Black Loch Of Myrton:

An interim report on the excavation of an Iron Age loch village in South-West Scotland

AOC Project: 60066

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AOC Archaeology Group

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On Behalf of:	**Historic Scotland** Longmore House Salisbury Place Edinburgh
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Prepared by:	**Anne Crone & Graeme Cavers**
Illustration by:	**Jamie Humble, Diana Sproat, Graeme Cavers**
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Author:	**Date:**
Approved by:	**Date:**
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Enquiries to: AOC Archaeology Group
Edgefield Industrial Estate
Edgefield Road
Loanhead
EH20 9SY

Tel. 0131 440 3593
Fax. 0131 440 3422
e-mail. edinburgh@aocarchaeology.com

AOC Archaeology Group

www.aocarchaeology.com

Contents

List of illustrations

List of tables

Abstract

Excavations at the Black Loch of Myrton in 2013 have demonstrated that the site previously described as a crannog was in fact a settlement of roundhouses built directly on marshy ground around the loch. One of the roundhouses was excavated revealing a massive stone hearth at its centre, stakebuilt walling and a floor structure of radial and tangential timbers. A single radiocarbon date from one of the posts within the house has provided a mid-1st millennium BC date for the structure and there is a tentative dendro date for the 5th century BC. As well as providing evidence about the types of materials used in the construction and use of the house, analyses of the insect remains, the macroplant assemblage and soil thin-sections, together with other structural evidence suggests that there was distinct spatial organisation within the house, defined by varying floor structures and coverings, as well as by moveable screens. Very few artefacts were found but two are significant; a tiny fragment of pottery in an otherwise aceramic region and an iron ploughshare, a very rare survival in Iron Age Scotland.

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1 INTRODUCTION

The site known as the Black Loch of Myrton (henceforth referred to as BLM) (NX 36104 42835) lies on the Monreith Estate, some 3.5 km due east of the village of Port William on the west coast of the Machars (Figure 1). The Black Loch may have been so-called in contrast to the neighbouring loch, the White Loch of Myrton which is a much larger body of water, whereas the Black Loch may always have been more of a shallow peaty pool, hence the name. It no longer survives today as a body of water, having been drained frequently in the past, and its original footprint is now covered in pasture and plantation.

A two-week excavation was carried out in the summer of 2013, and a programme of post-excavation analyses undertaken throughout 2014. This report presents the combined evidence from the excavation and post-excavation programme. As a further season of excavation is planned for the summer of 2015 this report is very much an interim statement, without full exploration of the context and wider significance of the results.

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

The Black Loch of Myrton was first referred to in a footnote within a paper by Munro on the lake-dwellings of Wigtownshire (1885). In the light of the recent excavations it is worth quoting the footnote in full:

> 'When Mr Cochran-Patrick and I were staying for a few days at Monreith during the autumn of last year, Sir Herbert Maxwell took us to see a supposed crannog in the dried bed of the Black Loch of Myrton, adjacent to the White Loch here referred to by Lord Lovaine, and in a short time we succeeded in detecting, through a dense thicket of bushes and nettles, the tops of a few black posts of oak which formed part of its surrounding stockade. Since then Sir Herbert made some tentative digging, of which he sends the following notes; "The crannog which I showed you close to this house will I think repay further investigation. The loch has been drained for 80 years, and its bed repeatedly cropped and then planted. Trees now over 25 years old. Surface of island extensive (140 feet diameter), and shows 8 or 9 mounds. Opened one; found pavement of flat stones laid in clay, about 9 feet in diameter and irregularly circular. Stones much fire-marked, with much ashes and cinders both above and below. Dug 4.5 feet deep, when water came in before reaching the old lake bottom. Found several excellent grinding-stones of white quartz and hard sandstone beach pebbles. Also many whitened beach beach pebbles, and some masses of corroded iron and vitreous slag. Worked only for four hours"'. (Munro 1885, 83).

This note was accompanied by illustrations showing two of the grinding-stones which Maxwell subsequently also published separately (Maxwell 1889, 214-5).

On the basis of Maxwell's investigations BLM was listed amongst the Group 1 'sites confidently identified as crannogs' during the first phase of the SW Crannog Survey (Barber & Crone 1993, 525). The site was recorded as dessicated although coring produced some organic deposits (ibid 526). During drainage operations in 2010 to improve the pasture to the NE of the site, the landowner, Rory Christie encountered two oak stakes in the run-off channel and consequently a small assessment of the area around the findspot was carried out to determine the nature and condition of the site (Cavers 2010). Several mounds were visible close to the findspot and test-pits were dug in the vicinity of one of the mounds. Horizontal timbers and an *in situ* stake were uncovered, all of which were subsequently identified as alder. The alder stake was radiocarbon-dated to 770 – 410 cal BC (2470 ± 35 BP; SUERC 32597). It was assumed that the two oak stakes formed part of the 'stockade' or palisade that Maxwell had observed. One of the oak stakes was radiocarbon-dated to 380 – 200 cal BC (2215 ± 30 BP; SUERC 32598), suggesting at least two phases of building activity on the site.

RECENT FIELDWORK

Funding became available for more extensive investigation in 2013 and a programme of fieldwork was undertaken in July of that year. The fieldwork included a terrain model survey to map the extent of the site, the partial excavation of one of the mounds, and a coring survey to investigate the environmental context of the site.

THE SURVEY

The site survives today in an open woodland of alder, willow and birch with occasional sycamores and oaks (Figure 2; the woodland had been cut down in the 1970s so the trees were young and multi-stemmed), overgrown with nettles and hemlock. The mounds described by Maxwell were just visible in the thick vegetation. A terrain model survey was undertaken using a Trimble S6 total station to collect elevation points which were processed to create a digital terrain model (DTM) (Figure 3). The DTM survey identified at least seven, and possibly eight mounds, some of which stood as high as 1 m. They were spread over an area *circa* 45 m NW – SE and 40 m NE – SW and although no evidence of a perimeter was observed this area compares favourably with that of the 'island' described by Maxwell as 180' or, 43 m in diameter.

THE CORING PROGRAMME

Two reconnaissance coring transect lines were completed, on roughly site N-S and W-E lines, centred on the excavation (Figure 3). Sediment cores were sampled on these transects, equally spaced by about 5 m, with a maximum distance of about 40 m from the central point. The sediments were analysed using a gouge corer (diameter 20 mm) in 1 m intervals, up to a depth of about 6 m. The sediments were described using standard techniques (Troels-Smith 1955) identifying the main components of the sediments (peat, silt and clay) and particulate matter (reed, wood and charcoal fragments), as well as the colour of the sediments. The humification of the organic material was also categorised as either low, medium, high and very high.

Using a wide gouge corer (diameter 70 mm) and a Russian corer (diameter 50 mm, 0. 50 m length) sediments were collected from the upper 5.5 m near the site (Core BLM1) and further away (core BLM2). Two monoliths were also collected. One was sampled near core BLM1 in an attempt to collect intact surface sediments (0-47cm depth), while the other monolith was sampled from the excavated section, along the north face of the site (*circa* 37-87cm depth), to sample sediments with archaeological context.

Core stratigraphy *Thierry Fonville*

The sediments can be described as mainly dark brown peat (*Turfa herbacea*) with a mixture of clay and silts, as well as frequent wood and reed fragments. From the core stratigraphy it is apparent that the upper *circa* 0.3 m consists of a decomposed grey peaty clay soil. This is followed by a greyish brown clayey peat layer with many reed and wood fragments. Underneath this greyish brown peat layer there is a distinct yellowish grey clay layer, with very low amounts of organic matter. However, the pilot excavation indicated that this is far below the occupation deposits, as these are mainly contained between about 0.3 m and 0.7 m depth. In the cores collected from the transects no distinct change in sedimentology is visible in this interval. In the cores near the site, at around 0.90 m to 1 m depth there is a distinct compact yellowish grey clay layer. This can be attributed to a flooding surface or perhaps a drying phase, both of which can lead to the higher minerogenic content. This clay layer appears to have created some sort of seal from the underlying water table, as water could be seen seeping through the core hole once the layer was punctured. Cores further away from the site do not contain this clay layer. However, they do contain very organic dark brown clays from about 2 m depth, which could be related to more humified organic sediments. The elevation profile of the cores indicates only a minor rise of the site above the surrounding landscape of about 0.15 m.

On the cores near the site, below the yellowish grey clay layer, there is dark brown silty peat which shows a gradient of increased humification as the depth increases. Towards 5 m depth, the sediments consist of very humified organic substances in a silty matrix. Below this interval, at *circa* 5.5 – 6.0 m depth, the sediments consist of light and medium grey silty clays with a very low organic content. This might be interpreted as relating to a periglacial environment, dating to the Late Glacial or Early Holocene. It would appear that the site rests on a rise in these deep grey silts and clays, which might lie deeper surrounding the site. The only distinguishing element in the sediments near the site is the compact clay layer at *circa* 0.8 – 1 m depth (ie the yellowish grey clay layer which is most pronounced around 1 m depth in cores 4, 8, 15, 19, 21).

Given the absence of high amounts of wood fragments from the cores on and near the site, it is apparent that the archaeological deposits are not resting on an artificial mound. The absence of lake sediments underneath the archaeology also excludes the possibility that site was constructed on a lake bed. Rather, the site appears to sit on peat deposits, deposited in a similar setting to that currently surrounding the site, which is a reed dominated swamp with occasional trees.

Preliminary analyses

These cores will be fully analysed as part of the ARHC-funded programme *Celtic Connections and Crannogs* but interim results are presented here. As the archaeological deposits are in the upper part of the top metre of sediment it was chosen to focus the interim analyses on this these sediments. A summary diagram of the analyses is presented in Figure 4.

The geochemical records indicate that the upper c. 25 cm of the core has been influenced by diagenetic reactions, as there are elevated levels of copper (Cu/Ti) as well as elevated titanium levels (Ti/kcps) related to post-depositional removal of organic matter, leaving inorganic sediments (silts/clay). Around 50-40 cm depth there are fluctuations in the MagSus record indicating higher amounts of inorganic sediments, but overall the MagSus is very low, thus interpretation is limited. There is a fine layer with brown silts around 36 cm depth, as indicated by the reduction in OM.

The diatom assemblages show an absence of planktonic taxa throughout the core, indicating that the sediments are derived from at most a reedy fen or stagnant pools. There are mainly tychoplanktonic diatoms, particularly small sized *Staurosira* taxa (*Staurosira construens venter and Staurosira elliptica)*, which are difficult to distinguish under light microscopy. Towards the top of the core there are increases in periphytic taxa (both epiphytic and benthic), indicating a reduction in water levels.

The pollen assemblages indicate that the site was originally in a hazel and willow catchment (below 75 cm). Moderate abundances of *Filipendula*, sedges and grasses are derived from nearby grasslands, thus the catchment surrounding the site was probably already subjected to some forest clearance. Between 60 and 35 cm there are a few occurrences of cereal type pollen (*Secale*- and *Hordeum*-types), indicating that the core is very nearby or adjacent to archaeological deposits, which is very probable the lochside settlement.

The upper part of the core (above 25 cm depth) indicates increased terrestrialization with increases in alder pollen, increases in periphytic taxa (*Gomphonema* sp. and small amounts of *Pinnularia*, *Navicula* and *Achnanthoid* taxa) and increased titanium in the sediments. This is probably related to the lake drainage that took place around the early 19th century. A drainage phase might also be inferred from the low abundance of aquatic pollen and spores in the top of the core.

2 THE EXCAVATED EVIDENCE

The northernmost mound was selected for excavation. The radiocarbon-dated alder had been retrieved from a testpit dug to one side of the mound and it was also the most easily accessible from the dry land to the N of the site.

Where necessary small trees and intrusive branches were cut down to facilitate the excavation; nonetheless, the presence of trees and roots influenced both the alignment and shape of all the trenches (Figure 2). Initially, T1A, a trench roughly 4.5 x 4.5 m square was opened up around the test-pit in which the alder timbers had been found, while T1B, a 1 m wide trench extended from the NE side of this trench over the stone mound for a distance of 8 m. Subsequently, two additional trenches, T1C, roughly 2 x 2 m square, and T1D, 1.5 x 2 m in area, were opened up on the SE side of T1B. In total some 35 sq m were opened up (Figure 3).

All excavation was carried out by hand, including the removal of the topsoil. A standard bulk sample was taken from all excavated deposits and the timbers were sub-sampled for dendrochronology and species identification. Duplicate samples of a selection of timbers were also removed for the SUERC wiggle match dating (WMD) research project. Timbers displaying evidence of joinery were retained whole. Selected profiles were sampled using monoliths and kubienas.

A prolonged period of dry weather prior to the excavation meant that water levels were very low and a pump was needed only when the very lowest levels of the site were under excavation. A 0.5 x 0.5 m sump was dug in T1B for the hose.

The excavation demonstrated that the mound consists of a massive stone hearth complex (Figure 5) which sits at the centre of a timber roundhouse, Structure 1 (Figure 6). Test-pitting revealed very similar occupation deposits on the periphery of the adjacent mound, here referred to as Structure 2 (Figure 3).

STRUCTURE 1

The stratigraphic sequence within Structure 1 is described below.

Structure 1; the foundation deposits

The primary man-made deposits on the site were [050] and [051], both of which lay directly over [030], a smooth homogenous yellow-brown natural peat. The surface of the peat must have been relatively dry at the time of construction because trees were growing on the surface and had been chopped and burnt down leaving the roots and stumps, [049] under the building (Figure 6).

[050] was observed only in T1C (Figures 7 & 8) and consisted of reeds, brushwood and woodworking debris, up to 0.04 m deep, while [051], which was identical to [050] but was also flecked with charcoal and had a more mineral component, was observed in the adjoining part of T1B. [051] was sealed by [052], an irregular layer of large flat stone slabs, some as much as 0.6 m across and 0.11 m thick (Figures 4 & 8). This layer was some 3 m wide from W to E and was abutted to SW, SE and NE by a layer of tightly packed alder logs, [046], which were up to 0.25 m in diameter. [046] was most extensive to the S of [052], where it formed a corduroy surface at least 2 m wide (Figures 7, 8 & 9), sealing the reedy deposit, [050]. To the SW of [052], the surface was only three logs wide, while to the NE it was represented by a single ash log (Figure 5). Occasional small stakes [053] were observed in between the logs of [046], possibly to secure the logs in position (Figure 5).

Hearth 1 and associated surfaces (Figures 5 & 6)

The first of a series of three hearths was built directly over the foundation stones [052]. Hearth 1 consisted of a rough kerb of large boulders laid just inside [046], within which a vacuous mound of sub-angular and rounded cobbles, 0.35 m high was built up (Figures 9, 10 & 11). The cobbles were also piled up over the kerbstones and were contained within a rectilinear framework of single logs [041]. The hearth, as defined by this framework measured 2.5 m SW – NE and at least 2.0 m NW-SE. The surface of the hearth consisted of a deposit of yellow-orange clay [044] up to 0.03 m thick and heavily charcoal-flecked (Figure 11). It did not completely cover the cobbles, extending 1 m from the S-facing section of T1B and 1.3 m wide from SW to NE. A loose brown clayey soil, [036] had developed in the voids amongst the cobbles; fragments of burnt bone and a chunk of flint (SF17) were recovered from this deposit.

Abutting the alder log framework [041] on the SW side of Hearth 1 was a corduroy surface formed from smaller alder logs [047], 0.10 to 0.12 m in diameter, slightly misaligned tangentially with [041] (Figure 12). [047] lay directly over [046] but extended SW for 1.4 m out over the surface of the natural peat [030]. To the SE of Hearth 1 [042] may represent the same surface (Figure 12). It had also been laid directly over the foundation logs [046] but was more irregular, consisting of bundles of small crooked alder branchwood, 0.08 m in diameter on average.

Extending SW from [047] was a radial structure of alder timbers [009] which had been laid directly on the surface of the peat (Figures 6 & 13). This radial structure consisted primarily of four main timbers 0.10 to 0.12 m in diameter and of varying lengths, spaced just over 1 m apart at their outer ends, in between which were smaller radially-aligned timbers laid at more irregular intervals. Bundles of small alder branchwood [010] had been laid tangentially between and over the radially-aligned timbers; there is some slight evidence that the branchwood may have been woven under and over the radial components. A purple-brown organic layer [003], flecked with charcoal and burnt bone lay amongst and over the timbers of [009] and [010] and was interpreted as the primary floor surface of the structure.

The floor structure and sequence of deposits seen to the SW of the hearth were not mirrored to the NE of the hearth. Apart from the single ash log, the foundation layer of large logs [046] did not occur on this side nor was there a surface of logs like [047] extending out from the framework [041]. Instead, bundles of small branchwood [022] had been laid down over the ash log and onto the natural peat. Further NE was a radial structure of larger alder and ash logs [012] in between which there were sparse bundles of tangentially aligned alder branches [022] (Figures 6 & 14). [012] and [022] lay directly over the surface of the natural peat [030] and in amongst the timbers was an orange-brown organic deposit [011] which may be similar to [003] on the SW side but did not have any obvious anthropic content.

Hearth 2 and associated surfaces (Figures 5 & 15)

Hearth 2 was constructed in a similar fashion to its predecessor but was larger, measuring 2.5 m wide SW-NE and at least 2.6 m NW-SE. It was built directly over Hearth 1, a mound of loose cobbles being piled over the clay hearth surface [044] to a height of approximately 0.35 m (Figures 10 & 16). A loose brown clayey soil [032], very similar to [036] below the hearth base of Hearth 1, had also developed amongst the vacuous cobbles of Hearth 2. It contained no visible anthropic material other than some largish fragments of burnt bone. The hearthstone was a large slab of greywacke, 1.20 m across W – E and extending out of the baulk for 0.5 m, placed on top of the cobble mound (Figures 10 & 16). A deposit of hearth debris [025], *circa* 0.01 m thick lay over the hearthstone and spread over the cobble mound to the NE of the hearthstone.

The log framework [041] continued to define the SW and NE sides of the new hearth but large boulders had been placed just inside the logs to form a rough kerb. On the SE side the cobble mound spread beyond [041] and was contained by a stacked kerb of large, flattish stones [043] which had collapsed outwards (Figure 16). A patch of pink-grey clay [037] and three small, poorly preserved lengths of roundwood [038] found amongst the [043] stones may represent packing to strengthen this side of the hearth (Figure 17).

Abutting the kerb stones [043] was a spread of densely packed angular stones [039] which formed a surface in the SE end of T1C (Figure 17). Similar surfaces were not observed to the SW or NE of the hearth but the spread of small angular stones [034] seen in the SE end of T1D may be a continuation of the same surface. Around the hearth to the SE and NE was a thick deposit of charcoal-rich clayey soil [019] containing lumps of burnt and unburnt daub (SF 06); this probably represents numerous clear-outs of hearth debris mixed with the disintegrated clay packing around the hearth (Figure 7). [027], a hard-packed creamy grey clay flecked with charcoal and burnt daub may represent dislodged patches of this packing.

Hearth 3 and associated surfaces (Figures 5 & 18)

The third and final hearth was constructed in a similar fashion to its predecessors but it was smaller, measuring 2.5 m SW-NE but extending only 1.2 m NW-SE from the baulk. A mound of small cobbles had been piled onto the hearthstone of Hearth 2, to a height of 0.15 m (Figure 10). These were contained with a kerb of massive boulders on the SE and SW sides, while to the NE a pinky-grey clay [020], containing burnt daub, had been packed around the cobbles (Figure 19). This clay packing had probably continued around the SE side because a discontinuous line of daub, some of it burnt and some unburnt (SF6), could be traced lying some 0.1 – 0.2 m behind the massive boulder kerb (Figure 19a). On the SW side of the hearth a creamy-grey clay with flecks of charcoal and daub [033], may be the decayed remains of this packing, while on the SE side a charcoal-rich clayey soil [035] may represent hearth clearout; a possible polisher, SF15 was retrieved from this deposit. A large greywacke slab formed the hearthstone, 1.20 m W-E and 0.6 m N-S (Figure 19b). A spread of heat-affected orange-red gravel [005], roughly 0.8 m in diameter and 0.02 m thick lay over the hearthstone (Figure 5).

A charcoal-rich, grey-brown clayey soil [004] lay around the hearth and probably represents numerous episodes of hearth clear-out. On the SW side it was packed in around the cobbles of the hearth and contained a number of saddle quern fragments (SF5 & SF11).

The superstructure and outer spaces of the house (Figure 18)

The evidence for the superstructure of the house consists of an internal post-ring and two outer stake-lines. Four posts lie around the hearth, some but not all of which probably represent the post-ring [021]. 021A, B and C lie to the W of the hearth complex in T1A and are spaced 2 and 3 m apart. Excavation demonstrated that 021/A was actually two posts, 021/A1 and 021/A3, one driven in tightly against the other with a wooden wedge, 021/A2 separating them (Figure 20). 021/A and 021/B were both alder (021B is the radiocarbon-dated stake – originally labelled T3 - SUERC 32597) and earthfast posts with sharpened tips. The other two posts, 021/C and 021/D were both oak and of quite different design. Rather than a sharpened tip their lower ends were concave as though designed to fit over a horizontal log (Figure 38). Both were found beside horizontal logs which they appear to have slipped off (Figure 5).

