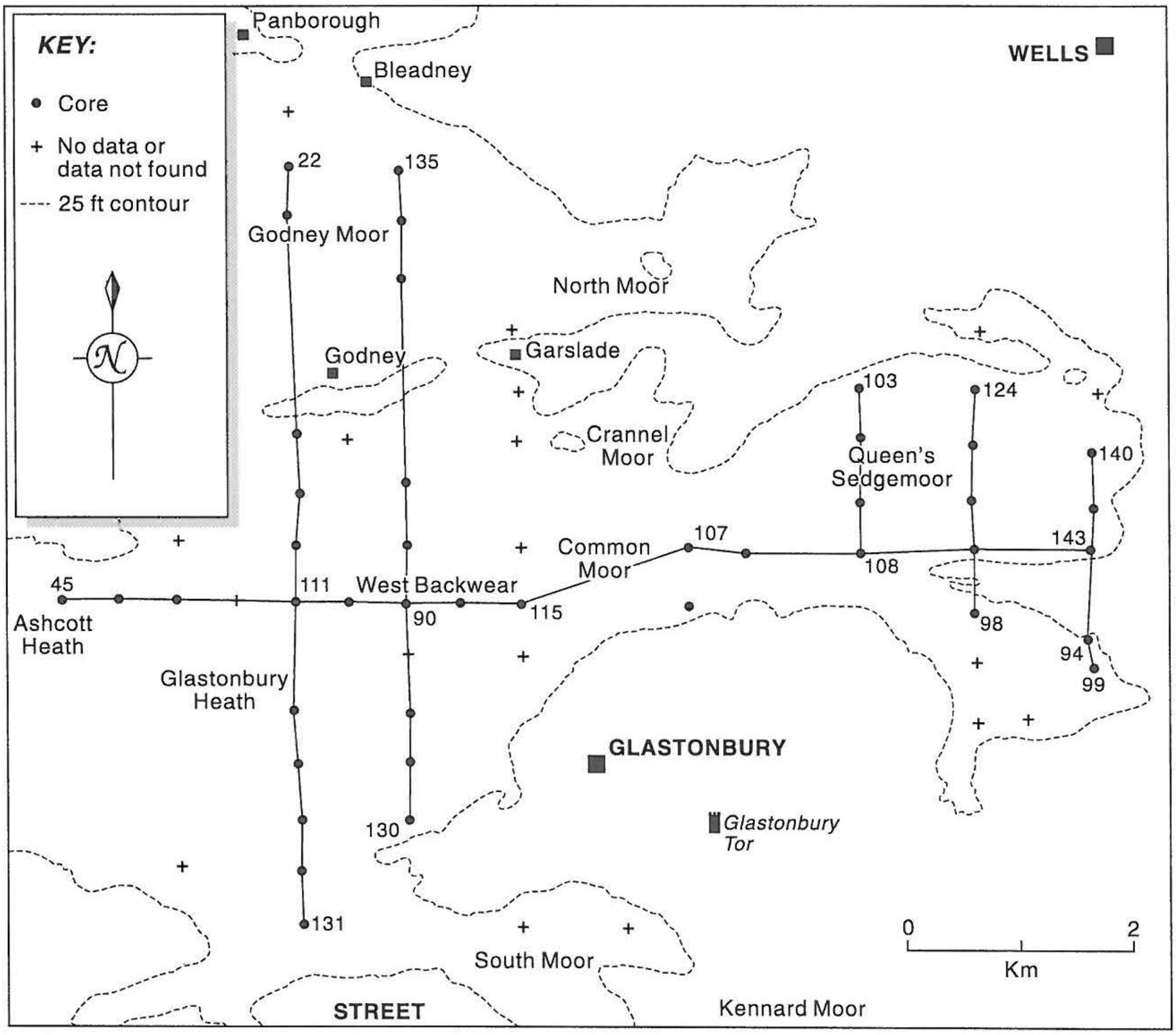


Figure 2: Map detailing the position of boreholes and places/areas referred to in the text.

clay/Middle Wentlooge peat boundary (the top of the 'OD clay' in the old terminology) - as a baseline. Previous studies (Godwin 1943, 1955; Kidson and Heyworth 1973, 1976) had shown that this easily recognisable contact was both well known in its elevation and remarkably consistent. By assuming the upper contact of the Lower Wentlooge clay was within 0.5 m of OD, and then adjusting to take account of correlations with profiles the elevation of which were known, an approximate altitudinal range was arrived at. For example, taking Queen's Sedgemoor (Figures 3-5) three boreholes, DWC108, DWC97 and DWC143 acted as *de facto* controls (it being possible to relate these to Housley's study area to the west, using Figure 6) and from these the other boreholes were accordingly aligned. The inherent errors from such a procedure are hard to quantify and we freely acknowledge the additional difficulties that compaction may have had on the data, but we estimate most cores are probably to within *c.*0.3 m of their correct vertical height. Clearly for many purposes this degree of error would not be acceptable, but viewed in the context that this study provides a potentially large pool of new data for some hitherto unstudied parts of the Levels, we would argue the information gain justifies the publication of such imprecise data.

The stratigraphic profiles (Figures 3-8) have been plotted using the Tröels-Smith Plotting Program (TSPPlus version 4.13) of Waller *et al* (1995). The symbol set was specifically devised to make the plots more compatible with existing stratigraphic profiles from the Somerset Levels and hence easier for comparative purposes. Some degree of interpolation of the Soil Survey data has been necessary in the discussion of the profiles.

Discussion of the Stratigraphy

Queen's Sedgemoor (Figures 3-5)

We have chosen to present three north-south transects across Queen's Sedgemoor based on 14 separate boreholes. The N-S separation of each individual borehole is 0.5 km. The W-E spacing of the three transects is 1 km. The easternmost transect (Figure 3) is complicated by the presence of minerogenic inwash from upslope and the fact that two of the boreholes (DWC142 and DWC94) were located close to, respectively, a dry upland margin to the basin and a minerogenic island within the peat. It is not clear whether the basal deposit in these cores represents *in-situ* weathered Lias clay, or whether, like DWC99, the lowermost recorded layer derives from Liassic inwash. Given the proximity to dry land the former is perhaps more likely. On the basis of the recorded deposits, it would appear that the eastern and southern margin of Queen's Sedgemoor has mainly consisted of wood-rich detritus mud. The area thus parallels Crannel Moor, East Backwear and Common Moor where Godwin (1955) and Housley (1988; 1995) have reported equivalent deposits. Overall, these detritus muds should probably be interpreted as representing one of the two main courses of the proto-Upper Axe/Brue, the second being in South Moor, the low-lying area between the modern towns of Glastonbury and Street. Next in succession, and overlying the woody detrital deposits, is a sedge peat, rich in *Cladium* (saw-toothed sedge) but partly humified in places. Interestingly, only the southern and eastern margins of Queen's Sedgemoor have a capping of silty-clay alluvium on which a modern soil has developed. This deposit may represent freshwater flooding. If this inference is correct then it could indicate that most of the mid-to-late Holocene drainage was concentrated along the southern margin of Queen's Sedgemoor, i.e. south of the Hartlake Bridge. Thus the present-day River Whitelake may simply represent the canalised course of this old drainage route.

