THE PALAEOENVIRONMENTAL AND ARCHAEOLOGICAL POTENTIAL OF FLANDERS MOSS EAST

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Introduction

AOC Archaeology was commissioned by Historic Scotland to assess the archaeological and palaeoenvironmental potential in the Upper Forth River Valley, with particular reference to the wetland zones. This paper will present some of the findings and results of this research centred on the raised moss of Flanders Moss East. The paper is divided into two sections. The first will present a brief resume of previous palaeoenvironmental research, followed by the results of the palaecological work within Flanders Moss East. The second section includes a review of wetland archaeology in the Upper Forth River Valley and presents some preliminary results of an archaeological evaluation of a buried wooden structure located within remnant peat deposits at Parks of Garden, near Flanders Moss East. This assessment of the Upper Forth River Valley was carried out as part of a programme to enhance understanding of the palaeoecological and archaeological potential of the Scottish wetlands (see Hingley *et al.*, 1999).

Palaeoenvironmental Research

Resume of palaeoenvironmental research

The topography of the Upper Forth Valley is dominated by the flat Carse of Stirling which trends east – west (Figure 1). Most of the Carse is underlain by postglacial marine sediments which form a plain about 4 to 5 km wide and which slopes from about 14 m above OD in the west to 8 m OD in the east (Laxton and Ross, 1983). Sissons (1966) demonstrated that at about 8800 to 8500 cal BP a bed of peat (the sub-carse peat) started to form on the poorly drained surfaces of lateglacial raised beaches in the western part of the Carse of Stirling. During a postglacial transgression much of the sub-carse peat was buried by marine carse clay, deposited between 8421 ± 157 and 5481 ± 130 cal BP (Francis *et al.* 1970, Brooks, 1972). However, in some areas peat formation was not terminated, demonstrated by one of the deepest peat successions in Flanders Moss East which included pollen zones V to VII (Durno, 1956).

The original extent of peat cover in the Upper Forth Valley is difficult to estimate following the removal of vast tracts of peat in the eighteenth and nineteenth centuries; but it is reasonable to assume that Cadell's account of a 12 mile stretch of moss from 1 to 2 miles broad is fairly accurate (Cadell, 1913).

Palynological research on Flanders Moss West, which lies across the River Forth to the south-west of Flanders Moss East (Figure 1), identified a recurrence surface which was dated to 2712 ± 120 uncal BP (Turner, 1965, 1981); and

although there may be some doubt about the accuracy of older radiocarbon dates the identification of a recurrence surface is important in itself. A recurrence surface is characteristic of a change in the growing surface of a raised peat bog from a well humified (decomposed) peat formed when the bog surface is relatively dry and oxygenated, with a vegetated surface of predominantly cotton grass and heather, to a weakly humified (poorly decomposed) peat, formed when the bog surface is wet for a considerable time and dominated by bog moss (Sphagnum spp.). The change in peat type is seen as indicative of a change in climate from a relatively warm and dry one to a cooler and wetter one and is therefore indicative of climatic deterioration. This is because the drainage and groundwater level of a raised bog is isolated from the surrounding landscape and therefore changes in these can only occur through climatic change and/or human interference (e.g. Tipping, 1995). Turner (1965; 1981) also identified a short lived regional clearance assigned to the Roman period and other small temporary clearances which continued until the final mid to late seventeenth century regional clearance, a result of the expansion of iron bloomeries. Durno (1956) palynological research from Flanders Moss East divided a core into a series of pollen zones based upon periods of relatively constant vegetation, with changes from one zone to the next indicative of environmental change. However, Durno's analysis needs to be regarded with caution, as it was based upon selected taxa and also used chronological controls based upon Godwin's English and Welsh research. Both Durno's (1956) and Turner's (1965) palynological work demonstrate the potential for long records and for detailed analysis and interpretation.

Recent palaeoenvironmental work

The principal aim of the recent palaeoenvironmental work reported in this paper was to assess the present condition and potential of the peat deposits of Flanders Moss East.

Flanders Moss East was surveyed by the Department of Agricultural and Fisheries as part of the Scottish peat survey (1965); this survey included the mapping of the bottom and surface contours of the bog. This data has been converted, by Margaret McKeen at the Maculay Institute, into absolute depths of peat deposits from the current bog surface (Figure 2). Using these depth data, three reference cores (cores described in the field and kept for laboratory based analysis) and three reconnaissance cores (cores just described in the field) were taken from Flanders Moss East (Figures 1 and 3).