Stake-line [016] lay in arc just beyond the ends of the radial timbers [009] (Figure 21). It consisted of 15 stakes of varying size and species (birch, alder and hazel), inserted to varying depths and spaced between 0.2 and 0.6 m apart. Some 0.5 – 0.6 m beyond this was another concentric arc of stakes, [028] consisting of nine stakes, also of various species (birch, alder and hazel) but more regularly spaced at circa 0.3 – 0.35 m apart (Figure 21). Again, the stakes were varied in diameter and the depth to which they had been inserted. [028] does not follow the complete circuit of [016] but ends at another stake-line [040]. These two concentric arcs of stakes may represent a double outer wall around the house, but it is also possible that one represents a replacement of the other.

[040] began on the line of [016] and headed in a S direction for a distance of 2.2 m. it consisted of nine stakes of mixed species (birch, alder and hazel) spaced between 0.2 and 0.3 m apart (Figure 22). Just before the S end of the stakeline a group of three worked oak timbers (SF 18 – 20), two plank-like and one triangular in cross-section, had been driven into the ground to form a very tight cluster (Figure 23). It might have functioned as a foundation for a gatepost at the end of the stakeline. Another stake-line [048] consisted of only three hazel stakes and lies parallel to, and some 0.7 m to the W of [040]. It started from the circuit of [028].

The function of these various stake-lines may have been to define an entrance into the house. A spread of small angular stones [008] (from which a grinder, SF10 and a flint flake, SF14 were retrieved) lay in an arc around the SW perimeter of the house, within the space between the two stake-lines [016] and [028] and extended off to the S, stake-line [040] forming a boundary along its W edge (Figure 13). However, the absence of an obvious break in the line of [016] at this point makes an entrance into the house less plausible, so the stone surface may have been an external yard. It appears to abut [003] along its northern edge but in the SE of the trench it appears to merge with [018], an organic-rich soil very similar to [003] but with less anthropic material and more mineral content (Figure 24). A fragment of daub (SF 12) and a small ceramic sherd (SF 13) were retrieved from this layer. [018] also lay over an extensive spread of charcoal, [029] which was up to 0.08 m deep in places and was concentrated at the junction between the stake-lines [016], [028] and [040]. It overlay the end of one of the radial timbers [009]. Both [018] and [029] lay directly on the surface of the natural peat [030] (Figure 24).

The sequence of deposits and structures seen to the SW of the hearth complex were not mirrored on its NE side. The radial timber framework is seen on both sides but there was no arc of stakes lying immediately beyond the end of the radial timbers. Instead, a cluster of five stakes [015] lay some 1.20 m from the ends of the radial structure in the NE end of T1B. They may well represent a continuation of stake-lines [016] and [040] but no pattern was apparent in the 1 m wide trench.

A scatter of small cobbles [023] lay around the edges of the radial timber framework and may be the equivalent of the stone surface [008] seen on the SW side of the structure (Figure 15). However, on the NE side both the radial timber framework, the overlying deposit, [011] and the cobble scatter ended very sharply and between their edge and the stakes [015] there was nothing over the surface of the natural peat [030] (Figures 5 & 15). Some 1.5 m from the edge formed by the timbers and cobbles was a very compact, fibrous organic deposit [013] seen only in the corner of T1B.

Finally, under the topsoil a mottled yellow-grey clay, [002] and [006], covered the site, up to 0.35 m on the slopes of the hearth complex but more commonly 0.1 – 0.12 m across the rest of the site (Figures 5, 7 & 14). An iron ploughshare tip, SF 03 and a flint flake, SF 04 were retrieved from [002], while another flint flake, SF 02 was retrieved from [006].

STRUCTURE 2

A small trench, 1 m x 0.5m, dug to extract a monolith sample of the uppermost sediments over the site, revealed evidence for Structure 2, the central mound of which lies some 17-18 m to the SE of Structure 1 (Figure 3). At a depth of *circa* 0.75 m anthropic deposits were encountered, including animal teeth (SF 22) and an oak stake which displayed the same concave base as the oak stakes in post-ring [021] within Structure 1 and was also lying next to the horizontal log it had probably slipped off.

THE 'PALISADE'

As described above the two oak timbers found in the run-off channel were assumed to form part of the 'stockade' or palisade that Maxwell had observed. However, no further investigation has as yet been carried out to determine whether there was indeed a timber perimeter around the site. Nonetheless, for ease of reference the two stakes are referred to below as the palisade stakes.

3 CHRONOLOGY

Analysis of charcoal samples throughout the hearth stratigraphy is ongoing so the two radiocarbon dates obtained after the 2010 assessment provide the initial chronological framework for the site. The radiocarbon date for the alder stake, subsequently identified as one of the posts in the post-ring, 021/B, was 770 – 410 cal BC (2470 ± 35 BP; SUERC 32597), thus providing a mid-1st millennium BC date for the construction of Structure 1. The radiocarbon date for the oak stake from the postulated palisade was 380 – 200 cal BC (2215 ± 30 BP; SUERC 32598), suggesting that it had been constructed at least several centuries after Structure 1. It was hoped that dendrochronological analysis of the oak timbers retrieved during the fieldwork would refine this basic chronology, while tree-ring analysis of the non-oak species would provide detailed chronological relationships between the structural components.

DENDROCHRONOLOGY *Anne Crone*

Only eight oak timbers were recovered. These include 021/C and 021/D, the two posts with concave bases, and SF 18 – 20, the group of three cleft stakes, in Structure 1, TP1, an oak post with concave base in Structure

2, and T8 and T9, the two palisade stakes recovered from the run-off channel. The dendrochronological data is summarised in Table 1.

The three cleft stakes, SF18 – 20 correlated well with each other (Table 2 & Figure 25A) and suggest that they had probably all been cleft from the same trunk. A sub-master, *F40oakx3*, 158 years long was constructed. The two palisade stakes, T8 and T9 also correlated well with each other (t = 6.2 – and see Figure 25B) and another sub-master, *PALx2*, 104 years long was constructed. The two sub-masters and the remaining individual sequences were compared against each other but no other correlations emerged. As the radiocarbon dates indicate that Structure 1 and the palisade were not contemporary, correlations between them were not anticipated but it is surprising that the two oak posts, 021/C and 021/D, did not match with each other.

The two sub-masters and the individual sequences were compared against a suite of prehistoric chronologies from Ireland, England and Scotland. *The only significant correlation was that between the site master from Cults Loch 3 crannog, CULTSx9 and F40oakx3 (t = 5.3) which dates the outermost surviving ring to 461 BC. This date was supported by only one other correlation, t = 4.03 with Sharragh, a single timber from the Irish Midlands (D Brown pers comm). As Cults Loch is the closest site to BLM it is likely that this correlation is correct but it must remain provisional until further corroboration is obtained. As sapwood was present it was possible to calculate a felling range of between 461 BC and 429 BC.*

TREE-RING STUDIES *Anne Crone*

Although they cannot be calendrically dated some non-oak species have the potential to provide chronological relationships between structural components within the site. For this purpose it is vital to know the felling year and so only those timbers which retained the bark edge were selected for analysis. This meant that many of the horizontal floor timbers and small stakes were not suitable because their outer rings were too decayed. However, even where fragments of bark were still present, analysis has shown that the outermost growth-rings behind the bark had often decayed and were difficult to distinguish. Alder, ash and hazel had all been used as structural components and were analysed. The surfaces of the samples were pared with razor blades and where there were bands of very narrow compressed rings, which often occurred at the very end of the sequence, particularly with the alder, thin-sections were also prepared and measured.

Alder

In all 28 samples of alder were measured (Table 3).

Post-ring [021]

The post-ring contained three alder posts, two of which, 021/A1 and 021/A3, have been inserted tightly against each other, with a large alder offcut, 021/A2, wedged between them. All the complete sequences are identical in length and all display a band of very narrow rings towards the end of the sequence. They all compare very strongly, both statistically (Table 4a) and visually (Figure 26), and a sub-chronology, *mn021x4*, 79 years in length was constructed.

Foundation logs [046]

Thirteen alder logs from this context were analysed. They varied greatly in length, from 47 yrs to 186 years and many had multiple bands of very narrow rings. Consequently there were few internal correlations. A group of five sequences compared well together statistically (Table 4b) and visually (Figure 26), and a sub-chronology, *mn46x5*, 107 years in length was constructed.

Hearth framework [041] and [042]
Three alder logs from this framework were analysed. They were roughly similar in age, 90, 100+ and 103 years but there were no correlations between them.

Floor timbers [009] & [047]
Only three of the radial floor timbers [009] and one of the tangential floor timbers [047] were suitable for tree-ring analysis. They varied in age from 49 yrs to 88 yrs. There were no correlations between them.

Stakelines [015], [016], [028] & [040]
Only four stakes, one from each stakeline, were suitable for analysis. They varied from 10 years to 32 years. There were no correlations between them.

Correlations between contexts
The two sub-chronologies *mn021x4* and *mn46x5* correlate well with each other visually and statistically ($t = 6.14$), as did many of their components (Table 5) and a sub-master ALDERx9 was constructed. The remaining individual sequences were compared against this sub-master and its components and another two sequences, 009/1 ($t = 5.21$) and 047/8 ($t = 5.56$) correlated well (Table 5). Consequently, these sequences were included in a sub-master, *ALDERx11*, 107 years in length. The chronological relationships indicated by this sub-master are illustrated in Figure 27, and they are discussed in detail below.

Ash

Of the four pieces of ash found in Structure 1 three were suitable for tree-ring analysis, 46/1, 22/1 and 22/2, with 56, 55 and 51 growth rings respectively. They all correlated well together both visually and statistically (Table 6 & Figure 28), indicating that they were all felled in the spring/summer of the same year.

[046] is the log foundation around the E side of the hearth and [022] are the radial timbers of the sub-floor structure on the E side of the hearth. The tree-ring results indicate that the radial sub-floor and the tangential log foundation were laid down at the same time.

Hazel

Of the 18 hazel stakes sampled only 10 were suitable for tree-ring analysis because they still retained their bark edge. The measured stakes varied in age from 13 to 45 years. There were no correlations between the measured sequences.

DISCUSSION

As the largest species group on the site the alder timbers held the greatest potential to provide chronological relationships between structural components, and 11 of the 28 measured sequences were incorporated into a site chronology. With the exception of the offcut 021/A2, all of the timbers in the alder sub-master retained the bark edge and the inter-relationships suggest felling dates spread over 9 years, from Rel Yr 99 to Rel Yr 107 (Figure 27). However, these felling dates do not make stratigraphical sense. They suggest that the foundation timbers were felled after the timbers used in the post-ring and the floor surfaces. They also suggest that the foundation timbers were felled over a 7-year period. Stockpiling could be invoked as an explanation for this spread of felling dates but it seems improbable that there would have been a need to stockpile timbers given the relatively small number of timbers involved in the construction of the round house (see Discussion).

All but two of the sequences have a band of extremely narrow rings just under the bark edge (Figure 26) and in some cases the growth-rings are no more than a cell wide. The outermost rings of all the sub-master components were subsequently thin-sectioned again and remeasured to check for errors but none could be observed. While most of these sequences always appeared to be measurable in thin-section the presence of a range of felling dates within what can only be a single episode of construction, ie the foundation layer, forces us to conclude that, either some of the trees have stopped laying down growth-rings or that the growth-rings have become too narrow to be visible. 46/2 and 46/15, the two sequences with larger, clearer and therefore more reliable, rings at the ends of the sequences, both end in Rel Yr 107, the outermost year of the sub-master, so this is probably the year in which all the components of the foundation were felled.

This conclusion undermines confidence in the other chronological relationships indicated within the sub-master. In the post-ring 021/A3 and 021/A1 had been jammed in tightly against each other so it is assumed that one post represents a replacement of the other, and the tree-ring analysis appears to confirm that interpretation. This suggests that 021/A3 and 021/B were felled 2 years later than 021/A1. The outermost years on the offcut, 021/A2, were not present but its significant correlation with 021/A3 (t = 10. 53) suggests that it probably came from preparation of the same log. This would also make sense in terms of wedging the offcut between the two posts when the replacement post was inserted. However, the fact that there could be at least 6 rings missing from some of the foundation timbers (the difference between the outermost ring on 46_13 and that on 46_15 – see Table 5), and that the post-ring timbers appear to have been felled several years earlier than the foundation timbers, means that we cannot place any reliance on the post-ring relationships either.

In the alder chronology floor surface [009] appears to be felled a year before the foundation timbers but the chronological relationships within the ash chronology (Figure 28), which has much clearer ring-sequences, indicate that foundation timbers [046] was laid down at the same time as flooring [022], the equivalent of [009] on the E side of the hearth complex. Again, this suggests that 009/1 is missing a growth-ring.

In conclusion, a consideration of the tree-ring results alongside the stratigraphic evidence suggests that there must be missing rings in the outermost growth of many of the sub-master components and that the chronological relationships could be adrift by at least 9 years, so can any useful information be drawn from the tree-ring analyses? Missing rings notwithstanding, it would be difficult to argue for multiple phases of construction spread over more than a decade; whilst we have to accept on stratigraphic grounds that there must be at least 8 growth rings missing from 047/8 for instance, it seems inherently unlikely that there could be as many as 20 or 30 growth rings missing without some visible indication on the stem. It is more credible that all phases of construction took place within a decade at most.

4 THE ECOFACT ASSEMBLAGES

MACROPLANT ANALYSES *Jackaline Robertson*

Methodology

All plant macrofossils were examined at magnifications of x10 and up to x100 where necessary to aid identification. Identifications were confirmed using modern reference material and seed atlases stored at AOC Edinburgh (Cappers *et al* 2006; Jacomet 2006). The waterlogged and charred macroplant assemblages are presented in Tables 7 and 8, respectively.

The charcoal assemblage is presented in Table 9. The recovery of charcoal from Scottish sites tends to be limited and this ultimately affects how far the evidence can be interpreted. The following criteria were used as a rough guide in interpreting the nature of the deposits. Those deposits which contained two or more wood species were typically designated as fuel waste, whereas larger concentrations of a single species were interpreted as more likely to represent the burning of a structural component or object.

The bone assemblage is presented in Table 10. The bone was identified to element and species with the aid of skeletal atlases (Hillson 1986; Schmid 1972) and the reference collection stored at AOC Archaeology Ltd (Edinburgh). Where an element could not be identified to species, it was instead described as large mammal (cattle/horse/deer), medium mammal (sheep/goat/pig), small mammal (dog/cat/rodent) or indeterminate. The assemblage was dominated by poorly preserved indeterminate burnt bone fragments so it was not possible to expand on the evidence other than by quantifying its presence by weight.

Summary

The waterlogged plant assemblage was small and preservation ranged from poor to good. The remains consisted of wild food taxa, woodland remains and weed taxa from a range of environments and habitats. The wild food remains were identified as hazelnut shell (*Corylus avellana* L.), raspberry (*Rubus ideaus* L.), blackberry/bramble (R. fruticosus agg) and strawberry (*Fragaria ananassa* L.). The plants derived from wooded landscapes were bracken (*Pteridium aquilinum* L.), birch (*Betula* sp), alder (*Alnus glutinosa*), leaves, bark fragments and bud scales. The weed taxa included a variety of nettles (*Urtica* sp), docks (*Polygonum* sp), sedge (*Carex* sp), rush (*Juncus* sp), buttercup (*Ranunculus* sp), goosefoot (*Chenopodium* sp), chickweed (*Stellaria* sp), orache (*Atriplex* sp), hemp nettle (*Galeopsis* Subgenus *Galeopsis),* Ragged robin (*Lychnis flos-cuculi* L), Cinquefoils (*Potentilla* sp), slender parsley piert (*Aphanes avensis L*), cabbage/mustard (*Brassica/sinapis* sp), wavy bittercress (*Cardamine flexuosa* L), violets/pansies (*Viola* sp), yellow water lilly (*Nuphar* sp), pigweed (*Amaranthus* sp) and finger grass (*Digitaria* sp) and plant stems which typically grow in waste ground, meadow land, cultivated fields and damp landscapes. While the weed taxa were generally scattered throughout the site, there was clear concentrations of materials such as the plant stems and wood chips within particular features.

The carbonized macroplant assemblage numbered 638 and preservation ranged from adequate to excellent with only a small number designated as poor. It was dominated by 302 cereal remains. The cereal remains included both caryopses and chaff fragments and these were dominantd by emmer (*Triticum dicoccum* L) (44%) and followed by smaller quantities of wheat (*Triticum* sp) (10%), bread/club wheat (*Triticum aestivum*-type) (8%), barley (*Hordeum* sp) (7%), emmer/spelt (*Triticum dicoccum/spelta* L*)* (6%), six row hulled barley (*Hordeum vulgare* L) (4%) and spelt (*Triticum spelta* L) (2%). The remaining cereal caryopses could not be identified further due to poor preservation. The charred cereal remains were concentrated in a floor deposit [018], a deposit of hearth debris cleared out from Hearth 2 [019], and hearth debris left *in situ* in Hearth 2 [025].

Other edible plant remains included 289 hazelnut shell fragments, six whole hazelnuts and 12 raspberry seeds. Other potentially useful plants were 17 fragments of charred bracken, two moss stems and one charred leaf. The remainder of the assemblage was made up of weed taxa. These were identified as two fat hen (*Chenopodium album* L), three sedge and two buttercup. A further two seeds could not be identified further. No charred macroplants were present in contexts [011], [027], [050] and [051].

The charcoal assemblage was dominated by alder (59%), but hazel (27%), oak (12%), birch (1%), apple/pear/hawthorn/quince (0.5%) and ash (0.5%) were also present (Figure 36). 25% of the charcoal assemblage consisted of roundwood fragments, the bulk of which were alder and hazel along with a single piece of ash. The charcoal assemblage is interpreted as hearth debris as there was typically more than three species present in most contexts mixed in with small fragments of roundwood and twig fragments.

The burnt bone assemblage was made up of 1904 bone fragments comprising 246.4 g. The species and the number of fragments identified were cattle (5), pig (6), L/M (143), M/M (175), S/M (1) and a further 1572 fragments could only be identified as indeterminate due to their poor condition and small size. With the exception of eight fragments the bulk of the assemblage had been modified by burning and of the burnt fragments, none exceeded 50 mm in size and most were smaller than 10 mm. The majority of the burnt fragments were completely calcified white but others had clearly been exposed to lower temperatures or burnt for a shorter period as these had evidence of black, grey and blue patches on their external surfaces. There was no evidence of surviving butchery or pathology on any of the bone fragments. The fragments identified as cattle were badly preserved molar fragments none of which were burnt and probably originated from a single tooth.

The ecofactual evidence is presented below by context.

Context [002] decayed occupation layer

Macroplant**:** The charred macroplant assemblage was small and consisted of one barley caryopsis, one emmer glume and an emmer/spelt caryopsis. The only other carbonised remains were seven fragments of hazelnut shell. The waterlogged remains included fragments of leaf and a few goosefoot seeds. The only other finds were a small quantity of charred peat and invasive modern roots.

Charcoal**:** A small quantity of charcoal (3.1g) was identified as hazel (40%), oak (40%) and alder (20%). Three of the hazel fragments were roundwood.

Bone**:** A single fragment of burnt bone weighing 0.08g was present but this could not be identified further due to poor preservation.

Synthesis**:** The material recovered from [002] is representative of domestic activities such as cooking waste and hearth cleaning. However given its close proximity to the topsoil the material has experienced some level of re-deposition and can offer little further information in understanding the development of this site.

Context [003] primary floor deposit

Macroplant**:** The carbonised macroplant assemblage was small but a large variety of cereal remains was present. These included a single six row barley caryopsis, five barley, two emmer, two spelt, four emmer/spelt, one bread/club wheat, two wheat and five cereal caryopses. Other charred food remains were eight hazelnut shell fragments and one whole shell. The waterlogged assemblage was significantly larger and the most frequent component was plant stems along with smaller numbers of birch seeds, leaves, goosefoot, fat hen, red orache, ragged robin and finger-grasses.

Charcoal**:** The charcoal assemblage was relatively large (39.2 g) and the species identified were alder (80%) and hazel (20%).

Bone: The bone assemblage weighed 3.5 g and all fragments were smaller than 50 mm, none of which could be identified.
Synthesis: The plant stems, leaves and finger-grass seeds probably represent floor coverings. The remaining weed taxa were probably accidental inclusions which grew alongside the material deliberately gathered for use as floor coverings. The charred food waste in the form of cereal, hazel and bone is probably trample from the hearth.

Context [004] Hearth 3 clearout
Macroplant: The waterlogged assemblage was small and the most common find was raspberry seed and trace amounts of weed taxa. The weed species were birch seeds, stinging nettle, pale persicaria, goosefoot, chickweed and sedge. The carbonised assemblage was just as small with one wheat, three cereal caryopses and six hazelnut shell fragments.
Charcoal: The charcoal assemblage was relatively large (45g) and the species were alder (60%) and hazel (40%). There were roundwood fragments in the hazel.
Bone: The bone (12.6g) was completely calcified and made up fragments mostly smaller than 10 mm. It was however possible to identify a long bone shaft belonging to a medium-sized mammal.
Synthesis: The charcoal was the largest component within this context and suggests that this deposit is hearth clearout. The small quantity of charred food remains present suggests that waste was regularly removed and not allowed to accumulate in large quantities.