The blue-grey marine-estuarine clay recorded in the central and western N-S transect from Queen's Sedgemoor represents the Lower Wentlooge Formation of Allen (1987), or the OD clay of Godwin (1943), Kidson and Heyworth (1973; 1976). Deposition of the clay has been attributed to a process of saltmarsh accretion and halophytic vegetational growth (Allen and Rae 1987). Marine clay/peat interface radiocarbon determinations demonstrate marine conditions were receding in the Levels by sometime between *c.*5650-5020 ^{14}C years BP (HAR-1831: 5650 ± 70 and HAR-5354: 5020 ± 80 BP; Coles and Dobson 1989, 69). In terms of calendar years these two determinations calibrate to (using the 1998 calibration curve and OxCal version 2.18 with 'whole ranges' on):

	±1 standard deviations	±2 standard deviations
HAR-1831	4580-4400 cal BC	4680-4350 cal BC
HAR-5354	3920-3720 cal BC	3970-3660 cal BC

The Lower Wentlooge estuarine alluvium is only to be found in the deeper central and northern parts of Queen's Sedgemoor (represented by thin layers in DWC95, DWC96 and DWC124). It is not recorded in the profiles where Lias bedrock rises to elevations above OD.

The centre and north of Queen's Sedgemoor has a very different organic sequence compared to the south and east of the basin. Here sedge fen – particularly *Cladium* – was much more important with peripheral reedswamp grading into detritus muds. We would interpret this to mean that the central and northern part of Queen's Sedgemoor experienced lower energy, more sluggish water movement conditions compared to areas to the south. This thereby allowed the development of extensive reed and sedge beds. Unlike on Ashcott and Shapwick Heath, where extensive raised bog developed, on Queen's Sedgemoor only a small amount of *Sphagnum-Calluna-Eriophorum* bog can be traced, restricted to cores DWC124 and DWC95. Significantly, this episode of raised bog growth was terminated by a re-establishment of reedswamp and *Cladium* sedge fen development. Although we have no dating evidence for when this occurred, one may postulate that the onset was triggered by the rise in calcareous groundwater levels associated with the flooding horizons described elsewhere in the Levels (Beckett and Hibbert 1979; Clapham and Godwin 1948).

The core record for DWC124 is particularly valuable in that it pinpoints a promising locality should future workers wish to investigate the early Holocene vegetational record of the Levels. Although there have been a considerable number of palynological studies for the mid-to-late Holocene, including several long sequences (Beckett 1979; Beckett and Hibbert 1979; Caseldine 1986), as Wilkinson (1998) has observed, the early Holocene vegetational record has hardly begun to be investigated. It would be of interest to see whether, within the 3 m of basal organic sediment, deliberate Mesolithic vegetational

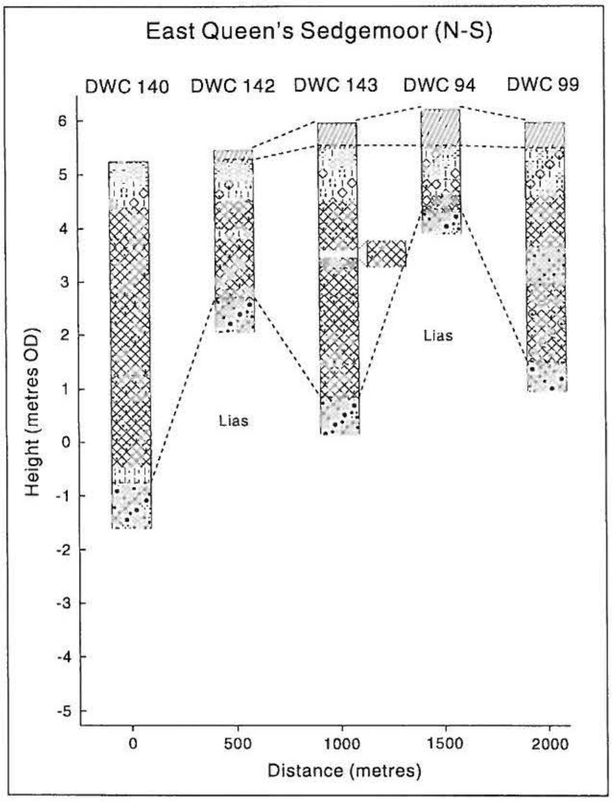


Figure 3: Results of a north to south borehole transect across East Queen's Sedgemoor. For explanation of the symbols used in this and subsequent Figures 4-8, see Table 1.

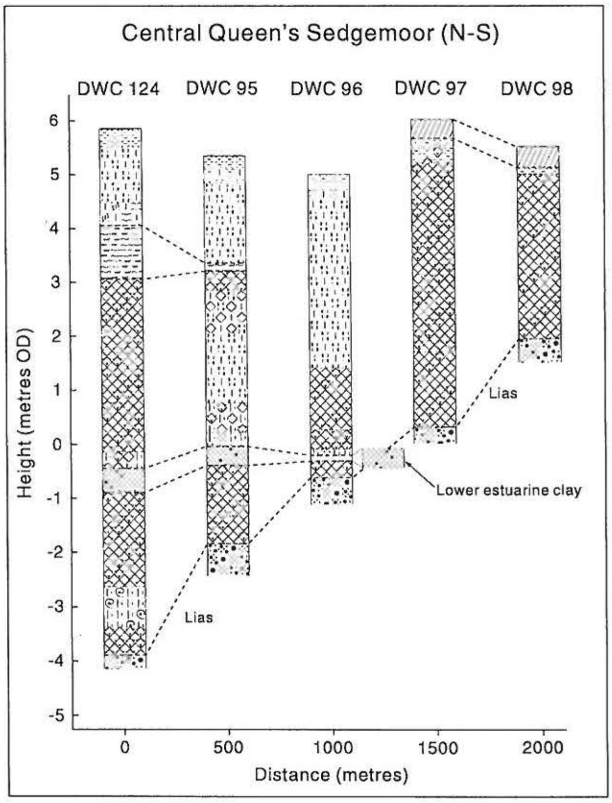
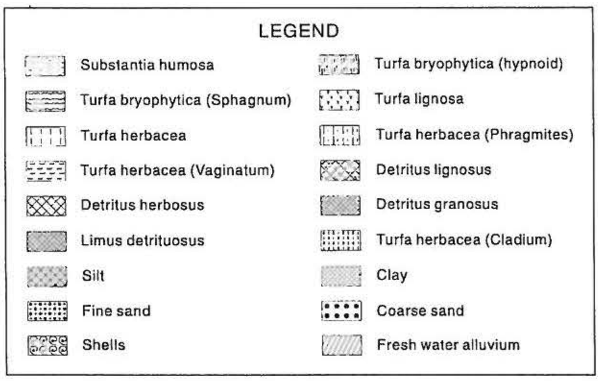


Figure 4: Results of a north to south borehole transect across Central Queen's Sedgemoor.