A basic stratigraphic pattern can be traced in all of the cores (Figure 3 and Appendix A for stratigraphic descriptions). Within the deep basin, initial peat development commences with a compact wood-rich 'fen' peat. Wood gradually becomes less dominant, replaced by fibrous, but well humified peat rich in cotton grass (*Eriophorum* spp.). There is a gradual replacement of cotton grass by *Sphagnum* spp. The *Sphagnum* rich units tend initially to be well

humified, but are gradually, and occasionally abruptly, replaced by poorly humifed, *Sphagnum* dominated peat. There are some variations, for example FMR1 (Figure 3) has *Phragmites* rich units near the base. The apparent lateral extent of stratigraphic units across the bog will be confirmed by an extensive programme of radiocarbon dating.

Humification is a measure of how decomposed and degraded organic matter is. The degree of humification was estimated according to the method devised by von Post (*cited* in Department of Agriculture and Fisheries, 1965). The humification results from Flanders Moss East show many subtle and relatively rapid shifts in bog surface conditions, which may demonstrate climatic changes within this raised bog regime (Figure 4a and b). A change from well humified peat to poorly humified *Sphagnum* peat can be seen in all but one of the cores, at around 2.00-1.50 m depth. This change in humification and stratigraphy may be interpreted as a recurrence surface. A smaller apparently laterally extensive poorly humified *Sphagnum* unit occurs at about 3.5 m; this unit is clearly visible in the humification data and may mark an earlier episode of regional climatic deterioration.

Also of interest is the first core, FM1, taken on the edge of the moss near to Wards of Goodie (Figure 1 and Figure 3). The shallow depth of surface peat is a consequence of the core being located outside the deep basin, but also a consequence of peat cutting and drainage. The core shows a lower peat horizon below the carse clay and it is thought that this is the sub-carse peat (e.g. Brooks, 1972); radiocarbon dating should resolve this.

The full length of the three reference cores were x-rayed to check for the presence of mineralogical material of a fluvial origin (i.e. a tsunami, see Smith this volume) or aeolian source (e.g. volcanic eruption) within the organic deposits (Ellis unpublished). Mineralogical material within the peat was rare and where detected was in such small quantities that no significant event could be attributed to its occurrence. Four samples from Core FMR12 were also rapidly assessed to appraise the condition and palaeoenvironmental potential of the pollen component of the bog (Mills unpublished). This work was carried out to ascertain whether the relatively recent deterioration and vegetation change of the bog surface (see Stoneman, 1998) had affected the preservation of buried palaeoenvironmental information. The condition of the samples was generally good, although the sample derived from 164-165 cm, a poorly humified *Sphagnum* peat, had low concentrations of pollen; this may have been due to rapid accumulation rather than deterioration. However, humification analysis coupled with a rapid palynological assessment of samples from Flanders Moss West revealed that much of the six to seven metres of peat has in the past been, or is currently being decomposed. Although further work is required to determine the precise cause of this decomposition and degradation, one plausible explanation is that the established conifer plantation may be introducing and circulating oxygen rich water through the peat profile.

The Archaeology

Review of the wetland archaeology

A large proportion of the known archaeological structures and artefacts recovered from peat deposits in the Upper Forth River Valley were unearthed during eighteenth and nineteenth century extensive peat clearance and drainage. The Old Statistical Account (OSA, 1799) gives a comprehensive description of the methodology followed in the removal of Blairdrummond/ Kincardine Moss. Prior to its removal Blairdrummond Moss covered a vast area of some 10,000 acres (OSA, 1799), stretching from near the confluence of the River Forth and River Teith westward up the Forth River Valley for about four miles. Other historical peat clearance in the area includes that of Poldar Moss located below Thornhill (Cadell, 1913) and 'improvements' along the northern margins of Flanders Moss East and around Flanders Hill (Johnson, 1792).