Context [005] in situ hearth debris on Hearth 3
Macroplant: The waterlogged assemblage was small with only a few fragments of raspberry seeds, bark and moss. The carbonised assemblage was even smaller with two fragments of hazelnut shell.
Charcoal: The charcoal assemblage was just as small (1.6g) and the species were alder (60%) and hazel (40%).
Bone: The bone fragments (1.1g) were all smaller than 10 mm fragments and none could be identified further. The bone was not completely calcified with some only partially charred.
Synthesis: The mix of finds from this context represents hearth debris but the small quantities in which they were recovered suggest that Hearth 3 was regularly cleaned and the resulting debris was not allowed to accumulate. Instead this material was probably disposed of offsite. It is also likely that the hearth was not used for an extended period of time and this prevented a significant buildup of domestic debris from accumulating around the hearth.

Context [011] primary floor deposits
Macroplant: The waterlogged assemblage was relatively rich, with a large quantity of sedge nutlets. Normally it is difficult to distinguish between different sedge species, but in this instance the preservation was adequate enough to allow for identification to species with some confidence and *Carex flacca, Carex hirta* and *Carex curta* were all present. Seeds of toad rush and jointed rush were also present but in smaller quantities. There were also quantities of plant stems and peat-type material, and given the large numbers of sedge nutlets and rush seeds it is probable that the plant stems belong to these species. The remainder of the assemblage consisted of small quantities of birch, bracken, sheep's sorrel, fat hen, Cinquefoils, slender parsley piert, yellow water lilies, hemp nettle and moss. The only food remains were a small number of blackberry/bramble seeds. The only carbonised seed was a single buttercup achene.
Charcoal: No charcoal was recovered from this context.
Bone: No bone was recovered from this context.
Synthesis: The dominant components of this context were the plant stems, sedge nutlets and rush seeds and it seems most likely that this represents plant litter flooring laid over the logs [012]. The remaining weed taxa are plants which were either accidentally collected alongside the flooring material or were already

growing on the site and the floor was constructed on top of them. The only food remains were a small quantity of blackberry/bramble seeds. Indeed, the cleanliness of this flooring is surprising, with no evidence for hearth debris trampled into the surface.

Context [017A] & [017B] rubbish spills/dumps

Macroplant: The waterlogged assemblage from these two contexts was poor and the only finds were leaf fragments and sedge nutlets. The carbonised macroplant assemblage was just as small. In [017A] there was a rachis node identified as six row barley, a spelt glume, an emmer/spelt caryopsis, one cereal caryopsis, one glume and a fragment of hazelnut shell. The finds from [017B] were made up of weed taxa and these were a sedge nutlet, a fat hen and buttercup seed.

Charcoal: 13.2g of charcoal was recovered from [017A] and 51.6g from [017B]. The species present were alder (43%), hazel (37%) and oak (20%). Oak was only noted in [017B].

Bone: The only bone recovered was five burnt fragments from [017B]. These were all poorly preserved and none could be identified.

Synthesis: Both bulk samples were small and [017A] was 0.2g smaller than [017B] but this would not account for the significant difference in charcoal content. As they represent discrete deposits it is more likely that the difference in their content reflects different depositional events, quite likely spills of rubbish being carried from the hearth.

Context [018] primary floor deposits

Macroplant: This is one of three contexts in which the carbonised macroplant assemblage was concentrated. Hazelnut shell was the dominant foodstuff with 96 fragments and two whole shells. The cereal remains consisted of 51 caryopses and chaff fragments. Emmer was the dominant species (27%) followed by bread club wheat (8%) and six row barley (4%). Preservation of the remains prevented the rest from being fully identified, so these are described as wheat (31%), emmer/spelt (4%) and barley (2%) with the rest can only be identified as indeterminate cereal (24%). There was evidence that some of the bread/club wheat had begun to germinate. Other charred plant remains include eight fragments of bracken, a single sedge nutlet, fat hen and moss fragment. The waterlogged assemblage was also relatively large and consisted of edible plants, floor material and weed taxa. The food remains included hazelnut and raspberry seeds. The floor material and weed taxa were alder fruits, leaves, buds, fat hen, goosefoot, red orachee, orachee, finger-grasses, plant stems and moss. A small quantity of both peat and charred peat was also present.

Charcoal: There was a large quantity of charcoal (87.4g) within this deposit. The species composition was hazel (80%) and alder (20%). It was comprised mainly (80%) of large roundwood fragments 4 mm to 8 mm in diameter and twigs, most of which were hazel.

Bone: Although there was a relatively large quantity of burnt bone (22.4g) it was generally poorly preserved. However, it was possible to identify a foot bone from a medium sized mammal and a tooth fragment from a larger mammal.

Synthesis: The contents of this deposit confirm that it was a floor deposit, the floor covering represented by the grass, leaves and plant stems, rather than the sedges and rushes used in [011]. It was also a much dirtier floor surface than [011], on which food residues and fuel debris had been spilt and trampled in.

Context [019] Hearth 2 clearout

Macroplant: The waterlogged assemblage was small and the only food remains were raspberry seeds. The remaining taxa included infrequent finds of birch seeds, leaf fragments, fat hen, goosefoot, rush, finger-grasses, indeterminate seeds and moss. In contrast the carbonised assemblage was significantly richer and contained the largest number of cereal caryopses from BLM. A total of 140 cereal caryopses and chaff were identified as emmer, bread/club wheat and six row hulled barley. Emmer was the dominant species and accounted for 74%. Bread/club wheat made up 13%, six row barley 4%, wheat 2%, barley 1%, and a further 6% which were designated as cereal. The only other carbonised remains were seven raspberry seeds. There was a small quantity of burnt peat and a few fragments of charred dung.

Charcoal: A relatively small amount (17.8g) of charcoal was recovered from this deposit. Alder was the dominant species (80%) with fragments of ash (10%) and oak (10%). This was the only deposit to yield ash charcoal.

Bone: This deposit contained the largest concentration of bone (41.7g) from any feature on BLM. A single fragment was identified as a rib belonging to a medium sized mammal. The remainder of the bone was mostly smaller than 10 mm.

Synthesis: The large concentration of charred macroplants, charcoal and burnt bone represents clearout from the hearth. While the presence of chaff reflects processing nearby, it is also possible that it was kept for reuse as fuel, alongside the dung and peat. The charred raspberry seeds could be cooking refuse but they could also have been inclusions within the dung. The area around hearth 2 does not appear to have been kept as clean as the other hearths.

Context [020] in situ clay packing around Hearth 3

Macroplant: The waterlogged assemblage was small and consisted of raspberry, knotgrass and sedge. The carbonised remains were equally sparse with three barley, one emmer, and six cereal caryopses and chaff fragments. There were also 13 carbonised hazelnut shell fragments.

Charcoal: The charcoal assemblage was small (3.8g) and the species were alder (45%), hazel (45%) and oak (10%).

Bone: The quantity of bone was small (1.9g) and all but two of these fragments were smaller than 10 mm. None of these fragments could be identified and all were completely calcified.

Synthesis: The finds from this deposit were all small and derived from hearth clearouts. The material may have become accidentally incorporated into the packing around the hearth.

Context [025] in situ hearth debris

Macroplant: The waterlogged assemblage was split into two distinctive categories. The major component was wild food resources including a large quantity of hazelnut shell and a much smaller number of raspberry seeds. The weed taxa were rarer finds in comparison and were restricted to background traces of leaf fragments, buds, annual nettle, sedge and moss. The carbonised assemblage is composed in a similar way to the waterlogged finds. The largest component was 114 hazelnut shells and whole shells. This deposit contained the greatest concentration of both waterlogged and carbonised hazelnut shell found at BLM. The carbonised cereal remains were varied with three emmer, two barley, one emmer/spelt and one cereal. The only other carbonised food remains were five raspberry seeds. Other carbonised finds were a single leaf fragment, a small quantity of peat and a small fragment of dung.

Charcoal: The charcoal assemblage was relatively small (14 g) and the species present were alder (60%), apple/pear/hawthorn/quince (10%), birch (10%), hazel (10%) and oak (10%).

Bone: A relatively large assemblage of burnt bone (29.2g) was present but only one of these fragments could be tentatively identified as a long bone fragment belonging to a medium sized mammal. The remainder of the fragments were mostly smaller than 10 mm and all were completely calcified.

Synthesis: This deposit represents the last use of Hearth 2 and the contents primarily reflect the type of fuel being used together with a small about of cooking debris. The large concentration of hazelnut shell was probably first used as a food source with the shell later being reused as kindling. The charred raspberry seeds could represent cooking waste but they could also have been inclusions within the dung which appears to have been used as a fuel.

Context [027] dislodged packing around Hearth 2

***Macroplant*:** The waterlogged macroplants from this deposit were rare and consisted of a few raspberry seeds, a few leaf fragments, chickweed and moss stems. There were no carbonised plant remains.

***Charcoal*:** The charcoal assemblage was small (1.3g) and comprised entirely of oak.

***Bone*:** No bone was present within this deposit.

***Synthesis*:** The finds from this deposit were few and of little interpretive value. This suggests that little hearth debris had been trampling into the packing on this side of the hearth.

Context [029] charcoal-rich deposit

***Macroplant*:** Both the waterlogged and carbonised plant remains were small and consisted of food remains and weed taxa. The waterlogged food remains consisted of small quantities of hazelnut shell and raspberry seeds. The weed taxa species were more varied but again these were only present in background traces. These included black bindweed, sheep's sorrel, fat hen, goosefoot, red orache, orache, ragged robin, hemp nettle, rush, sedge, as well as leaves and plant stems. The carbonised assemblage was equally small with a total of 18 remains. The cereal were one six row barley caryopsis, one barley, one emmer glume, one spelt caryopsis, two cereal caryopses and two hazelnut shell fragments. Although the cereal finds were small the species were still varied as six row hulled barley, barley, emmer and spelt were all present. The remainder of the finds were made up of nine fragments of bracken and one indeterminate seed.

***Charcoal*:** This deposit contained 403.5g of charcoal, the largest concentration of charcoal found at BLM. The species were hazel (80%), alder (10%) and oak (10%) and sizeable pieces of roundwood, 4 mm to 8 mm in diameter were present.

***Bone*:** Only eight fragments of bone (1.2g) were recovered, of which seven were completely calcified and all were smaller than 10 mm. The unburnt fragment was identified as a rodent vertebra which may be a modern intrusion.

***Synthesis*:** There are only trace amounts of food debris in this deposit which suggests that hearth debris is probably an incidental component. The composition of the charcoal, dominated by hazel and pieces of roundwood is reminiscent of a structural component, such as a withy screen, which has burnt down. The charred bracken might have been part of this construction.

Context [32] buildup of deposits under Hearth 2

***Macroplant*:** The small waterlogged assemblage fell into two categories, wild food resources and weed taxa. The food remains were hazelnut shell, raspberry and wild strawberry, the only occurrence of this species on the site. The weed taxa was made up of small numbers of birch seeds, leaf fragments, stinging nettles, rush, finger-grasses, wavy watercress and moss. The small carbonised assemblage consisted entirely of food remains. The cereal species included one emmer, one spelt, three wheat, one six row hulled barley, three barley and two cereal, and there were 29 hazelnut shell fragments including one whole shell.

***Charcoal*:** The charcoal assemblage from this deposit was relatively large (45.3g) and consisted primarily of alder (90%) with some oak (10%).

***Bone*:** This was the second largest bone assemblage on site (38.4g) from a single deposit and it was possible to identify a pig canine. There were also two ribs and a metapodial all deriving from a medium sized mammal. The remainder of the assemblage was dominated by fragments smaller than 10 mm. While most of these were completely calcified a small proportion had only been partially charred.

***Synthesis*:** The large concentration of charcoal and burnt bone together with small amounts of macroplant remains probably represents hearth debris which has trickled down from the hearth and accumulated in the vacuous rubble mound.

Context [033] clay packing around Hearth 3

Macroplant: The waterlogged assemblage was small and the wild food remains consisted of hazelnut shell and raspberry. The largest component was leaf fragments which were relatively abundant. The remaining woodland taxa were present in much smaller numbers and these were bracken and birch, as well as fragments of bark. The weed taxa were restricted to two species of sedge and finger-grasses. The carbonised assemblage was small and consisted entirely of food remains. Although only 23 cereal caryopses and chaff were recovered the species diversity was large with one six row hulled barley, one barley, two emmer, one spelt, eight emmer/spelt, three wheat and seven cereal. The only other finds were three hazelnut shell fragments.
Charcoal: A relatively large charcoal assemblage (49.2g) was identified as alder (60%), hazel (35%) and oak (5%) with some roundwood fragments amongst the alder and hazel.
Bone: The bone assemblage was small (3.8g) and none of the fragments could be identified. The majority of the fragments were smaller than 10 mm and all were completely calcified.
Synthesis: This assemblage represents food and fuel debris which has probably become incorporated in the packing during use of the hearth.

Context [035] hearth clearout associated with Hearth 3
Macroplant: Both the waterlogged and carbonised macroplant assemblage from this context was small and relatively insignificant. The waterlogged remains consisted of raspberry seeds and some bracken fronds. The charred food remains were identified as one bread/club wheat, one emmer, one emmer/spelt, four cereal and eight hazelnut shell fragments.
Charcoal: The charcoal assemblage from this feature was the second largest recovered from site with 110.8g consisting of alder (75%), oak (10%), hazel (10%) and birch (5%). Alder and hazel roundwood fragments were noted.
Bone: 30.8 g of bone was recovered and all fragments had been burnt. It was possible to identify one tibia and rib from a medium-sized mammal.
Synthesis: This assemblage is consistent with the interpretation of the context as hearth clearout.

Context [036] buildup of deposits under Hearth 1
Macroplant: The waterlogged plant remains consisted of small quantities of hazelnut shell, raspberry, birch seeds, leaf fragments, buds, finger-grasses, plant stems and moss. The small charred macroplant assemblage consisted of only two cereal caryopses and two hazelnut shells.
Charcoal: The charcoal assemblage was relatively small at 11.1g. The species identified were alder (90%) and hazel (10%). There was a single fragment of alder roundwood.
Bone: The bone assemblage was large (24.3g) and the following elements were identified as pig; a tooth fragment, metapodial and second phalanx. There was also a medium sized rib. The phalanx belonged to a pig younger than one year at time of death. It was not possible to ascertain any other aging or sexing information from this material.
Synthesis: The environmental remains from this deposit represent hearth clear outs in the form of domestic cooking waste and fuel debris. These remains probably represent accidental spillage which was allowed to accumulate on the floor before being trampled into the cobbled floor surface.
This context has a similar composition to that in [033] and like that deposit probably represents hearth debris which has trickled down from the hearth and accumulated in the vacuous rubble mound.

Context [037] dislodged packing around Hearth 2
Macroplant: The waterlogged assemblage was minimal and consisted of a few raspberry and goosefoot seeds. The carbonised remains consisted of cereal caryopses identified as three barley, one emmer/spelt, one wheat, three cereal caryopses, together with one hazelnut shell.

Charcoal: In comparison to the macroplant assemblage the charcoal remains were significantly richer in terms of quantity (29.8g). The species were alder (70%) and hazel (30%).
Bone: This deposit contained only trace amounts of burnt bone (0.05g) on site. All of the fragments were smaller than 10 mm and completely calcified.
Synthesis: The finds from this context were dominantd by charcoal with the plant remains and bone being only a minor component. This material has originated from hearth clear outs. The composition of this deposit is similar to that in [027]. Again it suggests that little hearth debris had been trampling into the packing on this side of the hearth.

Context [044] Hearth 1 base
Macroplant: The waterlogged assemblage consisted of a few leaf and moss fragments. The charred assemblage was equally small with one six row hulled barley caryopses and two emmer chaff fragments present. The weed taxa comprised a single sedge nutlet, moss stem and an indeterminate seed. The most common find within this deposit was a large concentration of burnt peat.
Charcoal: A large quantity of charcoal (45.5g) was identified as alder (80%) and hazel (20%) and roundwood fragments of both species were present.
Bone: The bone assemblage was relatively large (26.2g) and a pig canine, four ribs and one phalanx all belonging to a medium sized mammal were identified. The remainder of these fragments were mostly smaller than 10 mm and completely calcified.
Synthesis: The assemblage represents hearth debris which has probably been compressed into the clay hearth base during use.

Context [050] foundation deposit
Macroplant*:* The assemblage consisted of discrete layers of stems which are probably sedge as they were intermixed with sedge nutlets, together with bracken and a smaller number of leaves and buds. These stems appear to have been deliberately placed on top of plants such as fat hen and red orache which were probably already growing in the vicinity. There was also a single example of a pigweed fruit.
Charcoal: Only a small amount of charcoal (0.5 g) was found and all fragments were alder.

Bone: No bone was recovered from this context.
Synthesis: The layers of plant stems in [050] appear to be a deliberate attempt to create a damp proof surface prior to building the house. The absence of any domestic debris suggests that these layers were laid down and the house rapidly constructed over them, otherwise debris would have been trampled in over time.

Context [051] foundation deposit
Macroplant: Like [050] this deposit also contained large concentrations of bracken, leaves, buds, fat hen, red orache and a single pigweed but there were noticeable differences. Sedge stems and sedge nutlets were only a minor inclusion within [051] in contrast to [050] whereas [051] contained a large quantity of worked wood offcuts (see *Wood use*) which were mostly absent in [050]. The only food remains in [051] were a few fragments of hazelnut shell.
Charcoal: The charcoal assemblage from [051] was relatively rich [39.2g] and all were identified as alder.
Bone: The only bone recovered from the foundation deposits were two small burnt fragments (1 g) from a medium sized mammal.
Synthesis: The large concentration of bracken was probably to provide a temporary working surface and the difference in content between [050] and [051] is suggestive of bundles of different materials being dumped rapidly over the area. Wood may have been prepared on the surface, hence the offcuts, or they may have

been deliberately laid down as part of the surface. The leaves and buds were probably intrusive material that was stripped from the timber during its preparation.

The weed taxa are intrusive species found in a range of waste ground, woodland and damp habits which could easily have been transported along with the wood or were already growing directly on the site or nearby.

DISCUSSION

Taphonomy

The plant material recovered from BLM can be divided into two recognizable and distinct groups. The first includes those which were introduced as by-products of domestic activities such as food processing, cooking and cleaning, as inclusions within both human and animal fecal matter, and as building material. The second group typically derives from accidental inclusions of plants growing in the near vicinity which were either blown or trampled into archaeological features or were unintentionally brought in with other materials (Jacomet 2012, 498). The recovery of the macroplant assemblage is further influenced by the type of treatment, ie any foodstuffs exposed to heat as part of their pre-treatment and cooking regime such as cereals and hazelnut shells will survive whereas soft fruits, vegetables and leafy edible plants are either not deliberately exposed to heat prior to consumption or tend not survive the cooking process (Bishop *et al* 2009, 79; Jacomet 2012, 500). The plant assemblage at BLM is small but the presence of both waterlogged and charred remains provides a more detailed understanding of plant exploitation on the site. Charred food remains were recovered in larger numbers than waterlogged food remains; it is possible that cereals and hazelnuts may have had a more important dietary role but it could simply reflect the bias introduced by different cooking regimes and differential preservation.

The waterlogged macroplant assemblage is small in both species diversity and quantity and preservation ranged from poor to good. Poor preservation was probably due to proximity to the ground surface, invasive roots, insect activity and changing anaerobic conditions. However, while the small size of the waterlogged assemblage is partly a result of poor preservation conditions, it may also reflect how quickly this site was built up and subsequently abandoned because rapid build-up and short duration of use would limit the opportunity for plants to embed themselves securely within the deposits. Not surprisingly, the foundation deposits displayed good preservation because they were well below the water table, but contained little evidence of domestic debris suggesting rapid formation. The floor deposits were more poorly preserved because they were closer to the ground surface and also contained relatively small assemblages, perhaps also indicative of rapid formation and short duration.

Cereal remains

The edible plant remains were dominated by charred cereal caryopses of six row barley and wheat, including emmer, spelt and bread/club wheat. A large number of chaff fragments from all the cultivated species were recovered alongside the caryopses. This suggests that cereal was transported to BLM while still attached to the ear for storage and processed directly on the site. This also suggests that the inhabitants of this site were cultivating their own food. The cereal chaff fragments could be representative of material used for thatching, but no straw nodes were observed so it is more likely this material is processing waste. The large amount of cereal chaff associated with the hearth features probably represents the use of this material as a kindling fuel whereas the cereal caryopses are cooking waste.

Although the cereal assemblage is relatively small and concentrated within specific contexts it still remains possible to draw some conclusions concerning the economy, diet and status of the occupants. Consumption of cereals was varied with emmer, barley, spelt and bread club wheat all eaten. Emmer appears to have been the most economically important cereal followed by barley. The smaller quantities of spelt and bread/club wheat indicate that these two species were a more minor component of the agricultural economy at BLM. This conclusion is supported by the evidence from other sites in Scotland which have demonstrated that emmer and or barley where usually the favored species.