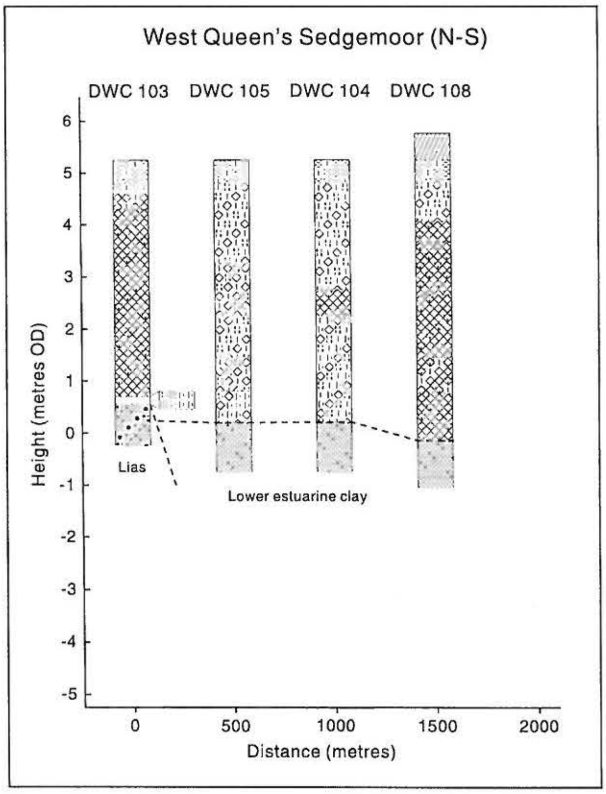


Figure 5: Results of a north to south borehole transect across West Queen's Sedgemoor.

disturbance can be detected as have been identified in a similar marginal setting in the Vale of Pickering, N. Yorkshire (Mellars and Dark 1998; Simmons *et al*, forthcoming). The recent discovery of Mesolithic flint on a Lias outcrop at West Waste on Godney Moor (Brunning 1998, 86) points to the possible potential of such an investigation.

Ashcott Heath to Queen's Sedgemoor (Figure 6)

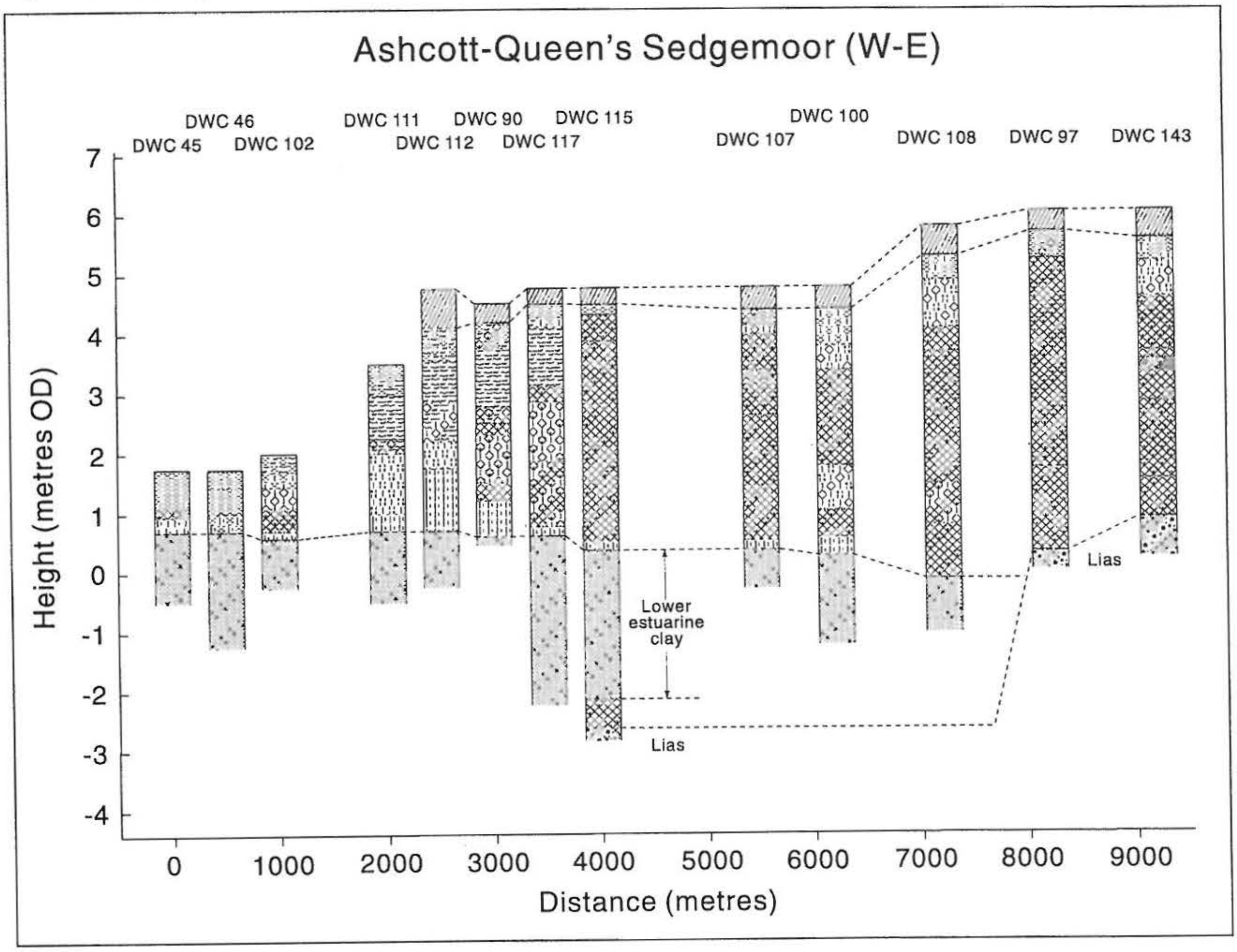
The Ashcott Heath to Queen's Sedgemoor transect highlights two broadly quite different sedimentary sequences. To the west a 'classic' Somerset Levels' OD clay-reedswamp-sedge fen-raised bog hydroseral succession is to be found, although here the upper part of the sequence on Ashcott Heath has been lost, probably to peat cutting. Based on the relative heights of the organic deposits to the east, one would postulate that the *Sphagnum-Calluna-Eriophorum* raised bog attained an altitude of +5.5 to +6 m OD. Further east – between West Backwear and Common Moor – the raised bog disappears to be replaced by the woody detrital mud sequence previously described. This same raised bog edge was identified by Housley (1988, fig 71) between boreholes GV29 and GV13. Higher in the sequence detritus mud is replaced by reed/sedge peat, although the humified amorphous nature of the uppermost organic deposit makes characterisation difficult. Significantly, the whole transect is sealed by alluvium that is thickest in core DWC112, next to the course of the modern River Brue at Cold Harbour Farm. This suggests the alluvium represents some sort of fine minerogenic overbank deposit, possibly comparatively recent in age.

Core DWC115 was of sufficient depth that it penetrated the blue-grey Lower Wentlooge estuarine silty clay to reveal underlying organic sedimentation. At this point the relatively thin layer of detrital mud has almost certainly been heavily compressed, if analogy with Nyland Hill (Haslett *et al.* 1998) is any guide, by the burden of overlying minerogenic sediment. Such differential compression – combined with peat cutting - may also partially account for the +3 to +6 m OD variation in height observed across the Somerset moors and heaths (Cope 1987, 33) and visible in Figure 6.