A broad range of organic and non-organic artefacts, the fate of many unknown, have been recorded by various eighteen and nineteenth century antiquarian authors. Those from Flanders Moss East include a timber trackway uncovered near Pallabay Pow which may have been associated with some form of float or jetty and the remains of a log boat (Anderson, 1967). Also near Pallabay Pow were found two swords, reputedly lying in a cross position (Ordnance Survey, 1866). Other finds from Flanders Moss East comprise: a Romano-British glass bangle (Stevenson, 1976) and a Late Bronze Age sword from Poldar Moss (Burgess and Colquhoun, 1988).

However, the largest collection of finds results from the clearance of Blairdrummond Moss (Figure 1). Probably the most important of these finds is a tripartite disc wheel dated to 2810 ± 85 bp, *circa* 1255 to 815 cal BC (NMRS MS/735/1), which was reported to have been found 10ft below the surface of the moss (Piggott,1959). This wheel was found in association with three other wooden wheels. It may be supposed that these are the remains of a horsedrawn vehicle perhaps trapped in the peat as it made its way across the moss. Access into and across Blairdrummond Moss appears to have been facilitated by at least one wooden road, the remains of which were uncovered on Blairdrummond Moss in about 1793 (RCHAMS, 1979). It was described as being constructed from tree trunks lying the full length of the surface of the carse clay and with small pieces of timber crossing at right angles; the whole was covered with brushwood and measured some 4ft in width (Tait, 1794; RCHAMS, 1979). A third recorded wooden trackway was first recorded as 'the remains of a supposed Roman Road' (Ordnance Survey, 1866) located just a couple of kilometres to the west of Flanders Moss East. The road was described as 'a causeway composed of the trunks of trees, with marks of bolts in the longitudinal sleeps' (Wilson, 1878).

Further finds from Blairdrummond Moss include: a wooden mortar (Archaeology Society, 1890); antler implements (e.g. Ordnance Survey, 1866); arrow heads (Piggott, 1959); several polished stone axes and maceheads (Wilson, 1863); three flanged bronze axes, a socketed bronze axe, three socketed

bronze spearheads, a bronze sword and bronze cauldrons (O'Connor and Cowie, 1995); and a faience bead (Callander, 1906). There are also two examples of Medieval homesteads located on the edge of the moss in the Upper Forth River Valley; one occurs on the western edge of Flanders Moss East and this site may have been a hunting lodge (NMRS NS 69 NW 5).

The presence of prehistoric artefacts recovered from beneath and within the mosses, and the occurrence of sturdy wooden routeways within these demonstrates that access to and probably across the moss was perceived to be important enough to expend a considerable amount of time and energy in achieving this goal. Unfortunately until now there has been no modern evaluation or excavation of archaeological material from the raised moss deposits in the Upper Forth Valley and so current understanding of the environmental and anthropic context of this archaeological record is at best limited and even rudimentary.

A recent archaeological evaluation; Parks of Garden wooden platform

Because of its SSSI status and the anticipated significant depth of peat (up to 7 m) no invasive archaeological works were carried out on Flanders Moss East. However, an archaeological evaluation was carried out at Parks of Garden, which is located to the west of Flanders Moss East (Figure 5); this evaluation in the context of this conference serves to demonstrate the potential of archaeological remains within Flanders Moss East.

As mentioned above, the site was first shown on the 1866 First Edition Ordnance Survey as the 'remains of a supposed Roman Road'. The archaeological site is located in a wedge of peat which lies between the glacial moraine deposits forming the higher ground on the west and the carse clay, from which peat has been cleared, to the east. The glacial moraine deposits stretch from Arnprior to Mentieth forming a ridge of higher ground across the Upper Forth River Valley (Sissons, 1966) and it is probably significant that this is the first high and relatively dry north-south crossing point across the valley to be reached travelling westwards from Stirling.

To determine the presence and precise location of the wooden feature, a relatively large area was initial evaluated using peat probing and non-invasive ground penetration radar (GPR) techniques; both methods enabling the detection (but not identification) of sub-surface anomalies within a peat profile. Peat probing works through the manual penetration of a thin metal rod into the ground; the passage of this rod stops when it meets resistance such as that caused by a stone or large timber. GPR operates on the same principles as conventional radar. At Parks of Garden both methods produced evidence of a series of sub-surface anomalies. To determine the nature of some of these sub-surface anomalies a series of trial trenches were opened (Figure 5).