In general hulled six row barley is the dominant cereal crop found on most Iron Age sites with emmer as a minor component (Boardman 1994, 270). This was certainly the case at the Iron Age settlement at Carronbridge (ibid) but amongst the few other contemporary sites which have been excavated in SW Scotland and which have produced macroplant assemblages, the picture is more varied. Barley was the only cereal present in the Iron Age enclosure at Woodend Farm, Johnstonbridge (Alldritt 2000, 250), but at the enclosure at Uppercleuch, Annandale the most abundant cereal remains were emmer with only small amounts of barley (Terry 1993, 66). At Rispain Camp bread wheat appears to have been more abundant than barley in some pre-Roman Iron Age contexts (Haggarty & Haggarty 1983, 37, 39). The cereal assemblages recovered from the crannogs at Dormans Island and Cults Loch 3 are relatively small but in terms of species variety they are very similar to BLM (Cavers *et al* 2011, 87-8; Robertson forthcoming). Wheat, particularly emmer was the dominant species alongside smaller quantities of spelt and bread/club wheat. Barley was also recovered in small numbers from all three sites and the only noticeable difference was the presence of two row barley (*Hordeum distichon* L) at Cults Loch 3 which was absent at both BLM and Dormans Island. The absence of two row barley at BLM may be due to poor preservation which often prevented detailed species identification.

Until recently spelt and bread/club wheat have been interpreted as exotics in Scotland, indicative of trading links with communities further south and therefore reflecting on the status of the inhabitants (Alldritt 2000, 40; Miller 2002, 43). This may still be the case further north in Scotland but in SW Scotland this interpretation needs revision in the light of the evidence emerging from the wetland sites of the region.

As well as the unquantified assemblage from Rispain Camp (Haggarty & Haggarty 1983, 37, 39) and the single grain from Fox Plantation, near Luce Bay (Alldritt 2000, 40) bread/club wheat has now been found at the wetland site Dorman's Island (Cavers *et al* 2011, 87) and on all the sites excavated around Cults Loch, including the crannog (Cults Loch 3), the promontory fort (Cults Loch 4) and the palisaded enclosure (Cults Loch 5) (Robertson forthcoming). Spelt has also been found on all these recently-excavated sites. The quantities recovered are admittedly small but their presence on all sites suggests that these cereals were perhaps more widely cultivated than previously thought.

The composition of the cereal assemblages on these sites closely resembles those of similar date in northern England. Barley was the most commonly cultivated cereal during the Iron Age, with smaller quantities of emmer and spelt also consumed (Huntley 2002, 85). Analysis by Van der Veen (1992) suggests that by about 300 BC spelt had replaced emmer as the principal wheat crop on sites lying south of the Tyne while north of the Tyne emmer continued in use (ibid 77). In the absence of environmental distinctions between the two areas Van der Veen concluded that the observed differences in crop husbandry pointed to socio-economic and/or cultural factors (ibid 159).

Trace amounts of bread/club wheat were also present. Van der Veen (1992, 77) suggested that bread/club wheat was introduced towards the end of the 1st millennium BC. When she wrote there was a single find of the species from a roundhouse at Rock Castle, N Yorks with two dates on the grains themselves. A tentative identification of bread/club wheat was also made at Scotch Corner, N Yorks, a roundhouse site similar in date and nature to Rock Castle (Huntley & Stallibrass 2002, 40). While acknowledging that bread/club wheat could still represent a weed Huntley & Stallibrass (1995, 41) suggest that its early appearance in this region might also represent cultural innovation. Bread/club wheat grains were also tentatively identified at the early Iron Age enclosure at Sutton Common, S Yorks (Boardman & Charles 1997, 248). Here, the recovery of both wheat and barley has led to the site being described as a mixed economy reliant on a variety of cereal species (ibid, 249). This suggests that bread/club wheat was deliberately cultivated on a small scale rather than representing an agricultural contaminant.

The southern Scottish assemblages could be viewed in the same way. Soils and climate may have been suitable for the cultivation of spelt and bread/club wheat on a small scale, and their appearance as a minor crop may reflect regional variation based on cultural choice rather than imported exotics.

Wild food resources

The inhabitants of BLM also exploited seasonal wild food resources such as hazelnuts, raspberry, blackberry and wild strawberry.

Hazelnut shells are among the most common finds from Iron Age sites due in part to their easy availability, their high nutritional content and the ability of the shell to survive within the archaeological record even in the poorest environmental conditions (Johnston *et al* 2007). At BLM both waterlogged and charred hazelnut shells were concentrated in floor layers and hearth deposits. They may have been thrown on the hearth to burn the debris but they could also have been used as kindling.

Evidence of fruit was recovered in the form of raspberry, blackberry and wild strawberry seeds. The blackberry and wild strawberry seeds were preserved entirely through waterlogging whereas the raspberry seeds were found in both a waterlogged and charred condition. On other wetland sites the presence of fruit seeds has been taken to suggest the dumping of cess waste (Johnston & Reilly 2007, 56) but there was no other evidence of fecal matter in any of these deposits, and the contexts in which they were found, hearth debris and domestic floor surfaces, make it more likely that they do indeed represent food waste. The charred raspberry seeds could be an indicator that some fruits were cooked prior to being eaten or alternatively that dung was being dried and used as a fuel substitute within Hearth 2 (see below).

Building materials

The foundation deposits [50] and [51] were built up of recognizable plant components such as bracken fronds and stems, rush seeds and capsules, sedge nutlets and grass caryopses. There were also large quantities of herbaceous plant stems which were not identifiable to species but because of the quantities of identifiable rush and sedge remains it is assumed that these stems were of a similar species. Distinct layers of these plant stems were clearly recognizable in [50]. Sedge and rush have traditionally been used to line floor surfaces, especially when bracken was unavailable or difficult to source during the winter (Johnston *et al* 2007). This certainly appears to have been the case at BLM where large bundles of plant material in the form of sedge, rush and bracken appear to have been gathered up and used to rapidly construct a waterproof laminated foundation deposit on which to begin the initial construction. The presence of large quantities of weed taxa such as goosefoot and red orache could represent plants deliberately or accidentally collected alongside those plants used for forming the floor layers. More likely these species were simply growing in the vicinity prior to construction and the foundation deposits were simply layered on top. Context [51] also contained a large quantity of wood offcuts (see *Wood use*); these may have been accidentally incorporated during construction but their absence from [50] suggests that they were a dump of woodworking debris deliberately thrown down as part of the foundation deposits. Selective disposal of material such as the woodworking debris suggests that different parts of the site were used exclusively for specific activities.

At Cults Loch 3 the floor deposits were characterized by highly compressed layers of plant remains with the major components formed by rush, sedge, grass, leaves, bracken and herbaceous stems (Robertson forthcoming) but at BLM the evidence for this type of floor covering is more ambiguous. The two contexts which had significant quantities of plant stems were [003] and [011], but in only [011] are there identifiable fragments of rush and sedge. The bracken at BLM would have had to be brought onto the site, either accidentally or deliberately, whereas the rushes and sedge would have grown around the damp silty margins of the site. It is therefore feasible that the trace amounts of rush and sedge present could have been blown or trampled into the deposits and may not reflect the use of these species as a deliberate floor lining. The leaves which do occur in quantities in some of the deposits around the hearths may represent the remains of old floor coverings.

Aside from issues of preservation, the floor layers at BLM may not be as distinctive as those reported at Cults Loch 3 because they were not treated in the same way by the inhabitants of the house. The charred remains of sedge and bracken were rarely found and were often only present in trace amounts, suggesting that dirty floor coverings were not regularly disposed of by burning, as they were at Cults Loch 3 crannog (Robertson forthcoming). It is also possible that the house was not used a long enough period to warrant repeated replacement of floor material, so there was no gradual buildup of floor surfaces. Furthermore, while BLM is a wetland site it did not face the same conditions as on a crannog which has to be continually built up to remain above water.

Small quantities of charred moss were present in two samples but there is no evidence to suggest it was burnt deliberately, and it was probably an accidental inclusion attached to the timber and turves brought onto the site. Certain species of moss can be used for making rope, toilet paper, antiseptic bandages, packaging and fuel (McMullen 2000) but there is no evidence at BLM to suggest that any of the mosses had been used in such a way.

Fuel

The charcoal assemblage is mainly representative of fuel debris except for [029] which may represent an instance of structural burning. In most instances alder was the dominant species followed by smaller quantities of hazel, oak, birch, ash and apple/pear/hawthorn/quince.

Small quantities of burnt peat were recovered from many deposits which were identified as hearth clear outs. This suggests that peat was deliberately collected for use as fuel, probably in the form of turves. In contexts [019] and [025] there were also small fragments of what was tentatively identified as charred dung but it was not possible to determine if it was human or animal in origin. The charred raspberries may have been inclusions within the dung.

The weed assemblage

The charred weed assemblage was limited to trace amounts in only two contexts and while the waterlogged weed assemblage was more extensive it was still relatively small in both quantity and diversity. Waterlogged weed taxa were recovered from most deposits and were spread throughout the site with no obvious concentrations suggestive of deliberate disposal. The weed taxa are typically associated with agricultural land, disturbed/waste ground and damp/moor/heathland habitats. The presence of weed taxa such as nettles and docks suggests that part of the site was probably overgrown and nitrogen rich during the construction and use of these structures. The small size of the assemblage may be due to a combination of preservation and the rapid build up of archaeological deposits. Most weed taxa were probably simply trampled into the floor surfaces during occupation especially if they were growing on site, or were brought in as accidental inclusions with bundles of plant matter intended for flooring material. The few charred weed seeds were probably burnt as accidental inclusions of cereal crops.

The leaves and seeds of some of the weed taxa such as goosefoot, chickweed and cabbage/mustard are edible and have been deliberately gathered to supplement both human and animal diets, especially during times of food shortages (Johnston *et al* 2007). However, there was no evidence to suggest that it had been deliberately collected at BLM and it is more likely these were accidental agricultural containments of the cereal or were simply plants growing in the vicinity of the site.

Conclusion

The macroplant, charcoal and animal bone assemblages from BLM have derived from domestic activates such as food processing, cooking and cleaning. The range of cereal species coupled with the presence of chaff is proof that the inhabitants of this site were producing their own food. The presence of emmer, spelt and bread club wheat also suggests they had access to a range of landscapes suitable for the cultivation of different cereal species even on a small scale. They were also able to exploit a range of environments from those surrounding the loch, to woodlands and heathland. The small size of the plant assemblage may be a reflection of poor taphonomic conditions but it is just as likely that these structures and hearths were constructed rapidly and cleaned regularly. This would prevent a buildup of both domestic waste and weed taxa. The fact that more material was recovered from Hearth 2 than from Hearths 1 and 3 is probably due to the damage to the formers structure which allowed material to escape which was subsequently trampled into the surrounding surface. The deliberate use of cereal chaff, hazelnut shell and possible dung as a fuel material is indicative of a society that is prepared to recycle all available resources. The ecofact assemblages recovered from BLM demonstrate that this was a domestic site which underwent rapid construction and was subsequently kept clean and ordered before being abandoned.

INSECT REMAINS *Enid Allison*

Four sub-samples in which insect remains had been observed during the bulk sample processing were submitted for full analysis.

Methods

Sub-samples with volumes of 4 litres were wet-sieved by AOC Archaeology. Flots and retents were recovered on 0.25mm mesh and submitted to the author. Paraffin flotation to extract insect remains was carried out following the methods described by Kenward *et al* (1980) with recovery on 0.3mm mesh. The sample from context [051] contained large amounts of waterlogged plant matter and was also rich in insect remains, so only half of the received material was subjected to paraffin flotation.

Following a rapid assessment, two samples were selected for detailed analysis. For this, beetle (Coleoptera) and bug (Hemiptera) sclerites were removed from the paraffin flot onto moist filter paper for identification using a low-power stereoscopic zoom microscope (x10 – x45). Identification was by comparison with modern insect material and reference to standard published works. Numbers of individuals and taxa of beetles and bugs were recorded, and taxa were divided into broad ecological groups for interpretation following Kenward *et al*. (1986) and Kenward (1997) (see Table 11 for groups used). Aquatics were subtracted from the rest of the assemblage to calculate percentages for the terrestrial fauna. For one sample that had a large decomposer component, the diversity (species richness) of the group was measured using the index of diversity (alpha) of Fisher *et al*. (1943). It was not possible to calculate alpha for the second sample since there were fewer than 20 decomposers. Values of alpha (α RT) and the associated standard error (SE) were calculated using a purpose-written Pascal program originally created at the University of York in 1992 by Harry Kenward and subsequently adapted to run on a personal computer by John Carrott.

The two remaining paraffin flots were scanned (x10 – x45) in industrial methylated spirits (IMS) and roughly quantified. Some beetle and bug sclerites were picked out for closer identification to enhance interpretation. The abundance of other groups of invertebrates in all the flots was recorded on a three point scale as present, common or abundant. Nomenclature follows Duff (2012) for Coleoptera. The paraffin flots are currently stored in IMS.

Notes on identification

Carpelimus bilineatus agg.: *C. bilineatus* has regularly been identified as one of the commoner beetle taxa occurring among occupation waste on archaeological sites. A closely similar species *C. erichsoni* has recently been distinguished on male genitalia and it appears that the two species have long been confused (Lott 2009). Which of them archaeological records encompass is therefore open to question. Specimens referable to the species pair were common in one sample and for brevity and continuity with existing archaeological records these are referred to in the main text as *C. bilineatus* agg..

Use of compound taxa eg *Anotylus sculpturatus* group, *Latridius minutus* group, *Phyllotreta nemorum* group: such groups have been used where distinguishing the various species within particular genera is difficult without the presence of genitalia, and the ecological implications are very similar.

The insect assemblages

Concentrations of beetles and bug remains varied considerably between the four samples (6 - 170 individuals per litre of sediment). The state of preservation varied both between and within individual samples. The best-preserved and largest assemblage came from the lowermost of the four deposits [051]. The most poorly preserved sclerites in some samples could not be closely identified.

The assemblages recovered are described below beginning with the earliest deposit. Host plants of strongly plant-associated beetles and bugs are shown in Table 12. The main statistics for the assemblages from contexts [051] and [011] are shown in Table 13, and details of all taxa recorded from individual samples in Table 14.

Context [011] primary floor deposits

Insect remains were common (120 beetles and bugs of 74 taxa) but they were sparsely represented relative to the large amounts of fine plant material. Almost a third of the beetle and bug assemblage were aquatic suggesting either that the deposit was waterlain or that aquatic sediments may have been used for building up the mound. Statoblasts of two species of crystal moss animals (Bryozoa) were present, those of *Cristatella mucedo* being the more common. Terrestrial insects were dominated by taxa from natural habitats, a quarter of them from damp or waterside habitats. The relative abundance of water beetles and *Cyphon* species was indicative of a wet well-vegetated habitat with shallow pools of standing water. There were indications from beetles such as the small rove beetle *Euaesthetus ruficapillus* that conditions in the mire were permanently wet. There would have been mud in places: the water beetle *Laccobius bipunctatus* is found in muddy shallow water, and *Dryops* in wet waterside mud. In contrast to this the riffle beetle *Oulimnius*, found predominantly in running waters or stony lake shores (Holland 1972), is suggestive of an influx or nearby presence of well-oxygenated, clear, silt-free water. The weevil *Limnobaris* feeds on sedges (*Carex*) which plant macrofossils analysis suggests were collected deliberately for use within the building (Robertson *infra*).

Scarabaeoid dung beetles were very well represented, accounting for 13% of the terrestrial fauna. Most of their remains were in too fragmentary a state for confident identification but they did include at least three *Aphodius rufipes* which is associated with dung of large herbivores (Jessop 1986, 20). Such a high proportion is indicative of the presence of domestic animals close to the site. There was no evidence of foul decomposers that are characteristic of dung and open-textured litter within buildings where animals are kept.

The number of synanthropic decomposers was low (4%) and there were only very slight hints of possible human occupation or activity. A single individual of *Latridius minutus* group in isolation could just as well have come from natural habitats such as grass tussocks as from occupation material, but several sclerites of a saw-toothed grain beetle (*Oryzaephilus surinamensis*) were perhaps more convincingly a remnant of material relating to human activity.

Context [032] Buildup of deposits under Hearth 2

A small insect assemblage of an estimated 25 individuals was scan-recorded. Preservation of most remains was moderate, but some fragments (mainly of *Cercyon*) were more poorly preserved being pale and considerably eroded. These could conceivably be a remnant from an occupation deposit but they could not be closely identified. In contrast, several sclerites from a single *Nebria brevicollis,* a common eurytopic ground beetle, were complete and excellently preserved, possibly suggesting a more recent origin than the rest of the assemblage. *Cyphon* was the most common taxon and together with *Dryops* is indicative of marshland with shallow pools and wet waterside mud. The only water beetle noted was a single hydroporine.

Context [036] buildup of deposits under Hearth 1

An estimated 40 beetles and bugs, a few mites and an anal sclerite of a fly (Diptera) puparium were recorded by scanning. The remains were variably preserved (good to very poor), but the majority of sclerites/fragments showed some degree of erosion. *Cercyon* remains were particularly badly affected with much loss of colour and surface texture: some were *C. analis* but the rest could not be confidently identified. It is possible that the very poorly preserved material, mainly of decomposers, had originated within an occupation deposit, but all of those identified were generalists associated with many forms of decomposing plant litter rather than being characteristic of occupation material within buildings.

The most common taxon was *Cyphon* found in well-vegetated marshy areas with shallow pools of standing water, perhaps indicating encroachment of the building by marshland. An alternative might be that they were introduced with rushes or reeds used as floor litter in the building but their relatively good condition in comparison to the decomposers in the assemblage suggests that this may be less likely, and there were only traces of such plant remains in this deposit (Robertson *infra*). A single water beetle (Hydroporinae) was noted.

Context [051] foundation deposit

Due to its size, half of the original sample flot was paraffined and a minimum of 340 beetles and bugs of 117 taxa were recovered. Fragmentation was relatively low and preservation was generally good, although some sclerites had become softened to some degree.

The assemblage was dominated by decomposers (64% of terrestrial taxa) but diversity was rather low (αRT = 11, SE = 1). Many within this group are regarded as synanthropic (favoured to varying degrees by the presence and activities of man). Most significantly a sizeable group consisting of *Latridius minutus* group, ?*Enicmus*, *Atomaria*, and several *Cryptophagus* species was characteristic of relatively dry mouldering plant litter within ancient buildings (Carrott and Kenward 2001; Hall and Kenward 1990; Kenward and Hall 1995). The size of this component (18% of the terrestrial fauna) strongly suggests that this either an occupation deposit, or that the foundation for Structure 1 incorporated dumped litter from another building. The bulk of the rest of the decomposers consisted mainly of generalists found in plant debris, among which *Clambus pubescens* and *Orthoperus* were particularly abundant, and *Cercyon analis* and *Carpelimus bilineatus* agg. were common. All may have lived and bred within the deposits, perhaps where they were relatively damp. *Carpelimus* species are adapted for burrowing into soft sediment on water margins and damp ground (Lott 2009, 61) but *C. bilineatus* agg. appears to have regularly exploited artificial habitats on ancient occupation sites, being often found in large numbers in house floor deposits (Kenward and Allison 1994; Kenward and Hall 1995). An indeterminate flea (Siphonaptera) body segment was noted.

Insects from aquatic and terrestrial outdoor habitats (ie not found within buildings or in accumulations of decomposing material) were fairly common providing some details of local ground conditions and habitats. Aquatic taxa made up 9% of the whole assemblage: *Anacaena globulus* (represented by five individuals) is most commonly found at the edges of running water but also occurs by permanent still waters and in other damp places (Foster *et al* 2014, 43), while *Agabus sturmii* generally lives in vegetated permanent waters (Foster & Friday 2011, 50). A few ostracod carapaces were noted. Several taxa were indicative of marshland or wet grassland including the ground beetles *Elaphrus cupreus*, *Pterostichus minor*, and *P.* ?*diligens*, while *Cyphon* is typical of well-vegetated areas with pools of shallow standing water where their larvae develop. Several terrestrial taxa suggested that there may have been disturbed or cultivated ground: *Meligethes* and *Phyllotreta nemorum* group are found on a variety of wild and cultivated brassicas, and *Chaetocnema concinnus* or *picipes* on knotweeds (*Polygonum*). Local trees or shrubs were indicated by *Crepidodera* found on willows or poplars (*Salix* or *Populus*), and *Salpingus planirostris* found under bark or in the passages of bark beetles (Scolytinae). Two elytral fragments were tentatively identified as being from longhorn beetles (Cerambycidae) the larvae of which are often associated with wood.

A number of taxa found in grassland were recorded including *Mecinus pyraster* found on ribwort plantain (*Plantago lanceolata*), *Longitarsus* (represented by at least seven individuals), and two species with turf-feeding larvae, *Phyllopertha horticola* and *Dascillus cervinus*. *P. horticola* was represented by at least five individuals and is characteristic of poor quality permanent grassland on light soils where there is a diversity of flowering plants and a high proportion of weeds (Raw 1951). When encountered in archaeological contexts they are sometimes suspected of having been imported onto sites in turves or cut vegetation such as hay (Kenward 2009, 292). At BLM no plant macrofossils suggestive of the use of turf were identified (Robertson *infra*).