Panborough to Street and Bleadney to Glastonbury (Figures 7 and 8)

The two transects running N-S from the Wedmore Ridge to the Polden Hills are important for the stratigraphic relationships they reveal. The five cores

Figure 6: Results of a west to east borehole transect from Ashcott Heath to Queen's Sedgemoor.



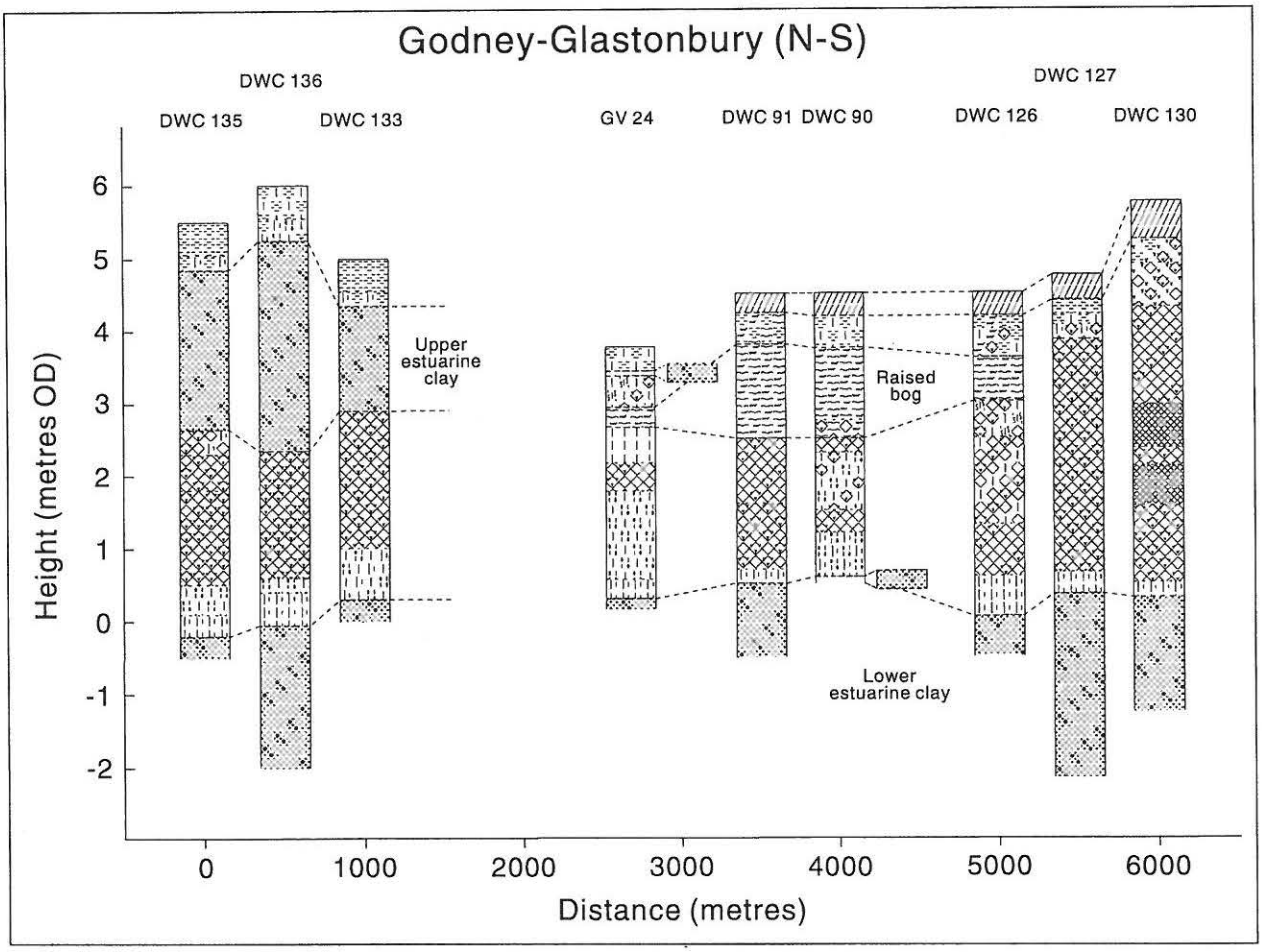
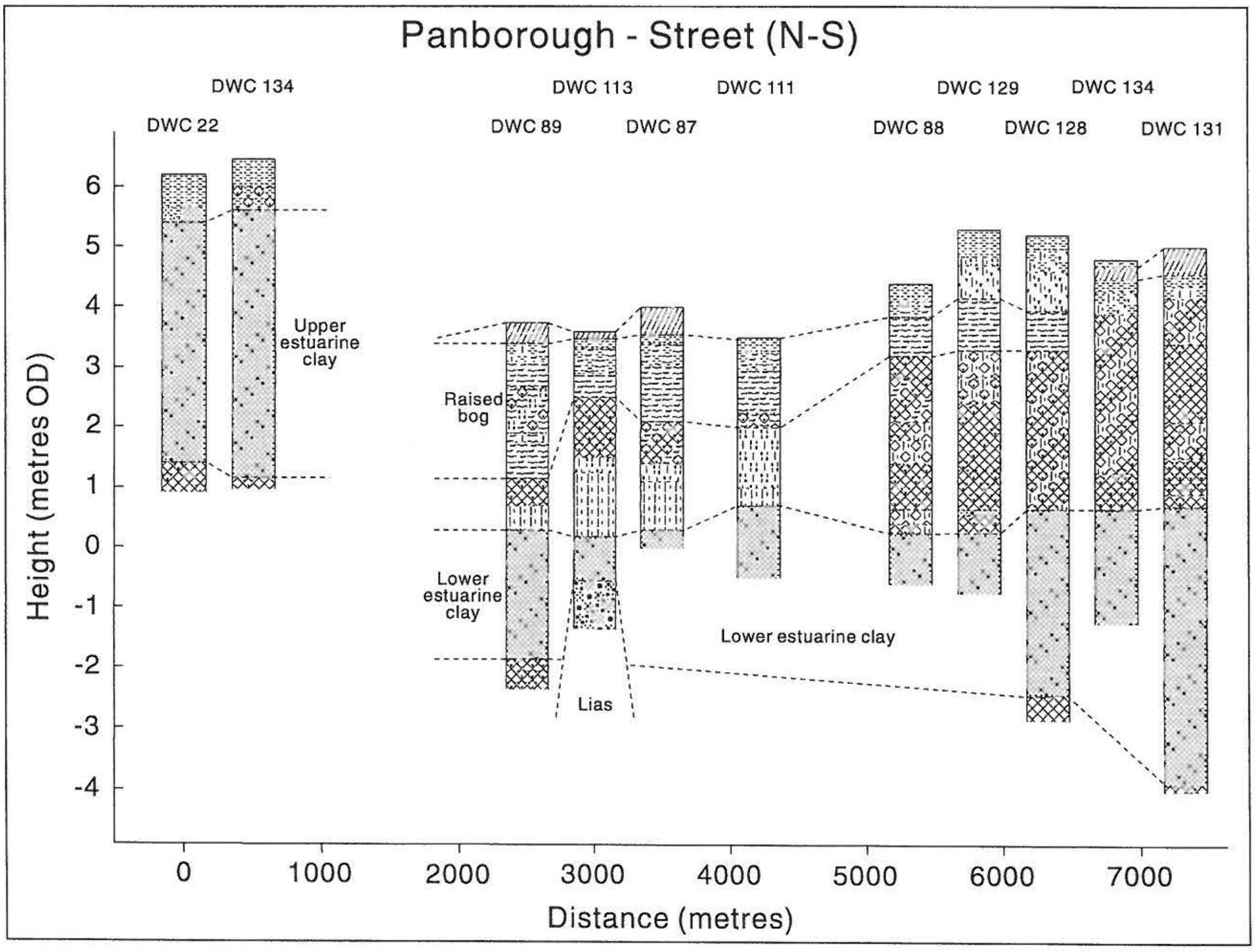


Figure 7: Results of a north to south borehole transect from Bleadney across Godney Moor to Glastonbury.