Archaeological remains were found to occur within Trench A at a depth of between 0.40 to 0.60 m (Figure 6). No archaeological features were fully excavated, as the objectives of the archaeological works were to determine the

56 Clare Ellis

presence of archaeological deposits and to assess and evaluate the nature and condition of preservation of the archaeological record.

The archaeology comprised an area of at least nineteen parallel oak and alder roundwood (Context 004) and oak planks (Context 006), probable brushwood (Context 010) and associated sedimentary contexts (Figure 7). The planks and roundwood timbers may be of the same phase of construction. Smaller split roundwood laths (Context 003) occur above the roundwood and may represent repair or an upper tier of construction. Smaller, mainly birch twigs appear to have been roughly laid or even dumped upon the planks and in some places upon the roundwood.

Any discussion or interpretation of this wooden structure re-discovered at Parks of Garden is at this stage tentative because palaeoenvironmental analyses and radiocarbon dates are not yet available.

Determination of the function of the wooden structure, as exposed by the present archaeological evaluation, is elusive because the extent of the structure has yet to be defined and its form, orientation and location with respect to the local topography is at odds with the description and ascribed function of Wilson (1878). In general, excavated trackways tend to comprise either single or double planks with their long axes oriented to the direction of 'traffic', such as the Sweet Track (Coles *et al.* 1984), or are constructed from shorter roundwood or planked timber laid transverse to the direction of traffic, a good example being the Iron Age Corlea Track in Ireland (Raftery, 1990). In addition, if the structure re-discovered at Parks of Garden is part of a trackway, its course would have hugged the lowermost contour of the glacial moraine slope. Because slightly higher and therefore drier ground following the same orientation occurred immediately to the west of the structure the reasoning behind its location remains elusive.

A second possible interpretation of the structure is as a wooden platform, used as a 'get ready point' for excursions into and across the bog, a parallel would be the Neolithic Baker Platform (Coles *et a.l* 1984); but again there would appear to be more immediately suitable locations elsewhere on the morainic spur. However, such a platform may have acted as a site from where ritual activities associated with the moss took place; although no 'votive' finds have so far been recovered from this site.

A third possible function is that the timbers represent the base of prehistoric dwelling constructed on the moss margin to free limited dry land resources for grazing or arable use; the Bronze Age platforms at Clonfinlough, Ireland (Moloney *et al.* 1993) represent a parallel. There is also a slim possibility that this wooden structure is the remains of a moss house built by the men employed to clear the land of peat. These dwellings on the High Moss (peat 6 to 12 ft deep) were scooped out of a pillar of *in situ* peat with 4 ft thick and 12 ft high walls surrounding the carse clay floor (Cadell, 1913, p 275). At other places on the Low Moss (the peat was up to 3 ft deep) the houses were set on wooden floors laid directly onto the surface of the moss (Cadell, 1913, p 275). However, the

recording of the site as a road on the first edition Ordnance Survey (1865) makes this last explanation unlikely as a generation familiar with the techniques of moss clearance would have probably set the record straight if a mistake had occurred and indeed it is probable that a member of that generation was responsible for the inclusion of the 'Roman road' on the ordnance survey map.

The Parks of Garden platform lay upon a fibrous peat which is interpreted as the old ground surface upon which the structure was built. Turner (1981) suggests that the construction of the many of the wooden trackways seen throughout Europe were built as a direct consequence of increased bog surface wetness equated to climatic deterioration characterised by increased precipitation. Palaeoenvironmental laboratory work is currently being undertaken on samples taken from adjacent to the structure to explore this idea. Unfortunately no finds were recovered during the evaluation, and confirmation of the structure as prehistoric (between 4000 and 2000 cal BP) awaits the return of radiocarbon dates samples.

Conclusion

The palaeoenvironmental data thus far obtained indicate that the preservation potential of organic archaeological materials within the moss is good. Palaeoenvironmental analyses have demonstrated that the peat deposits from Flanders Moss East are in a stable, generally reducing state. These peat deposits are deep and hold the potential for long palaeoenvironmental records, within which the potential of the environmental information has been demonstrated (e.g. Turner, 1965), but which would benefit greatly from modern analysis utilising development of theory and scientific techniques. The rediscovery of a wooden structure is encouraging for future research into the nature of human interaction and exploitation of the mosses of the Carse of Stirling and also serves to demonstrate that despite recent agricultural improvements organic archaeological material may survive in isolated pockets of peat; unfortunately with continued agricultural 'improvements' and the afforestation of mosses the outlook for the long term future of such material is less than rosy.