Scarabaeoid dung beetles (Geotrupinae sp. and several *Aphodius* species) accounted for 3% of terrestrial taxa and these may indicate a low-level presence of grazing animals nearby. Although the beetles are primarily associated with herbivore dung some *Aphodius*, including *A. prodromus*, *A. sphacelatus* and *A. ater* all of which were represented here, will less commonly exploit decaying plant matter including foul habitation waste, and some species hibernate in flood refuse (Jessop 1986, 20-25). *Aphodius fossor* and *A. depressus* are typical of dung deposited in the open however, the former most often associated with cattle dung (Jessop 1986, 20).

Discussion and conclusions

The only one of the four samples to provide convincing evidence for human occupation was from deposit [051] which overlaid the natural peat, apparently forming a foundation layer under the hearth complex. The assemblage included a substantial group of beetles characteristically occurring in relatively dry, mouldering organic litter within ancient buildings. Other decomposers suggested that damper conditions may have developed in floor layers, perhaps at least partly due to adverse weather or rising water levels in the surrounding mire. The commoner generalist decomposers in the assemblage (*Clambus pubescens*, *Orthoperus, Cercyon analis*, *Carpelimus bilineatus* agg. and *Acrotrichis*) are indicative of rather soft moist decomposing vegetable matter, and all may have lived and bred within the damper parts of floor deposits. Moister material would tend to be retained even if floors were regularly re-laid with drier litter.

Diversity of the whole decomposer component in deposit [051] was rather low (αRT = 11, SE = 1) but it was on a similar level to mean values in deposits associated with Iron Age occupation of the crannog at Cults Loch (mean αRT =12 for 14 assemblages; Allison forthcoming). Slightly lower diversity was recorded at Buiston crannog (mean αRT = 9 for 23 assemblages; Kenward *et al* 2000) a level that the authors regarded as impoverished by comparison with northern English sites of a broadly similar Roman date in Carlisle (Allison *et al* 1991a; 1991b), and in York (Hall & Kenward 1990). Possible explanations for the low decomposer diversity at all these sites could include low-level or short-lived occupation, and intermittent or seasonal occupation. Ancient structures need not necessarily have been occupied continuously to accrue or maintain some elements of a building fauna. Work by Smith (1996), for example, suggests that some synanthropic beetles can persist for a considerable period after abandonment of a site. Also, some beetles characteristic of ancient buildings were recorded from modern unoccupied reconstructions of Saxon buildings at West Stow (Kenward & Tipper 2008).

From the insect evidence alone, it cannot be determined whether the house/building fauna represents *in situ* occupation taking place earlier than originally thought, or the dumping of material from within another building as part of the foundation deposit. The rest of the insect assemblage from deposit [051] included both aquatic and terrestrial outdoor insects from marshland and grassland habitats. These might represent the natural ground conditions prior to construction, the close proximity of wet ground and grassland, the encroachment of marshland during abandonment, or seasonal disuse of the structure after an initial period of occupation.

Beetles and bugs represented in the other three samples were largely from natural habitats. This suggests either the use of natural deposits in the mound make-up or periods of abandonment or disuse. There was little unequivocal evidence for occupation even though all the samples came from deposits within the structure. The lack of a characteristic building fauna such as was recorded in deposit [051] might possibly be due to floor deposits being generally too dry or aerated for insect preservation to take place during occupation, perhaps because of the proximity of the hearth (anoxia provided by waterlogging is usually required for preservation). Some very poorly preserved decomposers in the samples from [036] and [032], mainly *Cercyon* species, might possibly be the decayed remnants of a fauna that built up in floor layers. This could not be proved however, since all those identified were generalists associated with many types of decomposing plant litter, and the rest were too poorly preserved to be identified closely.

The only slight hints of occupation in deposit [011], identified as primary floor deposits, were single individuals of *Latridius minutus* group and a saw-toothed grain beetle (*Oryzaephilus surinamensis*). If the latter is not intrusive, the record could have a bearing on the date of the deposit. Grain pests, including the saw-toothed grain beetle, are commonly recorded from the Roman period in Britain, but do not occur in pre-Roman deposits (Buckland 1978; Smith & Kenward 2011).

In deposit [011] aquatic beetles made up almost a third of the whole assemblage. This is at a level that suggests either aquatic deposition or the use of waterlain sediments to raise the level of the mound. Damp ground/waterside taxa were also well-represented. The relative abundance of scarabaeoid dung beetles in the same deposit (13% of the terrestrial fauna) suggests that grazing animals were a common presence locally during the period that it represents. A recent modern study has suggested that dung beetles make up more than 10% of the terrestrial fauna when large or dense populations of grazing animals are present nearby (Smith *et al*. 2010). There was no evidence for the presence of animals within the building. Dung beetles were much less common in the earlier deposit [051].

Some of the more closely identified aquatic, waterside and marshland taxa were indicative of permanently wet habitats probably reflecting the immediate surroundings of the structure. Evidence for trees was only obtained from the lowermost sample from deposit [051], the leaf beetle *Crepidodera* providing specific evidence for the nearby presence of willows or poplars.

SOIL MICROMORPHOLOGY *Lynne Roy*

Introduction

Micromorphology has become an increasingly important analytical tool in understanding site formation processes (Simpson & Barret 1996) and the use of space (Matthews *et al* 1997), which can be difficult to resolve at the macro scale. The occupation deposits excavated at BLM present an opportunity to differentiate between discrete areas of occupation and use and also allow these to be set in context with pedogenetic processes to which each site has been subject, both during and after its occupation.

This report presents the results of micromorphological analysis of four kubiena samples collected from strategic points in the site's stratigraphy (Figures 5 & 24). The aim of the analysis was to address a set of specific research questions about the nature of the deposits:

1. What is the nature of the surface of [030]?
2. Is [013] a flooring deposit?
3. What is the nature of the interface between [002] and [003]?
4. Are there laminated organic floor layers in [003] and in the base of [002]?

Results

Interpretation of the results is presented below by context; where the same context occurs in more than one sample they are discussed together.

Mineralogy of the sand grains and lithology of the rock fragments from throughout the sample sequence represent a soil parent material (gravels derived from greywackes (Bown *et al* 1982)) present over much of the surrounding area. Rock fragments are predominantly sandstones and most are classified as lithic greywackes (see Mackenzie & Adams 1994, 109) (see site archive for full description). No erratics introduced by human occupation were observed in any of the samples.

Context [030] natural peat

Context [030] was observed as a single layer at the base of sample M1.1 separated from the overlying layer by a diffuse boundary (Figure 29). The context has a complex lenticular to platy microstructure with common pseudomorphic voids few of which contain part 'disappeared' plant tissue residues. Porosity is variable up to 10%. It comprises horizontally banded well humified plant remains. The presence of diatoms attests to the waterlogged nature of the deposit. Observed anthropic markers are rare and limited to fragmentary charcoal at the base of the unit and fine charcoal within void spaces which may have been washed/trampled into the context. The wavy appearance of the wood fragments is indicative of advanced decomposition and compaction. This context is distinguished from the underlying by a higher proportion of coarse mineral material and greater quantities of curled denuded wood and plant tissue residues. Rock fragments and mineral aggregates were not observed within this context.

Discussion

[030] thus appears to comprise a naturally accumulated peat deposit. The surface of the layer which contains higher quantities of minerals and compressed plant material probably reflects the trampling of coarse mineral material from above and the gradual transition from the peat into the occupation surface. The upper layer of [030] could thus be interpreted as a sub-floor or perhaps levelling surface upon which the later floor [009] was deposited. Thin lenses with strong parallel orientation and distribution of components are characteristic of periodic accumulation and compaction/trampling over time (Goldberg & Macphail 2006). Whilst wood fragments have been observed they are not present in sufficient to quantities to suggest that they had been added to the surface to raise or level the floor as has been observed at Whitefield Loch (Cavers *et al* 2011). The nature of the surface of [030] is thus transitional. The micromorphological evidence does not provide any evidence for the preparation of the surface for building but this does not have to be ruled out as post-depositional changes including water saturation have served to blur the distinction between the two contexts.

Context [013] floor deposit?

Context [013] is contained within sample K1 and when viewed microscopically comprises three broad layers separated by diffuse boundaries (Figure 30).

The lower part of [013] (Layer 1) is a relatively compact (porosity up to 10%) poorly sorted silt with a lenticular microstructure. The coarse to fine ratio (c/f ratio) is 50/50. The matrix is heterogeneous; dominantly reddish brown with few patches of yellow and very dark brown material in plane polarised light (PPL) and black brown in cross polarised light (XPL). The layer has a moderately speckled birefringence fabric (b-fabric). Observed pedofeatures were limited to occasional iron (Fe) and manganese (Mn) blackened rounded anorthic nodules indicative of some water saturation (See Lindbo *et al* 2010).

Humified organic matter, decomposed but still identifiable as plant in origin, dominates the coarse organic component. Although frequently too heavily decomposed to identify internal cellular structures the elongate nature of the humified organic matter gives the lower part of this context a lenticular appearance. Anthropic indicators are limited to angular carbonised fragments (10-50µm) distributed randomly throughout the matrix and a single curved cellular fragment.

Layer 2 is a poorly sorted silt with a complex channel and chamber microstructure; occasionally lenticular, with common planar voids and sub-horizontal fissures. The matrix is heterogeneous. It is light yellowish to yellowish brown in PPL owing to a dominance of yellow amorphous fine organic material with a weakly speckled b-fabric. Rock fragments and mineral aggregates were not observed and the coarse inorganic material is dominated by sand sized quartz fragments. Within the layer are six large irregular anorthic patches of compact fine grey well sorted silt, the largest of which is 8 x 3 mm and located at the top of the unit. Each patch has a sharp to clear boundary with the surrounding micromass and a strongly speckled b-fabric. There are few, very fine sand sized, quartz inclusions and few fine sand sized black flecks (micro charcoal?).

Layer 3 is a moderately sorted silt deposit with a lenticular microstructure. Coarse organic material is much denuded. It is dominated by humified decomposed organic matter which is still identifiable as plant in origin but rarely contains cell structure. Frequent cellular tissue fragments are masked by fine humose material and difficult to identify. Although internally amorphous, this organic material is frequently elongate in shape and arranged parallel to the top of the sample.

Discussion

The series of deposits represented in sample K1 thus appear to comprise part of a highly organic floor deposit. The observed clasts of fine silt material (possibly daub) from within Layer 2 are rare examples of mineral material within a predominantly organic context. These silt clasts could have been incorporated into the layer through the trampling on the soles of feet or through falling from walls and consequently trampling into the floor. Common charcoal provides clear evidence for anthropogenic activity but it is not associated with ash or other anthropogenic material and could thus have been swept, trampled, blown or washed into the deposit from nearby.

The near absence of rock fragments and coarse mineral material is unusual for a deposit located within an hypothesised occupation horizon as occupation zones and floors are typically heterogeneous and mixed (see Macphail *et al* 2004; Goldberg & Macphail 2010). This near absence of coarse mineral material indicates that this is not a typical floor or occupation horizon. Stabling deposits from Early Medieval London Guildhall (Macphail & Goldberg 2006, 245) and Butser Ancient Farm (Macphail *et al* 2004) were found to be highly organic with fragments of layered plant material and excremental material not unlike the humified organic bands discussed above. Whilst the fecal spherulites which help to characterise such layers (Goldberg & Macphail 2010) were not observed, anthropological research into the micromorphology of known stabling deposits has shown that faecal spheruiltes are not always present (Milek 2012, 130). Indeed it is probable that in such a highly organic deposit calcitic faecal spherulites did not survive. Research into stabling deposits by Milek (2012, 130-132) has also shown that whilst stabling deposits typically consist of readily identifiable herbaceous plant tissue and associated phytoliths embedded in amorphous organic matter, in deposits that have been reworked by soil fauna it is not possible to distinguish between plant tissues representing dung and those representing hay. It is possible therefore that the decomposed banded plant matter identified in [013] represents the remnants of a banded stabling deposits where the finer boundaries have been blurred by post-depositional disturbance.

It is also possible that the compact plant matter represented in [013] has been redeposited as a means of covering or resurfacing the floor, a practice that is readily documented in anthropogenic (Milek 2012) and archaeological contexts (Courty 1992, Macphail & Goldberg 2010, Roy forthcoming). There are many examples of archaeological floors being covered by plant 'matting' giving rise to compact floor deposits associated with planar voids, articulated phytoliths and iron staining (see Cammas 1994; Goldberg & Macphail 2006, Macphail *et al* 1997; Matthews *et al* 1997). Macroplant evidence from elsewhere at BLM suggests that plant stems such as sedge and rush were deliberately collected and used to construct floor coverings within the foundation layers (Robertson *infra*). Of particular relevance to this study is the banded deposits observed at the nearby Cults Loch 3 crannog (Roy forthcoming) although the absence of a more heterogeneous occupation layer above with which it could be compared micromorphologically prevents any further testing of this theory.

Context [003a] (see also [003]) brushwood floor

[003] is represented within Layer 3 in sample M1.1 with the underlying Layer 2 forming a diffuse transition between it and context [030]; it has consequently been labelled [003a] (Figure 29). It is a poorly sorted heterogeneous silt and is predominantly organic but contains significantly greater proportions of mineral material than the underlying layer [030] including sub-angular lithic greywacke fragments. The layer also contains several anthropogenic indicators including large (12 x 13mm) rounded cellular charcoal fragments of birch or alder (Schweingruber 1982) and several smaller cellular fragments possibly of the same species. Occasional patches of anorthic fabric embedded within the micromass are indicative of trampling in of material (possibly soil clasts/elements of floor/daub) from elsewhere.

The plant material has a strongly expressed parallel arrangement and appears to comprise fragments of herbaceous and woody tissues in varying states of decomposition (slightly to very strongly decomposed, following Fitzpatrick 1993). The remaining coarse material is randomly oriented and aligned but frequently clustered in patches.

There are occasional sub-horizontal fissures and channels in the microstructure.

Discussion

The diffuse boundary between [030] and [003a] is consistent with a gradual accumulation deposit and it is probable that this is a floor deposit created from the existing ground surface rather than a floor created by the deposition of sediment from elsewhere. This is a type of surface described by Macphail *et al* (2004) as a beaten earth floor. It is probable that it was formed on the original ground surface and included trampled vegetation as a primary constituent. Anthropogenic indicators increase towards the top of the sample indicating that trampling and bioturbation may have been responsible for their downward movement from the surface. The embedded anorthic patches of soil clasts and daub material are also consistent with a trampled floor deposit and are observed elsewhere throughout this sample sequence (see [013] below).

Context [003] primary floor deposit

Context [003] is represented by Layer 1 within sample M1.2 and Layers 1-3 in Sample M2.1 (Figures 31 & 32). Layer 1 within sample M1.2 contains a complex patchy mix of micro fabric types which for the ease of description, discussion and interpretation have been divided into two broad types; SMT 1 and SMT 2. SMT 2 comprises the greater part of the layer and is a heterogeneous deposit with a weakly developed sub-angular blocky structure. SMT 1 is a compact grey moderately sorted silt with a moderately sub-angular block structure, common cracks and fissures and common black flecks throughout observed as discontinuous patches with sharp contacts with the surrounding groundmass.

Layers 1, 2 and 3 in Sample M2.1 are separated by diffuse boundaries. Layer 1 is an unsorted heterogeneous deposit with a weakly developed sub-angular blocky structure, frequent anthropogenic inclusions in the form of frequent carbonised fragments, few weathered charcoal fragments and occasional anorthic patches of

SMT1 (see above). Layer 2 by contrast has a complex microstructure which is moderately sub-angular blocky to lenticular in places with the banded distribution inclusions. Organic material is decomposed to heavily decomposed (following Fitzpatrick 1993). Layer 3 has a massive to weakly developed sub-angular blocky structure and unlike in the underlying layer, inclusions appear to be randomly oriented and arranged. This layer contains the greatest evidence for bioturbation by soil fauna observed in any of the deposits from across this sample sequence with occasional faecal pellets and channel voids part infilled by rounded excremental material.

Observed rock fragments across [003] as a whole include very few sub-rounded lithic greywackes and the mineral component is dominated by poorly sorted sub angular quartz. The high degree of blackening, humification and compaction of the organic compenent has left limited structural information with which to identify the plants originally present. Recognisable remains include elongated epidermal and vascular plant tissues which are commonly most resistant to decomposition (Fitzpatrick 1993); indeed many of these tissues appear as elongate external cells or outer cases or psedumorphic voids where the interior of the root or plant structure has been eaten by soil micro and mesofauna.

One of the most characteristic features across [003] as a whole therefore are the mosaic fabrics where larger clasts are embedded in a dense finer groundmass (porphyric coarse-fine related distribution). [003] thus consists of fine occupational debris (charcoal, ash, charred material, etc) often unsorted but occasionally as alternating massive and more porous lenses and laminae. Areas with compact bedded microstructure are characterized by common horizontal referred orientation of the components, fine horizontal oriented elongated pores and vesicles usually concentrated in zones. Plant material is heavily decomposed and often associated with discontinuous patches of dominant phytoliths.

Discussion

[003] is thus interpreted as a heterogeneous floor deposit that has been subject to compaction and some post-depositional pedoturbation. The relatively compact nature of the sediment is reflected in the frequently porphyric, commonly close porphyric related distribution. The massive to very weakly developed sub-angular structure reflects the compact nature of the deposit and highly fragmented nature of inclusions such as charcoal, plant tissues and rock fragments are consistent with a sediment that has been compacted and/or trampled (Milek 2012, 132; Macphail & Goldberg 2010). The identification of diffuse layers and the linear and parallel orientation of components within layer 2 of M2.1 is consistent with a gradually accumulated occupation deposit (Banerjea *et al* 2013). The frequent incorporation of anorthic patches of moderately sorted daub like material within this layer possible reflects trampling in of this material from outside or within the structure. The prevailing damp conditions as indicated by the accumulation of iron hydroxide and presence of diatoms may also have caused/accelerated the erosion of plaster/daub from the walls allowing it then to be trampled into the floor.

The layers that comprise [003] are thus typical of flooring deposits found across Europe as they contain charcoal derived from local hearths with sediment clasts, daub fragments, soil excrement and earthworm granules trampled in from outside the structures (see Goldberg & Macphail 2006).

Context [002] possible floor surface

Context [002] is represented by layer 2 and layer 3 in sample M1.2 (Figure 31) and layers 3 in and 4 sample M2.1 (Figure 32). The boundary between the layers is diffuse.

The coarse organic component of layers 2 and 3 (M1.2) and layer 3 (M2.1) is mixed including cellular charcoal, frequent single plant cells and few plant tissues. Organic matter commonly has a horizontal referred distribution and is concentrated into bands, consistent with a trampled floor layer (Banerjea *et al* 2013).

Observed pedofeatures within these layers include dusty clay coatings, which contain various silt-sized mineral and organic particles as well as clay. These are thought to form through disruption of the strong bonds that hold aggregates together, allowing larger particles to be taken up into the soil solution in suspension, and then translocated downward.

These types of features are generally indicators of some sort of disturbance, including cultural interaction with the soil resulting from such activities as deforestation, cultivation, levelling and construction (Macphail 1998, 1987; Jongerius 1970) and are consistent with interpretation of this layer as possible occupation/flooring within a prevailing wet or damp, environment. Anorthic patches of clay/daub like fabric also occur throughout this context. Layers 2 and 3 are distinguished from each other by the concentration and distribution of this patchy material which in layer 2 occurs as frequent patches with clear to sharp boundaries with the surrounding micromass. The patches of clay/daub also occur within layer 3 but at a lesser frequency than in the underlying layer and with diffuse boundaries with the micromass indicating that this layer has been subject to greater mixing and/or disturbance than the underlying layer.

Layer 4 [002] as present as the uppermost layer in sample M1.2 (Figure 31) is an unsorted heterogeneous deposit. This is a coarsely fragmented, bioworked and poorly sorted ashy deposit containing much fragmented plant material and unburned subsoil material. The ashy fine material includes bark and amorphous organic matter as well as possible coprolite material. Unlike underlying layers, where orthic patches of different fabric types have clear to sharp boundaries with the surrounding groundmass, this layer has evidently been subject to significant post-depositional mixing and boundaries between fabric types are diffuse. Anthropogenic indicators include few sub-rounded charcoal fragments and common rounded and sub-rounded carbonised/blackened organic matter. The sub-rounded nature of these inclusions contrasts with the generally angular nature of inclusions observed from lower down the sediment profile and is indicative that they have been weathered and perhaps washed/trampled into this deposit from elsewhere.

Discussion

Layers 2 and 3 of M1.2 and layer 3 of M2.1 of [002] are thus interpreted as a trampled heterogeneous floor/occupation deposit that has been subject to compaction and some post-depositional pedoturbation possibly in part due to water saturation. The distribution and organisation of components within [002] is of different composition to elsewhere across the sample sequence, with bands of phytolith-rich, ash like material and sub-rounded weathered charcoal perhaps indicating that this area contains swept accumulated hearth/occupation debris. The presence of very few woody root sections alongside occasional infilled channels and rare excremental features indicate that this layer has undergone some post-depositional re-working by soil flora and fauna.