Figure 8: Results of a north to south borehole transect from Panborough to Street.



from Godney Moor provide a link between the Holocene sequence in the Axe Valley (Haslett *et al.* 1998) and the deposits of similar age south of Godney island (Godwin 1955; Housley 1988; 1995). Together they chart the landward extension of the Upper Wentlooge estuarine-marine alluvium (Allen 1987) that Godwin (1955) termed his 'Romano-British clay'. Radiocarbon determinations on peat at a regressive contact on Godney Moor (Somerset County Council 1992: GU-3246: 2590 ± 50 BP; GU-3247: 2560 ± 50 BP) are in good agreement with the age reported in a similar context by Housley (1988; 1995) from Long Run Farm south of Godney island (Q-2458: 2550 ± 50 BP). When calibrated (using the 1998 calibration curve and OxCal 2.18 with the 'whole ranges' option selected) the following one and two standard deviations are obtained:

	±1 standard deviation	±2 standard deviations
GU-3246	810-590 cal BC	840-530 cal BC
GU-3247	790-560 cal BC	810-450 cal BC
Q-2458	780-560 cal BC	810-440 cal BC

The calibrated age determinations demonstrate that Godwin's 'Romano-British clay' is not third century AD in age. Instead it is clear that marine-estuarine conditions had ceased, to be replaced by freshwater organic sedimentation by the middle of the 1st millennium BC. Age estimates for the lower transgressive contact do not show the same degree of synchronicity. For example, Haslett *et al.* (1998) reported ^{14}C determinations of 3370 ± 60 BP (Beta-101740), 3380 ± 60 BP (Beta-101741) and 3240 ± 80 BP (Beta-101742) from Nyland Hill, whereas Housley (1988; 1995) recorded an age of 2860 ± 50 BP (Q-2459) from Long Run Farm. In terms of calendar years these four 14C determinations produce the following calibrated one and two standard deviations ranges:

	±1 standard deviation	±2 standard deviations
Beta-101740	1740-1560 cal BC	1860-1520 cal BC
Beta-101741	1750-1570 cal BC	1860-1520 cal BC
Beta-101742	1620-1430 cal BC	1720-1320 cal BC
Q-2459	1120-950 cal BC	1210-900 cal BC

A number of cores from Godney Moor reveal the existence of a much humified reed peat overlying the Upper Wentlooge clay. Although mostly lost to modern agricultural improvement, a Somerset County Council assessment (1992) of a field off White's Drove has demonstrated how valuable such unusual preservation is in that it shows that peat continued to form as late as the 10th century AD. The fact that it covers the early historic era makes it an extreme rarity and a fuller report is at present being prepared (Housley *et al*, forthcoming).

Underlying the Upper estuarine clay on Godney Moor is the Middle Wentlooge peat and the Lower Wentlooge estuarine clay (Allen 1987). The lower part of the peat sequence is typical of many parts of the Somerset Levels with a reedswamp-sedge fen hydroseral succession. This, however, was later replaced by a series of woody detrital muds suggesting that in the mid-late Holocene, east Godney Moor served as a drainage corridor for water flowing north – a consequence of the fact that the raised mires of Westhay and Tadham Moors prevented more westerly drainage.

The central cores in the Panborough-Bleadney to Glastonbury-Street profiles – to the south of Godney island - are mostly characterised by reedswamp, sedge fen and raised bog sequences with varying amounts of detrital mud. DWC113 revealed a Lias rock bench that may have played a role in defining the eastern margin of the Meare Pool (Caseldine 1986; Godwin 1955). Another, GV24, significantly shows the relationship between the raised bog and the Upper Wentlooge clay with the latter overlying the former. These two transects, located 1 km apart, chart the lateral extent of raised bog plant communities which in the south, significantly, do not appear to have reached the entrance into South Moor. Instead woody detritus mud appears to have remained the norm. This reinforces the inference that an important channel of the Upper Axe/Brue passed south of the Lias outcrop of Glastonbury, and that this carried virtually all of the drainage from South Moor and Kennard Moor. Only in two cores was the Lower Wentlooge clay penetrated, DWC128 and DWC131, and in neither case was it possible to penetrate the compact organic sediment interleaved between the lower estuarine clay and bedrock.

The Geographical Extent of the Main Lithological Units (Figures 9-11)

Although only a proportion of the original Soil Survey borehole records were accessed, we had sufficient additional information in unpublished correspondence to plot three lithological maps that together illustrate the geographical extent of six Holocene lithological units in the area. It is axiomatic that the degree of resolution heavily depends on the borehole coverage, i.e. on the density of data points. The Soil Survey made many more boreholes than just the forty or so presented here, and so the maps are on a more secure footing than might at first be inferred. However, with only a partial record of the extent of the survey programme, we cannot show the base grid and hence whether the boundaries derive from detailed field observations or from interpolation between data points. Despite these limitations, the mapped distributions are a considerable advance on our existing knowledge and we hope will provide a useful resource for future researchers.

Although Figures 9-11 (Lower Wentlooge clay, Middle Wentlooge peat and Upper Wentlooge clay) are in approximate chronological order (oldest to youngest) the figures do not represent environmental snapshots at particular moments in time. They merely show the maximum extent of the lithological units as far as it has been ascertained. It is likely that some of the deposits on Figures 10 and 11 were laid down contemporaneously, but they have been split between two figures to enhance clarity.

The distribution of the Lower Wentlooge estuarine alluvium (or OD clay) is fairly well defined (Figure 9). It has been attested between Meare and the Polden Hills by numerous workers and is known both north and south of the Shapwick Burtle (Wilkinson 1998). The same deposit can be traced south of Godney and in the northern and central part of Queen's Sedgemoor. The south and east of Queen's Sedgemoor does not seem to have experienced estuarine sedimentation during the Boreal period – instead saltmarsh conditions were confined to a deeper, more northerly channel or inlet. The situation on the south-easterly margin of what became the historical 'Meare Pool' is complex. We lack the detailed records to resolve the situation, however there is some indication that Lias outcrops partially blocked the passage between the easternmost tip of Meare 'island' and the Godney 'ridge'. This may account for the Lower Wentlooge alluvium boundary depicted in this part of Figure 9. Certainly both OD clay and raised bog – see below - have been attested further west in the Meare Pool area (Caseldine 1986; Godwin 1955), but the Soil Survey's programme of investigation is insufficiently detailed to resolve the complexities and neither Godwin's nor Caseldine's publications provide relevant information in this area either. At the time of writing we did not have access to the work of Aalbersberg (1999) on South Moor and so the extent of the lower estuarine clay on South and Kennard's Moors could not be depicted.