Postscript

Subsequent to the submission of this paper eleven radiocarbon dates have been obtained the reference cores taken from Flanders Moss East with dates falling between 11626-11172 BP to 1260-970 BP. Eight radiocarbon dates have also been obtained from Flanders Moss West reference core with dates falling between 10636-10221 BP to 2729-2349 BP. Five radiocarbon dates have been obtained from the platform and these show that it is Neolithic 4445 \pm 40 BP. A full excavation has also been undertaken on the Neolithic wooden platform and post-excavation analyses show that the most likely function was as an

58 Clare Ellis

assembly point for expeditions across the moss into the estuary beyond. The results of these works are in preparation and will be offered for publication in the Holocene and Proceedings of the Prehistoric Society.

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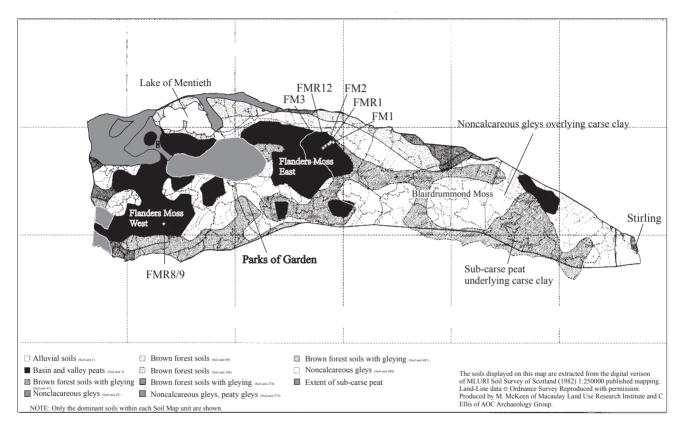
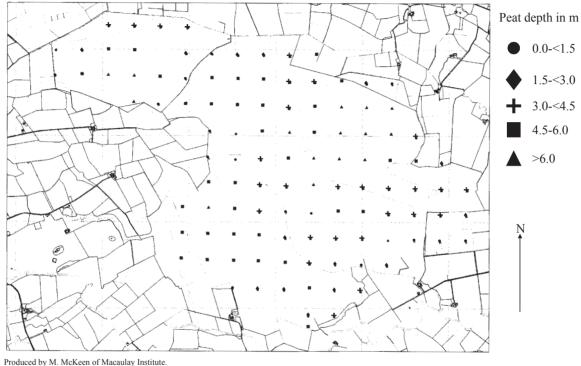


Figure 1 The present extent of peat deposits (according to Maculay Institute) of Flanders Moss East (and other 'wetland zones'). Also shown are the broad soil classifications of the Upper Forth River Valley, the location of peat cores (FM1, FMR1, FM2, FMR12, FMR13, FM3 and FM4) and the location of the archaeological evaluation.



Produced by M. McKeen of Macaulay Institute. Data digitised from Scottish Peat survey Mapping work completed 1950. Land-Line data ©Ordnance Survey reproduced with permission.

Figure 2 The peat depths of Flanders Moss East as surveyed by the Department of Agriculture and Fisheries 1965 and digitised by M. McKeen, Macaulay Institute, 1997. A deep basin can be seen in the north-eastern corner of the moss.

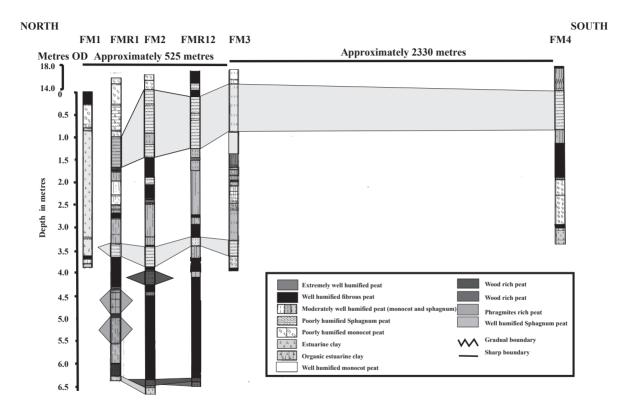


Figure 3 A schematic and simplified stratagraphic transect across Flanders Moss East. FM (Flanders Moss East) identifiers refer to individual peat cores.