Layer 4 of M2.1 [002] has been subject to significant reworking by soil fauna and inclusions are frequently rounded and weathered. This uppermost layer is thus interpreted as transitional between the occupation horizon below and the topsoil [001] above.

Site formation processes

In addition to detailed information about individually analysed contexts, micromorphology also allows for a number of observations regarding site formation processes and pedogenesis at BLM.

Owing to the prevailing damp conditions on and around BLM all samples have been subject to some degree of water saturation and subsequent post-depositional alteration. As observed by French (2013), the destruction of relict soil features is often a problem for sites affected by fluctuating groundwater tables allowing only a very broad interpretation of site formation processes.

The occupation sequence at BLM has been sampled from natural peat [030] through to emerging transitional Bh/Ah horizon of layer 4 [002].

Micromorphological analyses indicate that BLM was constructed upon an organic soil (peat) [030] formed under waterlogged conditions and containing very high amounts of organic matter comprising wood and frequent lignified material, well humified unidentifiable plant remains with some clay and silt also present. This peat is relatively homogenous in nature except at the top of the organic soil where trampling of occupation debris from above has created a heterogeneous anthropogenic organic soil horizon.

Anthropogenic activity on the site has significantly altered the formation of any 'natural' soil profile and occupation zones comprising contexts [013], [009], [003] and lower layer of [002] all formed under damp but not waterlogged conditions. The upper layers of [002] contain relatively few anthropic indicators and are characteristic of a Bh horizon consisting of well decomposed organic matter. Observed pedofeatures within this layer indicative of significant post-depositional biological activity were observed. Biological activity would have been at least partially enhanced by the increase in soil organic matter input during occupation. Field observations and descriptions of the topsoil are indicative that an Ah horizon formed directly above the Bh horizon.

Conclusion

The differences noted between observed floor layers at BLM and Cults Loch 3 are in part an artefact of preservation and post-depositional alteration and it may be an accident of sampling that very little evidence of domestic activity (eg phytolith, cereal processing waste, burned soil from hearths, etc) was found, in comparison to other broadly contemporary sites at Cults Loch 3 and Dorman's Island. It should be noted however that unlike the samples studied from Cults Loch 3, the boundaries between layers and contexts observed within the BLM thin sections are predominantly diffuse. These diffuse boundaries appear to reflect a gradual accumulation and compaction of floor surfaces which is quite different to the apparent deliberately truncated and resurfaced deposits observed at Cults Loch 3. Whereas at Cults Loch 3 there appears to be direct evidence for attempts to 'clean' and re-surface the floors, at BLM, the deposits appear to have accumulated gradually with debris from within and surrounding the site being trampled into the floor.

Micromorphological analysis of floor surfaces at Dorman's Island and Cults Loch 3 crannog showed evidence for the addition of wood and bark which was subsequently trampled and interpreted as evidence of attempts to raise the floor level of the crannogs. Micromorphological analysis of the floor surfaces at Cults Loch 3 also indicated periodic resurfacing of floor deposits with vegetation matting and gravel in an attempt to clear and/or raise the floor surface which also involved the periodic removal and dumping of occupation debris. It is possible that the banded organic material observed in [013] at BLM is formed from similar vegetation 'matting' although as discussed above it is not associated with the expected corresponding heterogeneous mineral surface. The sample sequence from BLM shows no evidence for preparation and/or levelling of the surface and deposits appear to have accumulated on top of the natural peat surface creating a beaten earth type (see Macphail 2004) floor as opposed to constructed floor surfaces documented elsewhere.

Micromorphology has also proved a useful analytical tool for studying homogeneous-looking deposits such as [002] which was observed to be heterogeneous at a microscopic scale, containing a number of discrete layers not detected in the field.

By analysing and characterising the matrix of these deposits and comparing their results with the other excavated occupation sites in wetland environments and with wider micromorphological and anthropological studies it has thus been possible to identify a range of anthropogenic and pedogenic site formation processes.

5 THE ARTEFACT ASSEMBLAGE

SUMMARY

Despite the limited quantity and range of artefacts recovered from the structure at BLM, the assemblage is significant both to our understanding of the activities that took place within and around the building during its occupation and to broader patterns of artefact survival from Iron Age contexts in SW Scotland more generally. In total, nine objects came from secure deposits and consist of a well-preserved but damaged iron ploughshare tip, fragments of broken saddle quern, two stone cobble tools, four struck lithics and a sherd from an undecorated hand-made ceramic vessel. In addition to these objects, a large quantity of lightly fired clay came from the vicinity of the hearth and this appears to have been deliberately laid down as a hearth lining.

As a group, these artefacts tell a tale of an Iron Age domestic household; one engaged with cultivating the surrounding land, as demonstrated by the ploughshare tip, and the day-to-day preparation of food, suggested by the stone tools and struck lithics. More difficult to interpret is the significance of the single sherd of handmade pottery as so little comparative ceramic material of this date survives in the archaeological record of SW Scotland. A study of Iron Age artefact assemblages from this region (Hunter, McLaren & Cruickshanks forthcoming) has demonstrated that the rarity of ceramics in SW Scotland during this period is real and not simply a bias of survival. This suggests that wooden or even leather vessels were preferred and that ceramic vessels are largely absent as a result. The reasons for this practice are enigmatic but the single pottery sherd from BLM is significant in this light as it implies that although pottery vessels were indeed rare they were not entirely unknown. The iron ploughshare tip is also important in terms of its broader context of discovery as so little metalwork is known from contemporary sites in the region as the result of poor archaeological survival and inconsistent retention by past excavators. Similarly, the small but stratigraphically secure group of struck lithics from BLM provides strong evidence of Iron Age flint tool use, material which in the recent past may have been interpreted as residual early prehistoric artefacts and dismissed from site-wide discussions.

The pattern of distribution of these artefacts at BLM is very informative as the majority of objects cluster in the SW quadrant of Structure 1 (Figure 18) around the central hearth. With the exception of one object, a flint flake (SF 02), the opposite half of the structure is devoid of artefacts, implying that the main activity area within the household was to the SW of the central hearth.

Alongside this picture of prosaic, everyday subsistence activities are ephemeral hints at household practices that reach beyond the site and connect with broader Iron Age cultural traditions, demonstrated by the broken-up fragments of a saddle quern stone. The surviving pieces of this now incomplete tool demonstrate that the quern was deliberately broken and the fragments deposited around the central hearth. The intentional damage or destruction of saddle and rotary querns during the Iron Age, followed by their purposeful deposition, is a picture slowly emerging across the length and breadth of Britain. Although the cosmological motivations that led this practice are still opaque, similar examples from the region and across Scotland as a whole demonstrate that this was a cultural practice that the inhabitants of BLM were not only aware of, but actively engaged in.

THE IRON PLOUGHSHARE *Dawn McLaren*

Introduction

SF 3 has been identified as a substantially intact but damaged ploughshare tip (Figure 33). This single item contributes significantly to our understanding the site's function and helps to illustrate the agricultural activities that took place in the vicinity of the settlement during the later prehistoric period, as evidenced by the substantial macroplant assemblage. What makes this find even more important is the general rarity of iron objects from secure Iron Age contexts in SW Scotland (Hunter, McLaren & Cruickshanks in press).

Discussion

The iron object under discussion here is consistent in form and size with a ploughshare tip of a type categorised by Manning as a 'flanged share' (1964). Manning's later reassessment of this implement form re-categorises them as share tips as they are not shares complete in themselves, but merely the iron tips for wooden shares (1985, 43). In use they would have been slipped over the front of the wooden foreshare of a bow ard (Figure 34); the shorter examples, like that from BLM, fitting onto the very tip (*ibid*, 43). Bow ards, similar to an intact example recovered from a peat bog in Døstrup, Denmark consist of four main components: the main curving beak, the foreshare, mainshare, ard-head and stilt (Glob 1951; Fenton 1968, fig 2). Long linear channels on the upper surface of wooden mainshare heads, such as that from Milton Loch, Kircudbrightshire (Fenton 1968, 150-1, fig 3a) appear to have been created purposefully to allow the wooden foreshare to fit closely on top of the mainshare (Rafferty 1996, 270, fig 393, 1). In this configuration the foreshare helps to protect the main share from excessive wear (*ibid*, 150). Although reinforcement of the foreshare by addition of an iron shoe or tip is not essential, the addition of an iron component would reduce wear to the tip of the shaft and potentially enhance the effectiveness of the share by increasing its ability to withstand stony or hard soils. Asymmetric wear and damage noted on the BLM implement is mirrored by the pattern of wear observed on earlier prehistoric stone ard points as well as later prehistoric iron bar shares, share shoes and share tips (Rees 1979).

Flanged ploughshares and ploughshare tips are well attested in the Iron Age, and more rarely from the Roman period (Manning 1985, 43) but they continue in use into the medieval period (Goodall 2011, 77, 84, fig 7.2, no's. F3-5). Although similar in form to Iron Age and Roman examples, the medieval share tips noted by Goodall (2011) are substantially larger in size than prehistoric and Roman examples and are not directly comparable to the share tip discussed here.

An almost identical iron share tip comes from Hod Hill, Dorset (Manning 1985, 43, no.F2). It is almost identical in size, the Hod Hill example being 142 mm in length (*ibid*, 43) whilst the Black Loch implement measures 145 mm in length and is very similar in form consisting of a short tip of almost oval cross-section with a long, open but asymmetrically damaged socket. A further similar, but slightly larger share tip comes from Frilford, Oxford, deriving from early Iron Age levels (Payne 1947, 89, fig 1:1). One significant difference between the Hod Hill, Frilford and BLM examples is the hint of a possible nail hole on the latter example, revealed during investigative cleaning. Unlike the Hod Hill and Frillford share tips which are unperforated, the BLM implement would have gripped the beam of the foreshare using the flanged edges and then additionally secured to the beam with a nail. Manning notes that the use of nails to fasten iron share tips in place are very rare and casts doubt on their identification but offers no alternative interpretation of their possible function (1985, 43). The addition of a nail fixture would not preclude use as a share tip.

Scottish cultivation implements

In a review of early and traditional cultivation implements in Scotland Fenton usefully summarises later prehistoric and later Scottish examples of iron share components, including wedge-shaped shoes and flanged share tips (1963). These include mostly Roman Iron Age examples, including those from a hoard at Blackburn Mill, Berwickshire (Piggott 1953, 47, fig 12: B3; Fenton 1963, 271-2, fig 4:1), Traprain Law (Burley 1956, 212, fig 7: 479-480; Fenton 1963, 272, fig 4: 2 & 3), Ekford hoard (Piggott 1953, 27, fig 5:E10; Fenton 1963, 272, fig 14:5), Falla Farm (Steer 1947) and from A Cheardach Bheag wheelhouse, South Uist (Fairhurst 1971, 102, pl 12). Of all the examples cited by Fenton, the Blackburn Mill share tip is most similar in form to that from BLM but is much stouter and the flanges that flank both tapering edges continue to envelope the rounded tip of the blade, resulting in the term 'shoe' being applied to describe its form; a term which is not considered appropriate here for the BLM example as the flanges do not extend to the tip of the blade. The Blackburn Mill share was discovered as part of a metalwork hoard of Roman Iron Age date which comprised multiple iron tools, household fittings and items of horse equipment alongside agricultural tools such as a peat-spade and a possible second spade shoe (Piggott 1953, 47; Fenton 1963, 271-2, fig 4:1).

As Fenton acknowledges, the Scottish group of blades and shares shows considerable diversity in form and further work on more recent finds echoes this assertion (1963, 273; Hunter 2006, 154). As a result, there exists an element of cross-over in terminology between iron ploughshare or ard components and iron fittings or blades for other cultivation implements (see Fenton 1963 & Payne 1948). Flanged or socketed iron ploughshare tips, as defined by Manning (1985, 43), are the most comparable in terms of form to the BLM implement, with their robust, tapering, oval-sectioned asymmetrically worn tips. Similar items are discussed by Fenton (1963) and Payne (1948) alongside narrow wedge-shaped shoes and flanged blades (Fenton 1963, 272-6, figure 4), also as ploughshare components. Although the form of these flanged blades does not preclude their use a component of a ploughshare, it is argued here that their wide rounded flat blades could equally have seen use as another form of cultivation implement (e.g. Fenton 1963; 1968), similar to an example from Cnip, Lewis (Hunter 2006, 154-6, fig 3.26: SF 31). In form these flanged blades are quite distinct in shape to that from BLM whose tip is far more robust and distinctly tapered in form.

The BLM example also shares many characteristics with what Fenton defines as a *Cas Dhireach* or delving spade for turf cutting (1963, 306-10; fig 14, fig 16) . These tools tend to be flat elongated ovoid flat blades with narrow flanges extending from the wide squared ends to about mid-length along the blade; in some examples the blade expands slightly and is a little wider than the flanged socket. Perforations to allow the blade to be secured to the wooden shaft or handle are also common on these tools; a feature which is shared by the BLM implement. The general shape of delving spades and the method of attachment, which comprises flanges to grip the shaft of the handle and a nail at the head, bears similarities to the BLM example but with two important differences: the BLM implement is much narrower and smaller that most delving spades and the tip is far more robust, arguing against its identification as a delving spade.

Context of the find

The iron share tip was recovered from a layer of decayed occupation material [002]. It is difficult to make any kind of statement on the significance of this find in such a context as it is impossible to know whether the tool was deliberately deposited or represents a *casual* discard of a broken object on abandonment of the site. The loss of the flange from one edge certainly suggests that the implement was discarded because it was no longer functional. It is assumed, due to the asymmetrical wear that is in evidence, that the damage to the share tip occurred as the result of use but the deliberately broken saddle quern (see below) from the site is a pertinent reminder that deliberate breakage of agricultural tools remains a possibility.

Looking at the artefact's context more broadly, the iron ploughshare tip is a rare example of a securely dated Iron Age agricultural tool. It indicates that the people of BLM were cultivating the land and growing crops; an activity which is considered commonplace in the Iron Age but is rarely demonstrable from artefact assemblages alone. This picture of cultivation suggested by the tool bolsters the important evidence of on-site cereal processing provided by the macroplant assemblage (see *Robertson infra*).

Conclusion

The iron share tip from BLM is a significant find from a well-dated site which suggests an Early Iron Age date for production, use and deposition. This tool would have been fixed to the tip of the wooden foreshare of a bow ard, used to plough soils for cultivation. The share tip is rare survival of an Iron Age agricultural tool and is significant, not just for its recognition as an agricultural implement, but also because of its production in iron; a material type which is rarely represented within later prehistoric assemblages from SW Scotland.

In his brief report on the mounds at BLM, Munro noted the presence of 'masses of corroded iron and vitreous slag' (1885, 83), providing a tantalising suggestion of the former presence of metal artefacts and possible metalworking debris in the vicinity of the settlement. None of this material was retained for further study but the iron share tip suggests that BLM might prove to be richer in metal artefacts than most prehistoric sites of similar age in this region.

Catalogue

SF 003 Iron ploughshare tip, intact but damaged. Elongated oval blade with wide rounded end perforated by a small square nail hole (Diam 5.5 mm) to enable fixture to the wooden shaft of the foreshare; the blade gently tapers along its length to a rounded tip, oval in cross section. Investigative cleaning of the surfaces has shown that one long edge has been flattened and thinned along much of its length (L 105 mm) to create a thin open flange but the curving edge of this feature has been damaged. It survives to a height of 23.5 mm. This gives the widest end of the blade an L-shaped profile. No corresponding flange survives on the opposing edge; x-radiography shows damage but this is not immediately apparent on the surviving object due to the extent of remaining corrosion products and it is likely that a symmetrical flange once existed on this damaged edge. L 145 W 34.5 at rounded end T 10.5 mm. Context 002.

THE COARSE STONE *Dawn McLaren*

Introduction

The coarse stone assemblage consists of two cobble tools and multiple joining pieces of an incomplete saddle quern.

The saddle quern (SF 05 & 11) is an interesting discovery as four separate pieces of the tool were recovered from around Hearth 3. It was only during post-excavation analysis that the individual fragments were identified as pieces of a single incomplete quernstone (Figure 35). Only one damaged blunt end and side of the tool survives as the quern has been broken across the centre of the grinding face resulting in the loss of one end of the stone. Further damage has occurred to the edges of the surviving fragments.

The saddle quern: type, condition and context

Saddle querns are principally used as tools to grind cereal grains into flour but could also have been used to process a range of other foodstuffs. The example from BLM confirms that grain was being processed on site, providing an insight into aspects of culinary practices and diet as well as illustrating the day-to-day food processing activities that are also indicated by the surviving macroplant remains (*Robertson infra*). The form of the quern conforms to Peacock's type 1 saddle quern, the most common form of saddle quern in use during the prehistoric period in Britain (2013, 14-15, fig 2.5). These querns were predominantly used to grind cereal grains into flour and represent opportunistic tools which tend to utilise locally sourced boulders or slabs with at least one naturally flat face which could be used as a grinding surface. Modification to the shape of the stone prior to use tends to be minimal but, like the stone from BLM, rudimentary dressing of the edges and grinding face can be present. The flat quern could be used in any direction in conjunction with a rubbing stone and concavity of the grinding surface tends to be the result of use rather than deliberate shaping (*ibid*, 14). Pitting and polish resulting from wear demonstrates the tool had seen extensive use prior to deposition.

The BLM quernstone was produced from a dense, thick, glacial erratic dolerite or granite boulder. Although the stone would have been portable in the sense that it would have been possible to move the tool around the site, the robust form makes it unlikely that the damage observed happened accidentally, by being dropped from a height onto a hard surface, for example. This observation is bolstered by the fracture pattern of the surviving pieces which imply that portions of the external surface were deliberately knocked off and the stone shattered by force across its centre. The physical effort required to break this stone implies that its breakage was a deliberate and purposeful act. The pieces then appear to have been scattered around the central hearth.

This pattern of deliberate breakage and purposeful deposition of saddle querns compliments the evidence from the Iron Age crannog and palisaded enclosure at Cults Loch, where several of the querns (both saddle and rotary types) appear to have been deliberately damaged prior to discard or abandonment (McLaren forthcoming). The scattering of the quern fragments around the final hearth at BLM emphasises the possible significance that quern fragments could hold despite their incomplete condition. The purposeful placement of both saddle and rotary querns is well attested throughout the Iron Age (Hingley 1992, 32; Heslop 2008, 65-8) and evidence for this has recently been reviewed in a SW Scottish context (Hunter, McLaren & Cruickshanks forthcoming).

Catalogue

*SF 05 & 11 Saddle quern; incomplete. Four joining angular fragments from one blunt rounded end of a badly damaged and fragmentary ?dolorite saddle quern, plano-convex in cross-section and sub-oval or sub-square in plan. The stone has broken mid-length, shattering pieces from both sides and corners; one damaged end survives but the opposing end has been lost. The rounded edges of the surviving end of the stone are badly damaged with angular fracture facets from large spalls that have been detached from the surface. It is difficult to estimate the proportion of the grinding surface that is represented but patches of two opposing sides are present which confirms the full width of the original stone. The quern appears to have been produced from a glacial erratic water rounded boulder, probably locally sourced. Regular but shallow peckmarks on the surviving edges show an attempt to shape and round off the edges but little modification of the plan of the original stone is indicated. The grinding face is dished on both long and short axes through use with regular pitting and well-developed polish around the circumference. The angular fresh condition of the fractured pieces, and the radial fracture pattern indicated by the re-joining fragments suggests that the stone was broken deliberately, and with some force. Remaining L 224 W 255 T 129.5 mm. Context 004.

SF 10 Grinder/?rubbing stone. Ovoid quartz-rich cobble, surfaces water-rounded but naturally pitted where angular quartzite grains have become detached. A bipartite facet (23 x 35.5 mm) of abrasion is present at one rounded tip from light use as a grinder. The extent of one face, particularly towards one curving, rounded edge, is smoothed, possibly from light use as a rubbing stone. L 123.5 W 81 T 55 mm. Context 008.

SF 15 Possible polisher. Plano-convex sub-square white quartzite pebble with water-rounded surfaces and rounded corners. Flat surface is naturally smooth but short curving bands of polish are present at the tips of two opposing ends, suggesting light use. Amorphous light staining is present on rounded face but it is unclear whether this is related to use or post-depositional processes. L 71.5 W 61 T 21.5 mm. Context 035.

THE CERAMIC SHERD *Dawn McLaren*

A single body sherd, SF 13, from a coarse handmade ceramic vessel was recovered from the floor surface [018]. Only the external surface of the sherd survives; the opposing internal face has been lost, exposing the dark grey organic rich core of the sherd. The surviving surface is light buff in colour and appears to have been hand smoothed when wet to create a uniform surface. The fabric is fairly fine silty clay with frequent natural quartzite flecks and frequent (+ 50%) fine organic inclusions which has been poorly fired. No diagnostic features of the sherd survive to allow comment on form or date. The surviving dimensions are as follows: L 35.5 W 31.5 T 9 mm.

THE CHIPPED STONE ASSEMBLAGE *Rob Engl*

A small assemblage of four pieces of flint was recovered during the excavation. All of the artefacts are made of good quality honey brown flint. The surviving cortex is smooth and water rolled suggesting a local pebble source. The flint is generally fresh in appearance with occasional cream blooms of patination.