Subsequent peat developments are summarised in Figure 10. This figure shows three broad organic units: 1) the maximum extent of the raised bog development, 2) the distribution of Cladium sedge fen on Queen's Sedgemoor and 3) the presence of woody detritus mud. The distribution of detritus mud may reflect the earlier drainage pattern that existed before the medieval diversion of the River Brue to a more westerly course (Williams 1970). Unlike the situation prevailing today, raised mires to the west are likely to have impeded a westerly drainage thereby encouraging a northerly flow of water via the Godney-Garslade and Panborough-Bleadney gaps into the Axe. Williams (1970, 66) cites documentary evidence that there were two courses of the Brue in the sixteenth century, one flowing northwards and one into the Meare Pool. In addition, that a more northerly pattern existed may be inferred if Figures 10 and 11 are compared. The coincidence between the distribution of detritus mud in the northern part of the study area and the distribution of Upper Wentlooge estuarine alluvium in the Upper Axe, on Godney Moor and in a lobe south of Godney 'island' - but not to the west – is significant. It provides strong evidence to suggest that, in this period, freshwater discharge and estuarine egress was via the Axe and not from the present-day course of the Brue. It would appear that the Upper Wentlooge estuarine alluvium entered the Brue valley in the watercourses that formerly had been responsible for the formation of the detritus muds.

The distribution of the detritus mud is also significant in another way. There is a strong correlation between the distribution of the detritus muds depicted in Figure 10 and the distribution of the modern alluvial clay soils of the Midelney, Fladbury and Compton series mapped by Avery (1955). The deposits on which these soils developed have their greatest thickness when in close proximity to the present-day Rivers Whitelake and Upper Brue (Cope and Colborne 1981, Godwin 1955, fig 3). In our opinion this suggests the detritus muds represent precursor channels to the modern-day canalised river courses that were responsible for the arrival of freshwater alluvium on which the soils of the Midelney, Fladbury and Compton series developed. The reasons why an organic depositional regime was replaced by one characterised by minerogenic freshwater alluvial sedimentation are too complex to discuss in any detail here however see Housley (1986, 141-144) for a possible explanation.

Although not readily observable from the Soil

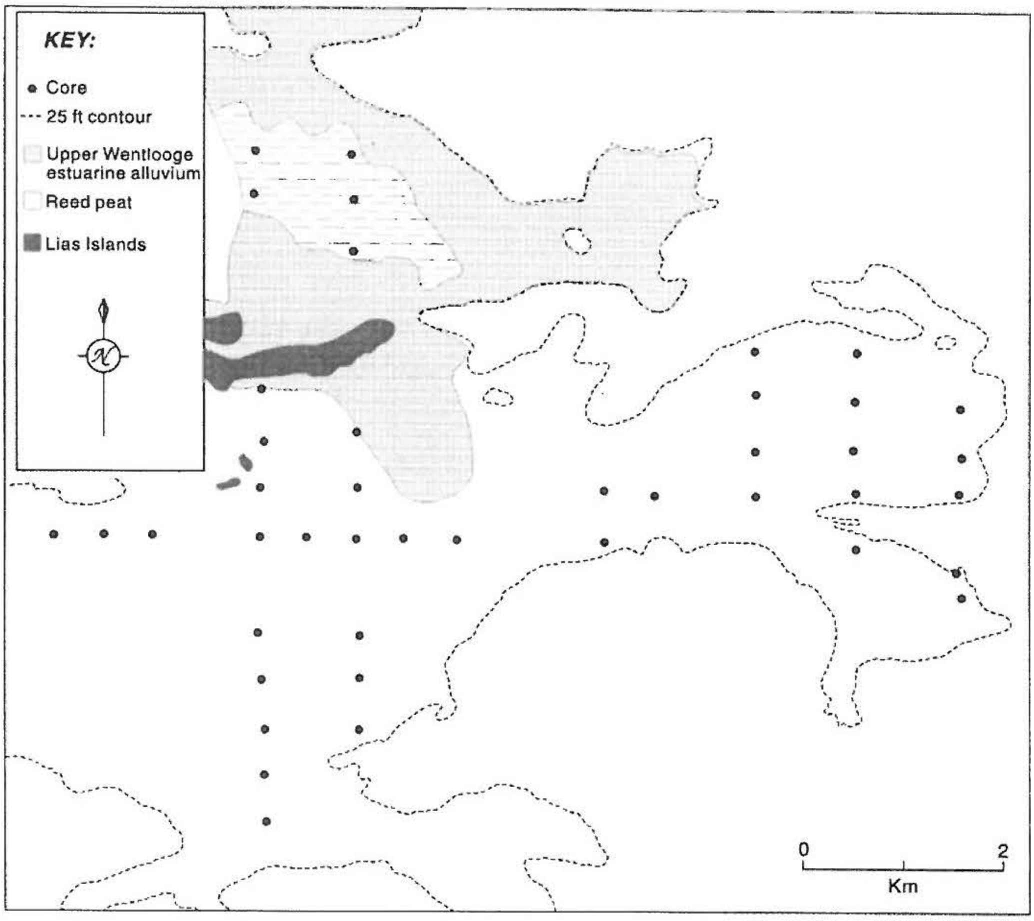


Figure 9: Map showing the distribution of the Lower Wentlooge estuarine alluvium (or OD clay) in the study area.