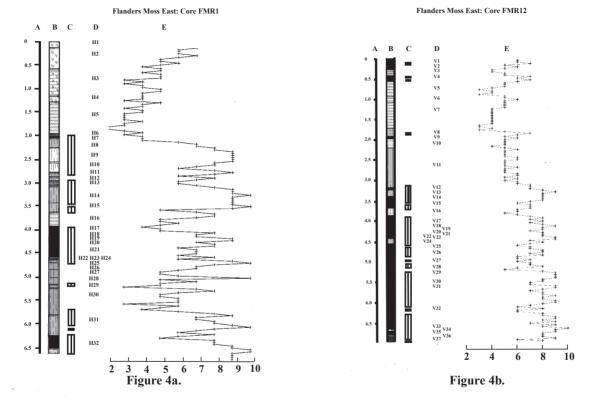


Figure 4a and 4b. A denotes depth in metres; B simplified stratigraphic profile; C well humified peat; D Unit identifier; and E degree of humification.

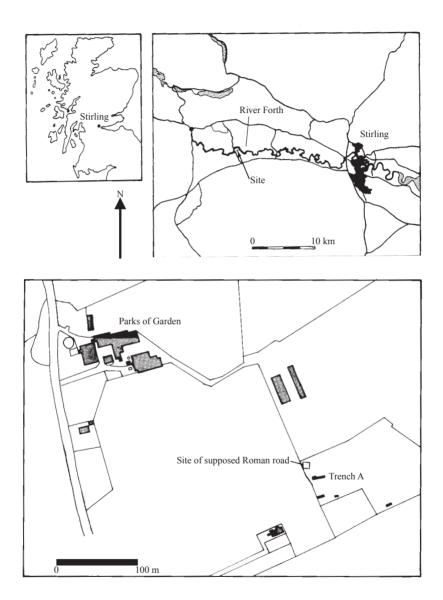


Figure 5 Site location, Parks of Garden. The wooden structure was rediscovered in Trench A.

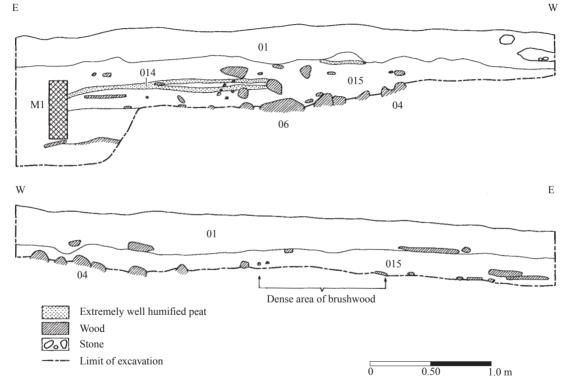


Figure 6 The upper most drawing is the north facing section of Trench A. The wood located on the limit of the excavation line is the wooden structure. The lower most drawing is the south facing section of Trench A. The wood located on the line of excavation line is the wooden structure and an area of dense brushwood is highlight.

W

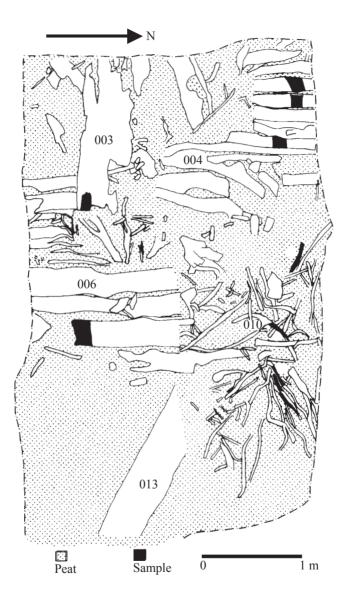


Figure 7

Trench A. Plan of wooden structure. Shown are the identified contexts discussed in the text, Context 003 split roundwood oak laths, Context 004 roundwood oak and alder timbers; Context 006 split oak planks; Context 010 birch brushwood and Context 013 a bog oak.