The assemblage consists of the following;

SF 02 (006) Flint flake. Secondary. Honey brown. Crushed platform with pronounced bulb of percussion and abrupt distal termination. Dimensions; 22.6 mm (L) x 19 mm (B) x 6.2 mm (TH)

SF 04 (002) Flint flake. Primary. Honey brown. Simple flat platform with pronounced bulb of percussion and abrupt distal termination. Dimensions; 19 mm (L) x 16.3 mm (B) x 6.3 mm (TH)

SF 14 (008) Flint flake. Secondary. Honey brown. Facetted platform with pronounced bulb of percussion and feathered distal termination. Dimensions; 33 mm (L) x 16.3 mm (B) x 4.3 mm (TH)

SF 17 (036) Flint chunk. Secondary. Honey brown. Orange segment. Dimensions; 44.5 mm (L) x 23 mm (B) x 12 mm (TH). Possible use wear along lateral edge.

Discussion

All of the flint artefacts were associated with either hearth (SF 17) or occupation (SF 02, SF 14 & SF 08) deposits. The retrieval of such a small assemblage makes the discussion of technological aspects such as manufacture difficult. However, the apparent *ad hoc* and expedient nature of the material mirrors the excavated assemblages recovered from other wetland sites of Iron Age date in SW Scotland such as Buiston, Ayrshire (Finlayson 2000), Dorman's Island, Whitefield Loch (Cavers *et al* 2011, 92-3) and Cults Loch 3, Dumfries and Galloway (Engl *forthcoming*).

As with the assemblage at Cults Loch 3, the distribution of lithic material within settlement deposits at BLM make it more likely that the assemblage relates to activities undertaken on the site and can therefore be considered of firm Iron Age date, rather than residual. The material therefore presents a small assemblage with strong contextual associations which supports the thesis that flint working continued in later prehistory.

THE FIRED CLAY *Dawn McLaren & Jackaline Robertson*

Multiple large angular fractured pieces of lightly fired clay (SF 06; 3.1kg) were recovered from a thick deposit of charcoal-rich clayey soil [019] associated with Hearth 2. It was not possible to re-join the pieces but they appear to derive from an anthropomorphic flat layer or series of flat slabs of clay up to 50 mm thick. Large quantities (c.70%) of organic inclusions are present that survive as impressions on the fractured faces of the clay fragments. The clay survives in a spectrum of colours which reflect the variety in the level and intensity of exposure to heat, ranging from pale grey unburnt patches, buff coloured lightly fired areas through to brick red-coloured heavily burnt pieces.

The fabric comprises a fairly coarse silty clay with occasional water-rounded pebbles (up to 60 mm in length). Smooth flat impressions and dimpled hollows have been left on the surface of the clay from pebbles which have detached and been lost. Distinct organic impressions are frequent and present on and within each of the pieces examined. This material appears poorly sorted as though handfuls of organic matter were pounded or folded into the wet clay before it was laid down, perhaps as a bonding or strengthening agent to allow more stable construction. The impressions are so distinct that fine grasses, stems of rush and sedge have been identified as well as larger wood impressions from twigs.

The floral material represented by the impressions in the fired clay fragments reflects those present in the macroplant assemblage (*Robertson infra*). A similar process of adding large quantities of organic matter to raw clay to make a stronger, more durable construction material was noted at Bon Accord, Aberdeen (Robertson forthcoming) attesting to the extended history of this practice. The context that this burnt clay derives from has been interpreted as hearth debris representing multiple hearth clearouts making it likely that the clay was used to line or pack around the hearth.

A single amorphous fragment of burnt clay (SF 12; 17g) was also recovered from the floor surface [018], possibly trample from around the hearth. Microscopic clasts of daub-like material have also been recorded in thin-sections of [002], [003], [009], [013], all interpreted as floor surfaces within which micro particles of domestic debris have been trampled (Roy *infra*).

WOODWORKING AND WOOD USE *Anne Crone*

Wood use

The waterlogged wood assemblage is dominated by alder which accounts for 60% of the structural timbers. Hazel (16%), oak (10%) and birch (9%) and ash (4%) account for the remainder (Figure 36). The offcuts from the primary foundation layer [051] are also all alder, except for one offcut of oak.

Alder has been used almost exclusively when horizontal timbers are needed, for the primary foundation layers [046] and [047], for the radial and tangential sub-floor framework ([009], [010] and [022], and for the framework around the hearth [041] (Figure 37). The only ash in the assemblage was found in some of these features, in [046] and [022]. Alder has also been used for three of the posts in the post-ring.

Oak has been used exclusively for vertical components. The palisade stakes T8 and T9 are both oak and within Structure 1 oak has been used as posts 021/C and 021/D around the hearth. Three worked oak timbers (SF 18 – 20) had been driven into the ground at the end of stakeline [040] to form a very tight cluster, possibly, as a foundation for a gatepost. An oak post TP1 was also recovered from Structure 2. Dendro analysis has provided some information about the type of oak that was used. In Structure 1 the two oak posts in the post-ring vary considerably, in diameter from 0.16 m to 0.26 m and in age from 45 years to 144 years respectively. Dendro analysis has demonstrated that SF18 – 20 were cleft from the same trunk and, using the curvature of the ring-pattern it is possible to suggest that the parent tree was probably at least 0.64 m in diameter and with as many as 500 rings. The builders may have had access to mixed woodland, parts of which were relatively untouched while other parts had been frequently cut over.

Hazel and birch have been used only as stakes in Structure 1 (Figure 37). The stakelines all incorporate a mixture of alder, hazel and birch in varying proportions.

The charcoal assemblages from most contexts probably represent fuel debris (Robertson *infra*). The composition of the overall charcoal assemblage mirrors exactly that of the structural timbers (Figure 36), with alder comprising 59% of the total, hazel 28% and oak 12%, with single fragments of birch and ash. The possible exception to this pattern is [029] a deposit which contained the largest concentration of charcoal found in Structure 1 and was characterised by the dominance of hazel and the presence of large quantities of roundwood fragments (Robertson *infra*). It is possible that [029] represents a collapsed withy screen as it was concentrated around stakelines [016] and [040] but the composition of these stakelines is quite different, with an almost equal mixture of alder, hazel and birch stakes.

Woodworking

There is very little evidence for much conversion of timber. The stakes, posts and horizontal timbers are all invariably undressed roundwood, often with the bark still *in situ*. The only exception is TP1 which has been shaped to a roughly rectangular cross-section from a half-log, and the three oak timbers SF18 – 20, which are all irregular in cross-section and have been rapidly cleft radially and tangentially from the same log (see *Dendrochronology*).

All the offcuts found on the site came from the foundation structure, [046], [050] and [051] and all but two came from [051]. They are all thin, flat offcuts, mostly with cleft faces and ends which have been chopped roughly square and could have been generated from the shaping of stake tips, for instance.

The tips of the stakes have been fashioned, either by a single long facet down one face, or two facets on opposing faces to form a chisel point, or more rarely by three facets to form a pencil tip (Figure 38B). The stakes are very variable in size, even within one alignment; for instance the stakes in [016] vary from 35 mm to 85 mm in diameter. Although somewhat larger, the alder posts in the post-ring have also been fashioned in the same way, multiple facets shaping them to a blunt pencil point.

The three oak posts, 021/C and 021/D (Figure 38C) from Structure 1 and TP1 from Structure 2, all display a very unusual design. The bases are concave in one plane, leaving blunt tangs on opposing sides. The concavities are shallow, varying from 20 mm to 40 mm, and 021/D and TP1 display what looks like compression damage to one of the tangs. The purpose of this design would have been to seat the post over a roundwood horizontal timber; indeed in section 021/D appears to have slipped off one of the [046] horizontals (Figure 5). This design has implications for both the type of surface laid over the log floors and for the re-use of timbers in roundhouses, issued which are discussed in the summary below.

021/D has an additional feature which may bear on the design and construction of the building. It has two holes, both 50 mm in diameter which lie one above the other. The lower lies 85 mm above the top of the concavity and is 80 mm deep and the upper lies 250 mm (centre to centre) above the lower and is 50 mm deep. These holes were facing in towards the hearth when found but it is of course possible that the post has swivelled as it collapsed and that they originally lay facing tangentially around the hearth. The holes could have housed small poles and one possible reconstruction is that they formed a low barrier around one side of the hearth.

TP1 also has a hole which lies some 100 mm above the top of the concavity but this hole is very different in nature to those in 021/D (Figure 38). It is roughly square, 45 mm x 60 mm, and penetrates the post, lying so close to one face as to leave only a small bridge. This is more akin to the notches displayed by T8 and SF15 for which another function is suggested. The palisade post T8 has an hourglass-shaped notch crudely cut into one side, the base of the notch lying some 180 mm above the tip. It is 90 mm deep and 80-85 mm wide, narrowing to 40 mm at the midpoint. 046/15, one of the horizontal logs in surface [046], has a similar hourglass-shaped notch which lies some 150 mm from its flattened end (Figure 38A). The notch is 80 mm deep and roughly 90 mm wide, narrowing to 45 mm at the midpoint. There is no fourth side to the notches in SF15 and T8, as there is on TP1 but it is possible that this broke in antiquity and has decayed away, the condition of the wood now obscuring that evidence. The notch in 046/15 could conceivably have held a small upright post but that in post T8 would have been redundant as it would have been buried below the ground surface. These notches could signify the re-use of timbers, with implications for their dating. However, these notches are similar in size, manufacture (ie hourglass-shaped) and position to the offset through-holes observed on timbers from the crannogs at Cults Loch 3 (Cavers & Crone forthcoming), Oakbank (Dixon 2007, 257 & Figures 2 & 3) and Loch Arthur (Henderson & Cavers 2011, 111 & Illus 8). None of these appeared to have any structural function in their recorded positions and it has been suggested that they were cut so that the timbers could be dragged from woodland to crannog using a rope slipped through the hole. This seems a likely explanation for the notches in the BLM timbers.

TOOLS AND TOOLMARKS *Graeme Cavers*

Overview

Many of the timbers recovered from the excavation showed evidence for working, with the majority of vertical stakes sharpened to a point (see above), and toolmarks were often visible on structural timbers. Only in a minority of cases was it possible to establish the width and profile of the blade used, but the evidence nonetheless allows some broad conclusions to be drawn. Evidence for tool signatures, or striations visible on tool facets resulting from small damage notches in the axe blade (Sands 1997) was visible on several timbers. This information has the potential to be used to identify individual axes and, where significant numbers of suitable signatures survive, thereby identify construction episodes. The BLM tool signatures were too few to allow this form of analysis in the existing assemblage, but good potential exists for this information to be of value in future seasons of work.

Evidence from toolmarks

Axes

Sands has identified blade width and blade curvature as two key indices in the identification and analysis of blade type (1997, 81-2). For the reliable collation of blade width and curvature data, complete axe facets are required; ie facets where the direction of blow and blade extents, including jams can be determined. In the BLM assemblage, suitable tool facets were found on several timbers: those from the inner post ring (021/A, 021/B and 021/C), 021/D, T8 and 046/15 (Figures 39 & 40). Of these, damage striations with potential for use in signature analysis were visible on 021/B and 021/A; several others displayed evidence for tool signatures but these were incomplete or very indistinct. Where it was possible to do so, laser scans were carried out on complete blade facets in order to provide accurate measurement data on blade width and depth, and casts were taken from facets displaying evidence for tool signatures on timbers 21/A and 21/B using dental silicone putty. A NextEngine 2020i laser scanner was used to produce solid mesh models of the tool facets; these were rendered using simulated raking light and the measurements extracted using CAD.

All of the facets identified were likely to have been produced by very similar axes. Tool facets from timbers 21/A, 21/D, T8 and 046/15 indicated blade widths varying from 47mm to 51mm with depths varying from 4.6mm to 6.7mm, giving curvature indices ranging from 9.5 to 13.1%. Where incomplete toolmarks were identified on other timbers estimates of their widths and depths did not vary significantly from these figures, suggesting that all of the axes used for wood working in Structure 1 were of this size.

These attributes place the BLM axes in a very similar category to those analysed by Sands from Oakbank crannog, Loch Tay, which typically have curvature indices in the range 7% to 16%, with widths ranging between 40 and 60 mm (Sands 1997, 82), as well as those from Cults Loch, which were typically in the range of 50 to 60 mm in width. The nature of the axes in use at the time that Oakbank, Cults Loch and BLM were constructed is not straightforward to determine: the blade widths and depths are in line with those of socketed bronze axes of the late Bronze Age (Coles 1960, 31-4), as well as the very limited number of socketed iron axes from Scotland (such as those from Traprain Law (Cree & Curle 1922) and Lochend Loch, Coatbridge (Monteith & Robb 1937)) and drawing a distinction between the two forms on the basis of tool facets is virtually impossible. While the extent to which socketed iron axes replaced bronze versions across Scotland is difficult to gauge, but by the 5th century BC iron tools were probably well established and it seems likely that the BLM axes were iron. Such narrow blade widths are a characteristic of early Iron Age axes and almost certainly indicate that the BLM axes were of the socketed form; shaft-hole axes of the later Iron Age and Roman period tend to have significantly wider blades, typically in excess of 70 mm.

Other tools

One timber, timber 21/D, showed evidence for the use of a gouge-type chisel in creating the holes in the upright discussed above (Figure 41). The tool was around 9 mm in width with a blade sweep of around 2-3 mm. The use of a chisel- like tool was also evident at Cults Loch 3 on SF38, the wooden box carved from a single block of wood. Similar tools were probably employed in the creation of the mortise-like joints on timbers found at Cults Loch 3, Loch Arthur, Oakbank and BLM (see above), but evidence for sophisticated carpentry using such tools is conspicuously absent from the evidence from all of these sites. It is possible that more complex jointing and carving was involved in the superstructure of the BLM buildings, but no evidence has been so far been forthcoming.

Tool signatures

The preservation of tool facet signatures indicates the potential for these to be of value in identifying individual axes and, thereby, construction sequences. The number of facets displaying suitable signatures in the BLM assemblage was too small to allow such analysis, but examples on structural posts in the internal post ring indicate the possibility that tool facets could be of value in future analyses.

6 SUMMARY OF THE EVIDENCE

Firstly, both the coring and the excavation have demonstrated that the site is not a crannog. There is no evidence of an artificial foundation and Structure 1 appears to have been built directly onto a surface of natural peat. Analysis of the cored sediments (Fonville *infra*) is required to determine the conditions in which the roundhouse was built but the peat must have been oxidised and relatively dry to support trees. Excavation has demonstrated that what appears as a mound on the surface is a stone-built hearth complex at the centre of a roundhouse. This corroborates Maxwell's record of his investigation so it is likely that the other mounds are also roundhouses. Thus, the site probably consists of a settlement of at least seven buildings built on peat, a loch-village or lochside settlement rather than a crannog in a loch.

The coring has produced no evidence of open water in the immediate vicinity of the site. A brief survey of the cartographic evidence indicates that the Black Loch of Myrton was a small body of open water until the late 18th century; it appears as such on Roy's map of 1752 and on an estate map of Monreith drawn by John Gilone in 1777/8 (Figure 42) it is still depicted as a small body of open water draining into the Drumfad Burn. Maxwell states that in the early 19th century the loch was drained and planted with trees but on the 1st edition OS map of 1848 an open body of water is still shown. The site lies well to the S of the open water depicted in 1848 and the excavation has demonstrated that it was built in the marshland surrounding this small, shallow loch, possibly on a drier hummock of peat.

THE CONSTRUCTION OF STRUCTURE 1

Structure 1 was built directly on the surface of the peat. Trees were cut down to create the space and dumps of material [050] and [051] were laid down over the peat to create a working surface on which the primary woodworking was carried out. A layer of large stone slabs [052] was laid down over this surface to form a rectilinear foundation for the hearth and around this a surface of large logs [046] was laid down. A radial and tangential timber framework of logs ([009]/[010] and [012]/[022]) formed the sub-floor foundation.

The outer wall of the house is represented by stakelines [016] and/or [028] on the west. The two stakelines either formed a double wall or one was a replacement of the other but dendrochronological analysis could not resolve the chronological relationships between them. The projected circumference of [016] would have enclosed a space 10.8 m in diameter while that of [028] would have enclosed a space 11.7 m in diameter. These projected circumferences pass through the cluster of stakes [015] on the NE so these probably do define the outer walls on this side (Figure 18). The house would have had a floor area of between roughly 92 m^2 and 107 m^2. The entrance to the house may have lain on the SW side where a spread of small stones [008], bounded by a stakeline [040] extends outwards from the outer stake walls. There is no break in the outer stakeline [016] but the stone surface may have formed a courtyard around an entrance which lies further around the S perimeter beyond the edge of the excavated area (and thus facing into the settlement).

Although four posts lie around the hearth the inner post-ring [021] is probably represented by only two of the posts, the earthfast alder posts 021/A and 021/B. A circuit which passes through them and has the same centre as that of the outer stakelines would produce a post-ring *circa* 7.2 m in diameter. On the NE side of the house this projected circuit coincides with the edge of the flooring on that side, suggesting that this is indeed the circuit of the post-ring. The function of the other two posts 021/C and 021/D is discussed below.

A large rectangular hearth had been built over the foundation slabs [052], its centre lying at the exact centre of the circumference defined by the outer stakelines (Figure 18). It had been rebuilt twice. Each of the three hearths had been constructed in a similar fashion; cobbles had been piled within a kerb of large stones and a surface, clay for the first hearth, and greywacke slabs for the later hearths, laid over the cobbles. Clay was packed around the edges of Hearth 3 ([020] & [033]) and some clay packing may also have been used in Hearth 2 ([037] & [027]). Floors of small logs, [042] and [047] had been laid to the SW and SE of Hearth 1 and when Hearth 2 was built a packed stone floor (039] was laid down on its SE side. Hearth debris [019], [035] and [004] built up around the hearth, mainly on its SW and SE sides.

The primary hearth mound was 0.35 m high; allowing for settlement and compression it may have originally been as high as 0.5 m above the surrounding surfaces. Over time the weight of the hearth complex caused it to sink, or the peat to compact under it (Figure 5), which is presumably why it was rebuilt several times.

OCCUPATION DEPOSITS

The ecofact analyses have provided vital information about the nature of the occupation deposits and the manner of their deposition.

The foundation deposits [050] and [051] are very different from each other and this suggests that they represent bundles of material brought in from different sources to form a firm dry surface for construction. [051] contained large quantities of bracken and wood offcuts, and an insect assemblage characteristic of the relatively dry, mouldering organic litter found in old buildings. While the offcuts may have come from the construction of Structure 1 the insect assemblage indicates that occupation debris from another building had been dumped in the foundation deposits. In contrast, [050] is dominated by layers of sedge and there were no insects or offcuts in this deposit, suggesting a quite different source. The use of old occupation debris in the foundation deposit also implies that Structure 1 was not the earliest building in the settlement.

Insect remains were rare in most other deposits but it is significant that the only floor deposit in which insect remains were relatively well-preserved, [011] displayed only slight hints of human activity. Allison (*infra*) has suggested that the dominance of aquatic beetles in this deposit could mean either aquatic deposition or the use of waterlain sediments to create the surface. The dominant macroplant components of this deposit were sedges and rushes, the stems of which were visible during excavation, so the beetles may have arrived in this material. Layers of sedges and rushes are characteristic of the plant litter floor surfaces seen at Cults Loch 3 but unlike those floor surfaces, there was no evidence of food or hearth debris trampled into it. This is consistent with the lack of insect evidence for human activity so it might be that there was a working surface above it which sealed it, such as a plank floor for instance, which was removed, possibly on the abandonment of the house. The presence of such a surface is also hinted at by the lack of any surviving occupation deposit over the natural peat which lies beyond the edge of [011], although it remains a possibility that there were decayed occupation layers in the base of [006] which lies above the natural peat in this area (Figure 5).

Allison (infra) also noted the presence of significant numbers of dung beetles in [011] and postulated that there was a large population of grazing animals nearby. This chimes with the micromorph evidence for [013] which suggests that this highly organic deposit is more like stabling deposits than an occupation horizon, so it is possible that grazing animals were stabled on the NE side of the house.

On the SW side of Structure 1 the equivalent floor surfaces to [011] are [003] and [018] in that they all lie immediately over the timber sub-floors, [009]/[010] to the SW and [012]/[022] to the NE. However, they are very different in composition. [003] and [018] contain a lot of domestic debris, [018] in particular producing one of the largest assemblages of carbonised macroplant on the site. The flooring materials represented in these contexts are grasses and leaves, in contrast to the sedges and rushes seen in [011]. The micromorph analysis of [003] suggests that it was a gradually accumulated occupation deposit which built up over the sub-floor, and into which domestic debris was trampled. The discrete charcoal-rich deposits [017] which lie scattered around the SW periphery of the structure could well be spilt bucket-loads of hearth debris which contributed to this trample.