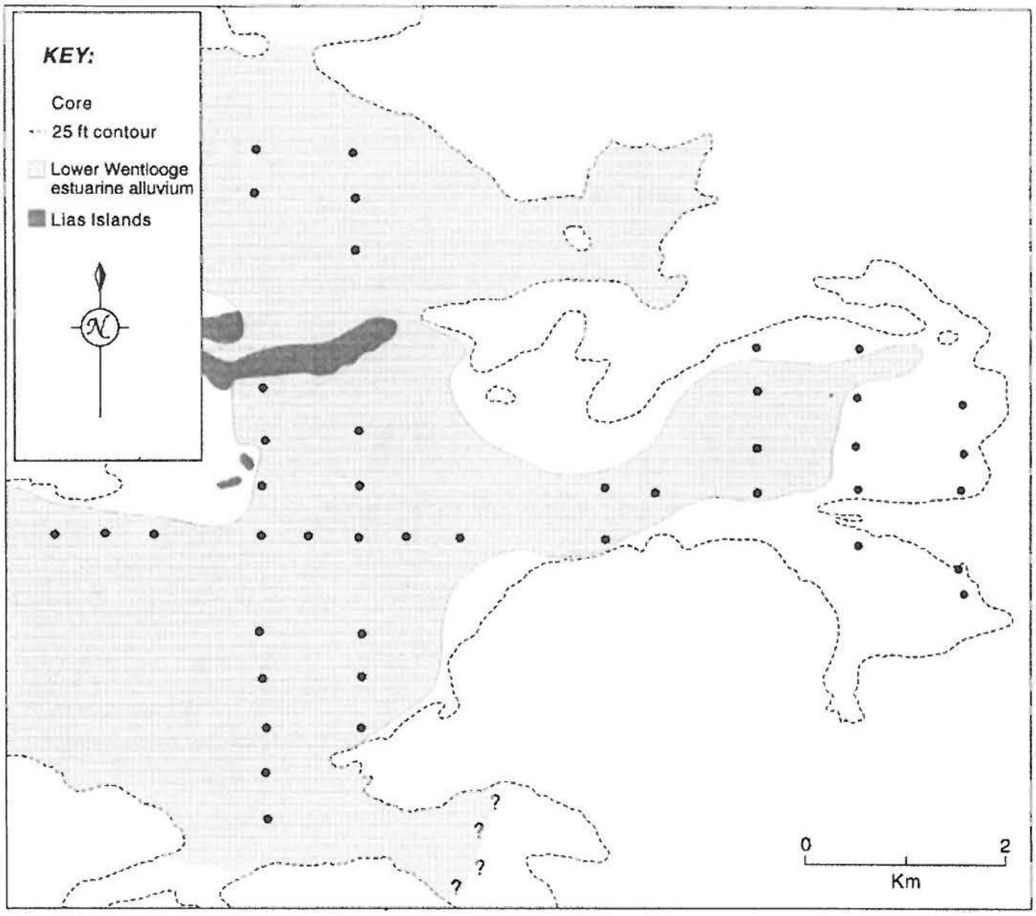


Figure 10: Map showing the distribution of the three main organic lithological units that are (mostly) to be found above the Lower Wentlooge alluvium. 1) The maximum extent of Sphagnum-Calluna-Eriophorum *raised bog in the study area. 2) The distribution of* Cladium *(saw-toothed sedge) fen on Queen's Sedgemoor. 3) The presence of woody detritus mud .*

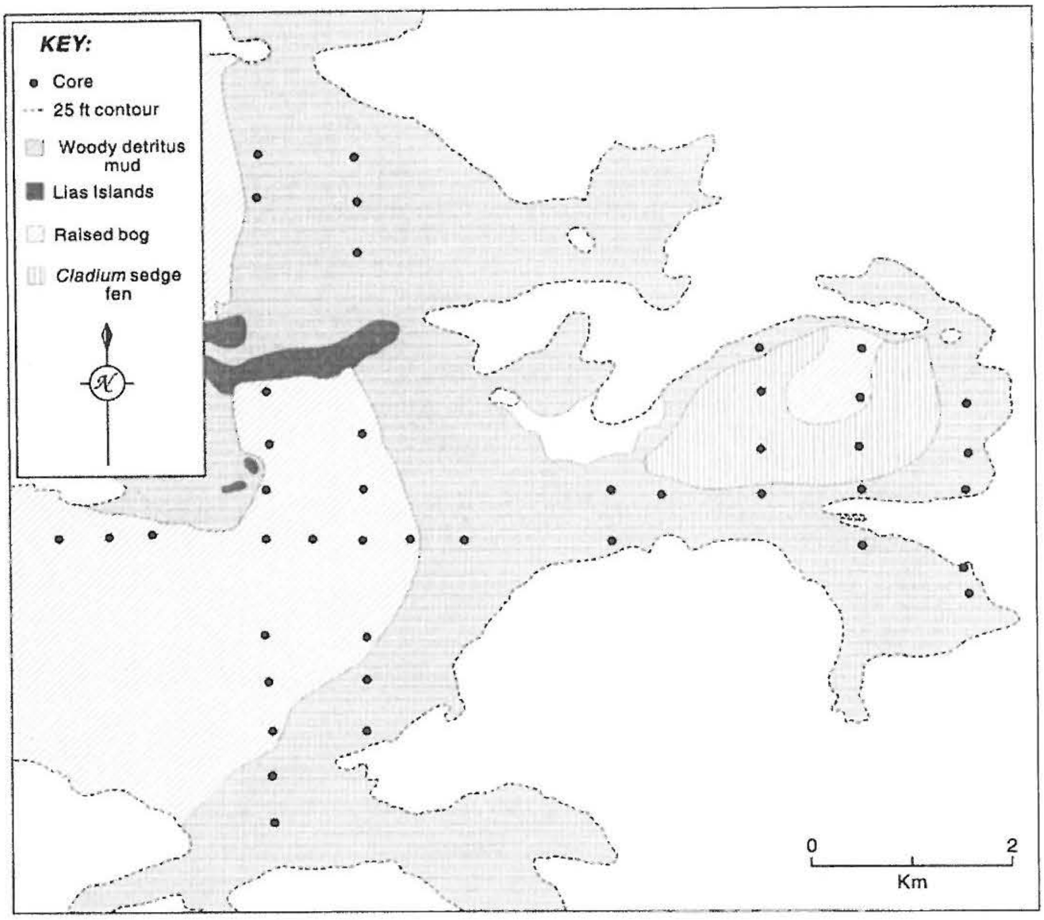


Figure 11: Map showing the distribution of late 2nd to mid-1st millennium cal BC Upper Wentlooge estuarine alluvium (Godwin's 'Romano-British' clay) and the reed peat that, in places, succeeded it.

Survey data, other studies (Housley 1988; 1995) have shown that the deposition of the Upper Wentlooge estuarine alluvium coincided with high groundwater levels in the perimarine areas of Glastonbury Heath and Common Moor. In terms of sedimentation this is reflected by change to fine detritus mud and botanically by an increase in plant macrofossils that could tolerate deeper and wetter conditions. The most likely explanation for this increase in water levels is that it is due to the backing up of fresh water in areas that were upstream of where estuarine alluvial deposition was occurring. Such evidence reinforces the impression that the distribution of the detritus muds and the Upper Wentlooge estuarine alluvium are, in some way, closely related.

Figure 11 shows the distribution of the late 2nd to mid-1st millennium cal BC Upper Wentlooge estuarine alluvium and the reed peat that subsequently developed on Godney Moor once marine conditions receded. As previously mentioned, subsequent deposits of freshwater riverine clays occur along most of the rivers, and are particularly thick south of Glastonbury and in the southeasterly corner of Queen's Sedgemoor (Cope and Colborne 1981; Cope 1987). It is also possible that since the Soil Survey's investigations in the 1980s, some of the upper reed peat on Godney Moor has been lost to modern agricultural activities (Somerset County Council 1992). The western boundary of the estuarine alluvium immediately north of the Godney 'ridge' and close to the Meare Pool is confirmed by Godwin's GO IX boring (1955, 170), whilst the lobe south of Godney was more fully mapped by Avery (1955) and Housley (1988; 1995).

Conclusions

Although the Somerset Moors and Levels are noted for the many detailed environmental studies mainly associated with structures revealed by peat cuttings, the wider context has not always received the same attention. Thus, whilst the lithology of some areas is very well documented, knowledge of the wider landscape has remained rather imprecise. To some extent the early 1980s National Peat Inventory programme of the Soil Survey of England and Wales has given us new insights into the wider environmental context of the Somerset Moors. Despite the lack of good vertical control, new dating evidence or detailed analyses of plant macrofossils, it is clear the level of coverage achieved has been sufficient to provide valuable insights into the general stratigraphy of the moorlands of the Upper Brue that will be of use to future researchers.

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Bibliography

Aalbersberg, G., 1996, The alluvial fringes of the Somerset Levels: preliminary research results. *Archaeology in the Severn Estuary* 7, 25-30.

Aalbersberg, G., 1999, *The Alluvial Fringes of the Somerset Levels.* Unpublished PhD thesis, University of Exeter.

Allen, J. R. L., 1987, Late Flandrian shoreline oscillations in the Severn Estuary: the Rumney Fórmation at its typesite (Cardiff area). *Philosophical Transactions of the Royal Society* **B315**, 157-174.

Allen, J. R. L., and Rae, J. E., 1987, Late Flandrian shoreline oscillations in the Severn Estuary: a geomorphological and stratigraphical reconnaissance. *Philosophical Transactions of the Royal Society* **B315**, 185-230.

Avery, B. W., 1955, *The soils of the Glastonbury district of Somerset*, Memoirs of the Soil Survey of Great Britain.

Beckett, S. C., 1979, The palaeobotanical background to the Meare Lake Village sites. *Somerset Levels Papers* **5**, 18-24.

Beckett, S. C., and Hibbert, F. A., 1979, Vegetational change and the influence of prehistoric man in the Somerset Levels. *New Phytologist* **83**, 577-600.

Brunning, R., 1998, Somerset Wetland Archaeology 1998. *Archaeology in the Severn Estuary* **9**, 85-87.

Burton, R. G. O., and Hodgson, J. M. (eds.), 1987, *Lowland peat in England and Wales*. Harpenden: Soil Survey of England and Wales Special Survey 15.

Caseldine, A. E., 1986, The environmental context of Meare Lake Villages. *Somerset Levels Papers* **12**, 72-96.

Clapham, A. R., and Godwin, H., 1948, Studies of the post-glacial history of British Vegetation – VIII. Swamping surfaces in peats of the Somerset Levels. *Philosophical Transactions of the Royal Society* **B233**, 233-249.

Coles, B. J., and Dobson, M. J., 1989, Calibration of the radiocarbon dates from the Somerset Levels. *Somerset Levels Papers* **15**, 64-69.

Cope, D. W, 1987, The Somerset Peat Moors. In Parkinson, R. J., and Williams, A. G. (Eds.) *South West England Soils Discussion Group Proceedings 1983-86*, No. 3, 33-50.

Cope, D. W., and Colborne, G. J. N., 1981. *Thickness of peat in the Somerset Moors. Map at 1:50,000.* Harpenden: Soil Survey of England and Wales.

Godwin, H., 1943, Coastal peat beds of the British Isles and North Sea. *Journal of Ecology* **31**, 199-247.

Godwin, H., 1955, Studies in the post-glacial history of British vegetation – XIII. The Meare Pool Region of the Somerset Levels. *Philosophical Transactions of the Royal Society London* **B239**, 161-190.

Haslett, S. K., Davies, P., Curr, R. H. F., Davies, C. F. C., Kennington, K., King, C. P., and Margetts, A. J., 1998, Evaluating late-Holocene relative sea-level change in the Somerset Levels, south west Britain. *The Holocene* **8** (2), 197-207.

Housley, R. A., 1986. *The environment of Glastonbury Lake Village*. Unpublished Ph.D. thesis, University of Cambridge.

Housley, R. A., 1988, The environmental context of Glastonbury Lake Village. *Somerset Levels Papers* **14**, 63-82.

Housley, R. A., 1995, The environment. In Coles, J. M. and Minnitt, S. (Eds.) *Industrious and fairly civilised – the Glastonbury Lake Village*, 121-136, Somerset Levels Project and Somerset County Council Museums Service.

Housley, R. A., Straker, V., Chambers, F. M., Lageard, J. G. A., and Cox, M., forthcoming. *The palaeo-environment of the Somerset Levels in the first millennium AD: evidence from Godney Moor*, in preparation.

Kidson, C., and Heyworth, A., 1973, The Flandrian sea-level rise in the Bristol Channel. *Proceedings of the Ussher Society* **2**, 565-584.

Kidson, C., and Heyworth, A., 1976, The Quaternary deposits of the Somerset Levels. *Q. J. Engineering Geol.* **9**, 217-235.

Mellars P. A., and Dark, P., 1998. *Star Carr in Context: new archaeological and palaeoecological investigations at the Early Mesolithic site of Star Carr.* Cambridge: McDonald Institute for Archaeological Research.

Simmons, I., Innes, J., and Cummins, G., forthcoming, The palaeoenvironmental and geostratigraphic context of the archaeology. In Schadla-Hall, R. T. and Lane, P. (Eds.) *The Early Mesolithic in the Vale of Pickering*, Cambridge: McDonald Institute for Archaeological Research.

Somerset County Council, 1992, *A palaeoenvironmental* *investigation of a field off White's Drove, Godney Moor, Near Wells, Somerset.* Unpublished Interim Report.

Tröels-Smith, J., 1955, Characterisation of unconsolidated sediments. *Geologiske Undersogelse* **3**, 38-73.

Waller, M., Entwistle, J. A., and Duller, G. A. T., 1995, TSPPlus – a menu driven programme for the display of stratigraphic data. *Quaternary Newsletter* **99**, 32-39.

Wilkinson, K., 1998, An investigation of Holocene peat and intertidal stratigraphy at Shapwick Heath, Somerset: preliminary results. *Archaeology of the Severn Estuary* **9**, 85-88.

Williams, M., 1970. *The draining of the Somerset Levels.* Cambridge: Cambridge University Press

Table 1: Lithological units relevant to the study area

Name	*Description*
Substantia humosa	Completely disintegrated organics, or precipitated humic acids without macroscopic structure
Turfa bryophytica (hypnoid)	Hypnoid mosses
Turfa bryophytica (Sphagnum)	Mosses, including *Sphagnum*
Turfa lignosa [Tl]	Roots, stems, branches, etc of woody plants with demonstrable macroscopic structure
Turfa herbacea	As Tl, but with roots, stems, leaves of herbaceous plants
Turfa herbacea (Phragmites)	As Tl, but with roots, stems, leaves of *Phragmites*
Turfa herbacea (Vaginatum)	As Tl, but with roots, stems, leaves of *Vaginatum*
Turfa herbacea (Cladium)	As Tl, but with roots, stems, leaves of *Cladium*
Detritus lignosus	Detrital fragments of woody plants >2 mm
Detritus herbosus	Detrital fragments of herbaceous plant >2 mm
Detritus granosus	Detrital fragments of woody and/or herbaceous plants <2 mm >*c.* 0.1 mm
Limus detrituosus	Plant fragments of <*c.* 0.1 mm
Clay	Mineral particles <0.002 mm
Silt	Mineral particles 0.002 to 0.06 mm
Fine sand	Mineral particles 0.06 to 0.6 mm
Coarse sand	Mineral particles 0.6 to 2 mm
Shells	Shell fragments
Freshwater alluvium	Humic silty-clay with developed soil structure found near modern drainage courses

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