SPATIAL ORGANISATION

One of the most significant results to emerge from the excavation and subsequent analyses is the differences in layout within the structure and the variation in type of floor surface, particularly around the hearth. The NW side was not excavated but the differences around the other three sides are striking. The basal layer of logs [046] is only found to the SW and SE of the hearth, as are the subsequent log surfaces [047] and [042]. These are completely absent on the NE side where all that exists is a surface of radial and tangential logs [012]/[022] laid immediately over the natural peat surface. (It may also be significant that the only ash wood used in the construction of the house was found on the NE side, alder being used everywhere else, but this could also simply be an issue of availability). The stony surface [039] which lies to the SE of the hearth does not extend around the SW or NE sides, although [034] may be a continuation of this surface into the E side of the house. The occupation deposits in the SW and NE halves of the house are also strikingly different. Different types of plant litter appear to have been used for flooring, sedges and rushes on the NE and grasses and leaves on the SW, but the most significant difference is the absence of domestic rubbish on the NE side of the house. Food and hearth debris has been trampled into the floors on the SW side, bucket-loads of hearth debris have been spilt and hearth debris spilling out from the hearth has built up on only on its SW and SE edges. The artefacts were also found mainly on the SW side of the house and around the SW and SE sides of the hearth (Figure 18). The implication is that most domestic activity was taking place in the W half of the house and possibly to N and S of the hearth.

So what was happening in the NE half of the house? There are hints from the insect and micromorph evidence that animals might have been stabled on this side of the house. The putative stabling deposit [013] lies on and beyond the boundary of the outermost stakeline so they may have been stabled outside rather than inside the house. It is possible that the stony surfaces [034] and [039] represent a path through the house from the SW entrance to another entrance on the NE side which accessed the stables.

It is in this context that the oak posts 021/C and 021/D might have a function. These posts could feasibly have provided structural support for the roof, and at least one, 021/C lies just off the projected circuit of the post-ring. Their concave bases were clearly designed to fit over a log floor, a design feature which would have spread the downward thrust of the roof over the log floor rather than into the peat below, and would also have facilitated the replacement of damaged posts. However, 021/D lies well off the circuit of the post-ring and perhaps too close to the hearth to the hearth to have functioned as a roof support. An alternative explanation is that they formed a low barrier around the SW and NE sides of the hearth with small horizontal poles between each post (see *Woodworking*) preventing access to the hearth from the path. The design of the post bases would have made such a barrier moveable and easy mobility may have been an important requirement for which earthfast screens or barriers were not suitable. The design also implies that the log sub-floors were exposed to the extent that the posts could be easily positioned over a log so the plant litter coverings must have been thick enough to create a flat floor over the corrugated surface of the logs.

7 DISCUSSION

Investigations at the site at the Black Loch of Myrton has added a new site-type to the Scottish archaeological record, that of a loch-village, a settlement on the peaty margins of the loch, rather than a crannog in the loch itself. As yet only one of the structures in the settlement has been excavated, and only partially, but this has produced new evidence for the construction and internal organization of Iron Age roundhouses.

No physical earthfast evidence for the division of space has been found in the form of stakelines but the differences in floor surface observed around the hearth, in floor coverings and the presence/absence of domestic rubbish must surely represent areas where distinct activities took place. Only 15% of excavated roundhouses display clear evidence of internal divisions (Pope 2003, 257). None of the distinctions observed at BLM would have survived on a terrestrial site, apart from the stone surfaces (though even these would be lost to plough truncation or field clearance in areas cultivated in subsequent centuries), and the different activity areas may have been delineated by a moveable screen or barrier, which would have left no imprint. Without knowing where the entrance is, the evidence from BLM cannot contribute to the debate on cosmologically-based divisions or more straightforward front-rear division (ibid 263) but the variety in floor type and coverings points to complex arrangements of space.

The refurbishment of the hearth twice after its initial construction, as well as the replacement of posts within the post-ring, indicates some chronological depth but dendrochronological analysis has not been able to specify the exact duration of occupation. Nonetheless, the analyses suggest that it cannot have been much more than a decade (Crone *infra*) and other evidence also supports a relatively short duration for the construction and occupation of the house. Robertson (*infra*) argues that the small, limited nature of the waterlogged organic assemblage is indicative of rapid formation and short duration, while the absence of evidence at BLM for the cleaning and renewal of floor surfaces seen at Cults Loch 3 (Roy *infra*) could also be interpreted as evidence that the house was not lived in for any prolonged period of time. This also raises the issue of seasonal occupation; if it were seasonal the slight evidence for stabling would suggest over-wintering.

We have few clues as to the social and economic status of the occupants but both the artefact assemblage and the macroplant evidence confirm that they were cultivating and processing their own crops. The iron ploughshare tip testifies to cultivation, as does the presence of large numbers of chaff fragments. The presence of spelt and bread/club wheat at BLM is contributing to an emerging regional picture which suggests that these wheat crops were a small but consistent element of the diet of SW Scotland during the Iron Age, and should perhaps be viewed as the norm rather than as exotics or traded goods.

The artefact assemblage is undistinguished apart from the ploughshare tip and the presence of a small ceramic sherd which is an exceptional find in the generally aceramic culture of Iron Age SW Scotland.

The first season of excavation at BLM has revealed valuable evidence for the organic dimension of Iron Age roundhouses but it is clear that much has already been lost. Both the micromorphological evidence and the insect remains indicate the degree of decay that the upper oxidized layers have undergone, as does a comparison between the well preserved alder timbers of the foundation layer [046] and the decayed remains of the sub-floor surface [009].

THE SIGNIFICANCE OF THE BLACK LOCH OF MYRTON

As a *lochside settlement* BLM represents an entirely new site type for Scotland. The only contemporary parallels that come readily to mind are the Iron Age lake villages of Glastonbury and Meare in Somerset (Coles & Minnitt 2000), and the settlement at Ballycagen Lough, Isle of Man which was built out on the floodplain of a small river (Bersu 1977). While many of the features of the Glastonbury and Meare sites can be recognised at BLM, such as the refurbishment of sinking hearths, BLM is perhaps structurally more akin to the Irish Bronze Age settlements of Clonfinlough (Moloney 1993) and Cullyhanna (Hodges 1958), both of which consist of a small group of house platforms built directly over fen peat on the shores of a small lough. These are all exceptional sites, with few, if any comparable examples elsewhere in the British Isles.

It has long been assumed that such settlements must exist in Scotland; the site of Cults Loch 3 was initially thought to be a lochside settlement but excavation has shown it to be a crannog, the reverse of what has been revealed at BLM. BLM is significant in a Scottish context because the site lies on a spectrum between the classic wetland site, the crannog and the roundhouses of the terrestrial record. It has always been difficult to transpose the evidence of the better-preserved structural organics from one site to the other, but BLM provides an intermediary stage, a well-defined roundhouse with its organic components relatively intact, and with evidence of sophisticated structural responses to challenging environments. BLM demonstrates that in the Iron Age a wider range of wetland environments than was previously known were being sought out for settlement. The settlement at BLM may reflect a different social and economic stratum to that represented by crannogs in terms of access to resource bases and social organisation. In this context the relationship between BLM and the crannog in the neighbouring White Loch of Myrton (Henderson *et al* 2003, 93-4) is of critical interest. The White Loch crannog produced a radiocarbon date of 2080 ± 50 BC (GU-10921), which calibrates to 350-50 BC (Henderson *et al* 2006, 30) and is comparable to that from the oak palisade stake from BLM.

It is worth noting that although the BLM settlement is unique in a locational sense, there are many indications that the form of the settlement is very typical of the earlier Iron Age more widely. The diameter of Structure 1 is entirely in keeping with the typical range of ring-groove structures found widely on settlements of the mid 1st millennium BC across southern Scotland, and the post and stake ring arrangement is very similar to other excavated roundhouses in the area found in dryland environments, not least Roundhouse A at Cults Loch 5 (Cavers & Crone *forthcoming*). No evidence has yet been identified for an enclosure at BLM (Maxwell described a stockade and the two timbers recovered during the digging of the run-off channel may relate to such a feature but it has still to be conclusively demonstrated); if one were not present it would certainly make the site unique in our knowledge of the settlement record of SW Scotland. It is perhaps in this sense, in the potential to fill out our otherwise skeletal knowledge of how early Iron Age roundhouses were built, used, re-built and abandoned, that BLM has most to offer future study.

With the excavations at Whitefield Loch (Cavers *et al* 2011), Loch Arthur (Henderson & Cavers 2011) and Cults Loch (Cavers & Crone forthcoming) the work of the Wetland Strategy programme in SW Scotland has already demonstrated the variability in construction, morphology and location that is subsumed under the generic label 'crannog', and the excavation at BLM shows that there is probably an even greater variety of site types to be uncovered, as well as other examples of lochside villages. A brief review of the antiquarian literature has already revealed a similar site at nearby Dowalton Loch; On the E side of the loch Stuart (1866, 120-1, Plate XII) had mapped a cluster of little stone mounds and described them in the following fashion;

> 'On the south-east side of the loch, near one of the little promontories, were several cairns surrounded by piles, of which the outline had mostly disappeared at the time of my visit. When they were first seen by Lord Percy, there were six structures of the same character as those already described, arranged in a semicircle. They were, however, much smaller than the others, and appeared to have been single dwellings' (Stuart 1866, 120).

Further afield, the structures uncovered in the 19th century at Whiteburn Moss, Spottiswoode, Berwickshire also sound remarkably similar to that excavated at BLM (Scott 1871) and were found within a similarly terrestrialised lochbed environment; this site is listed in Canmore as a possible crannog.

Placename evidence may also reveal the location of similar sites. It has been pointed out that the name, Myrton, already alerts us to the presence of a 'town on the muir', a placename of Anglo-Saxon derivation (Alex Woolf *pers comm*) so it may be that other names of similar derivation (Merton near Newton Stewart for instance?) may indicate a lochside or wetland settlement.

8 COMMUNITY INVOLVEMENT

Volunteers attended the excavation most days, all of them previously involved in the HLF-funded Machars Project. The Whithorn Story Visitor Centre hosted a poster display of previous work on crannogs in the region and regular updates about the progress of the excavation were posted there. Over the course of the fortnight AOC staff ran workshops at the centre, on finds handling, tree-rings and dating, and ecofact analyses.

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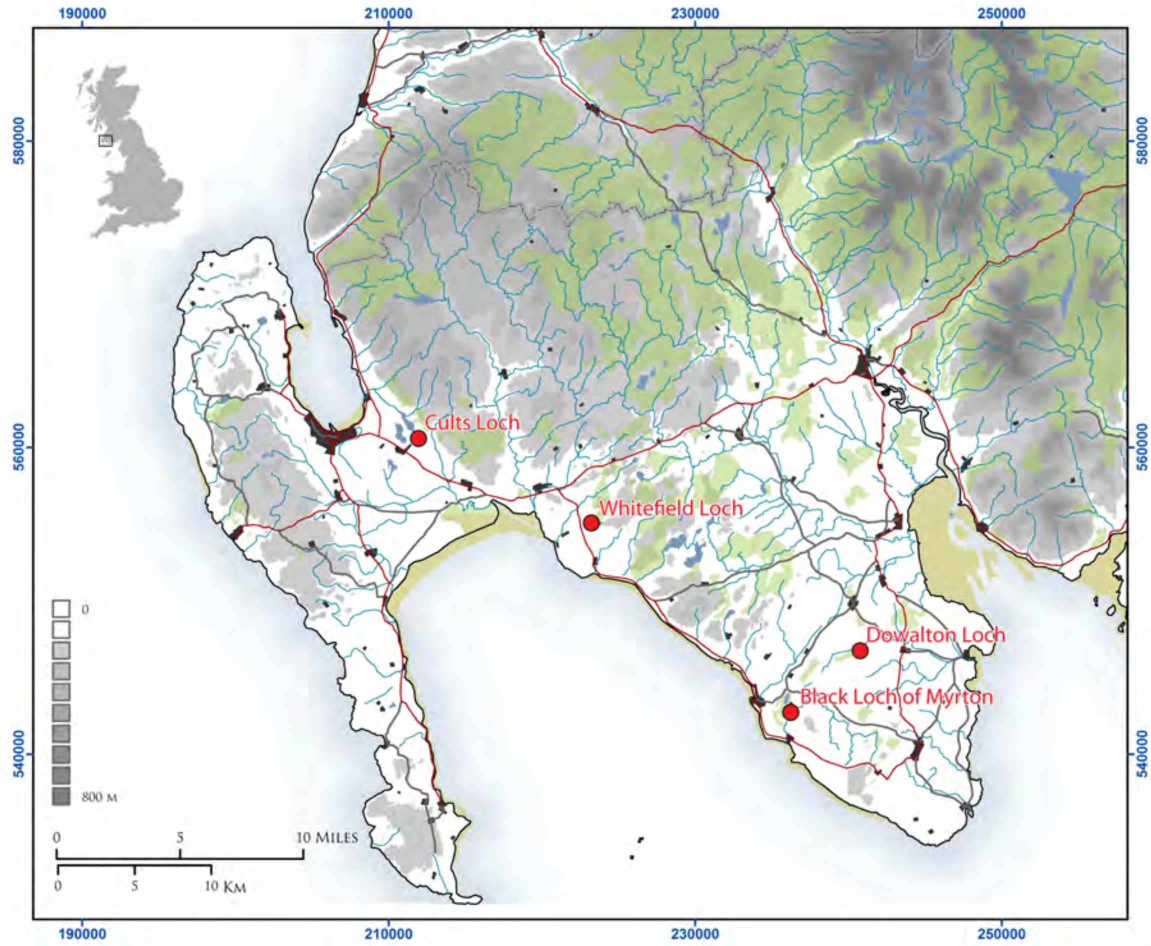


FIGURE 1: Location map

FIGURE 2: The site in its woodland setting; looking E from the mound towards Trench 1A. In the foreground Hearth 3 has just been uncovered on top of the mound.

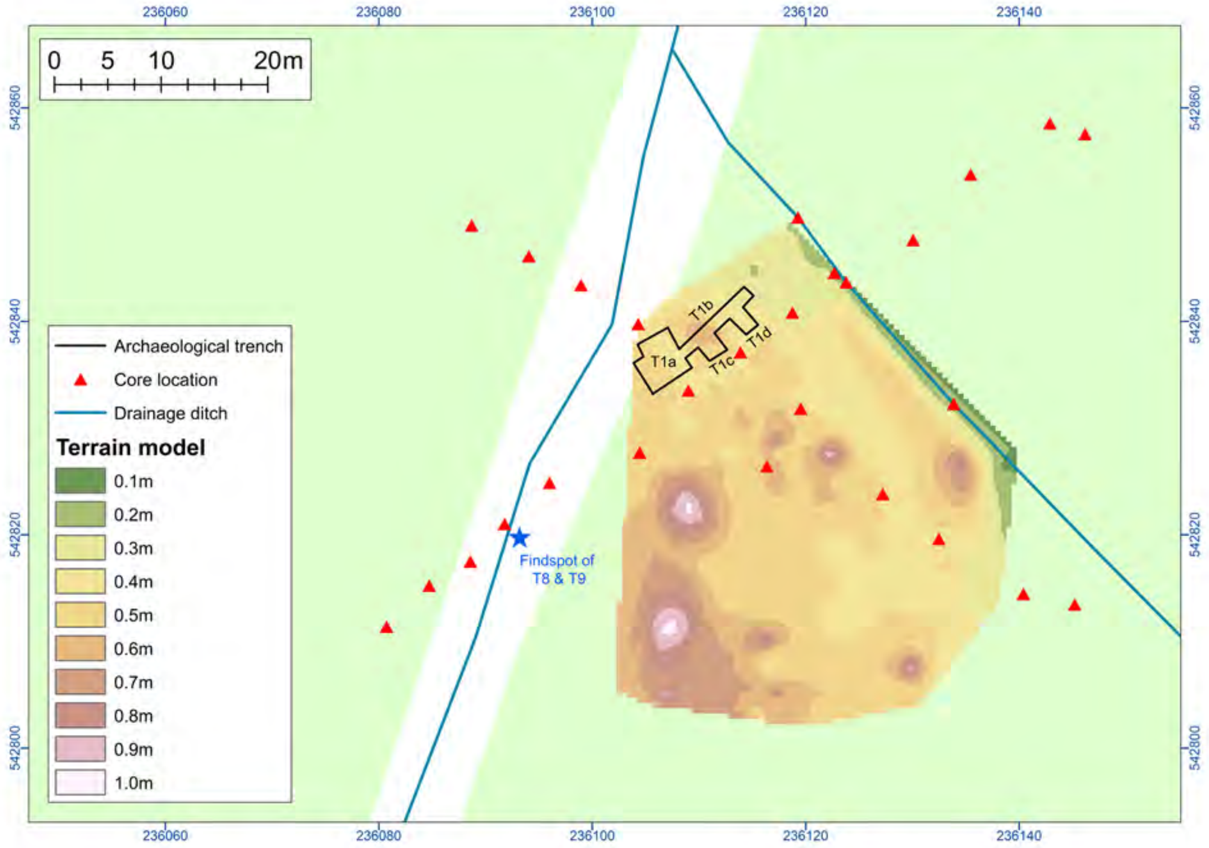


FIGURE 3: The digital terrain model of the site, showing the excavation trenches, the coring transects (coring points denoted by triangles) and the location of the other mounds on the site, including Structure 2.

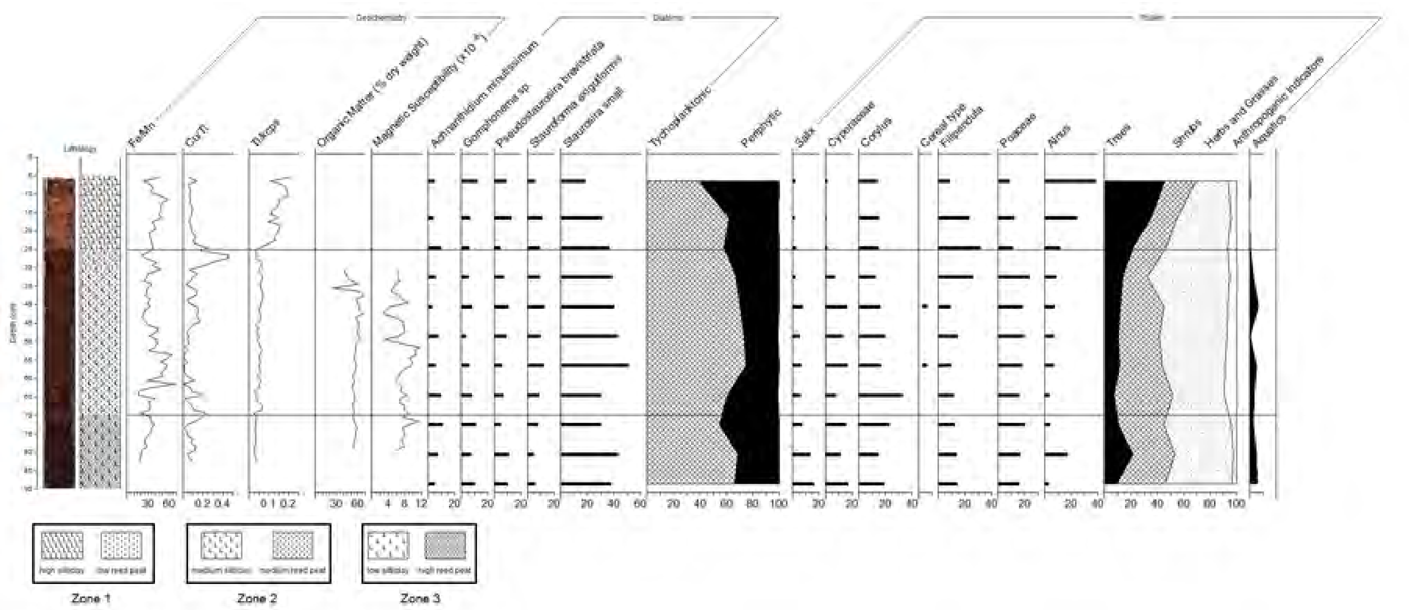


FIGURE 4: Summary diagram of the interim results for the palaeoenvironmental analyses

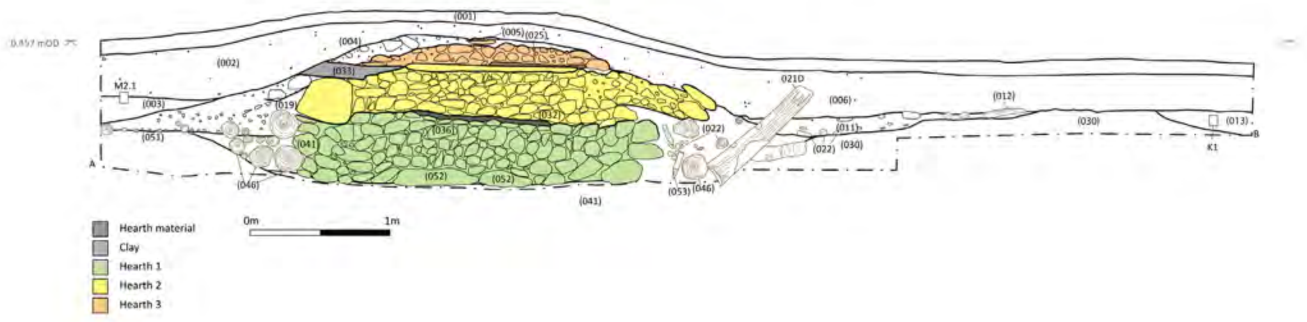


FIGURE 5: Section 1; the main S-facing section along T1B

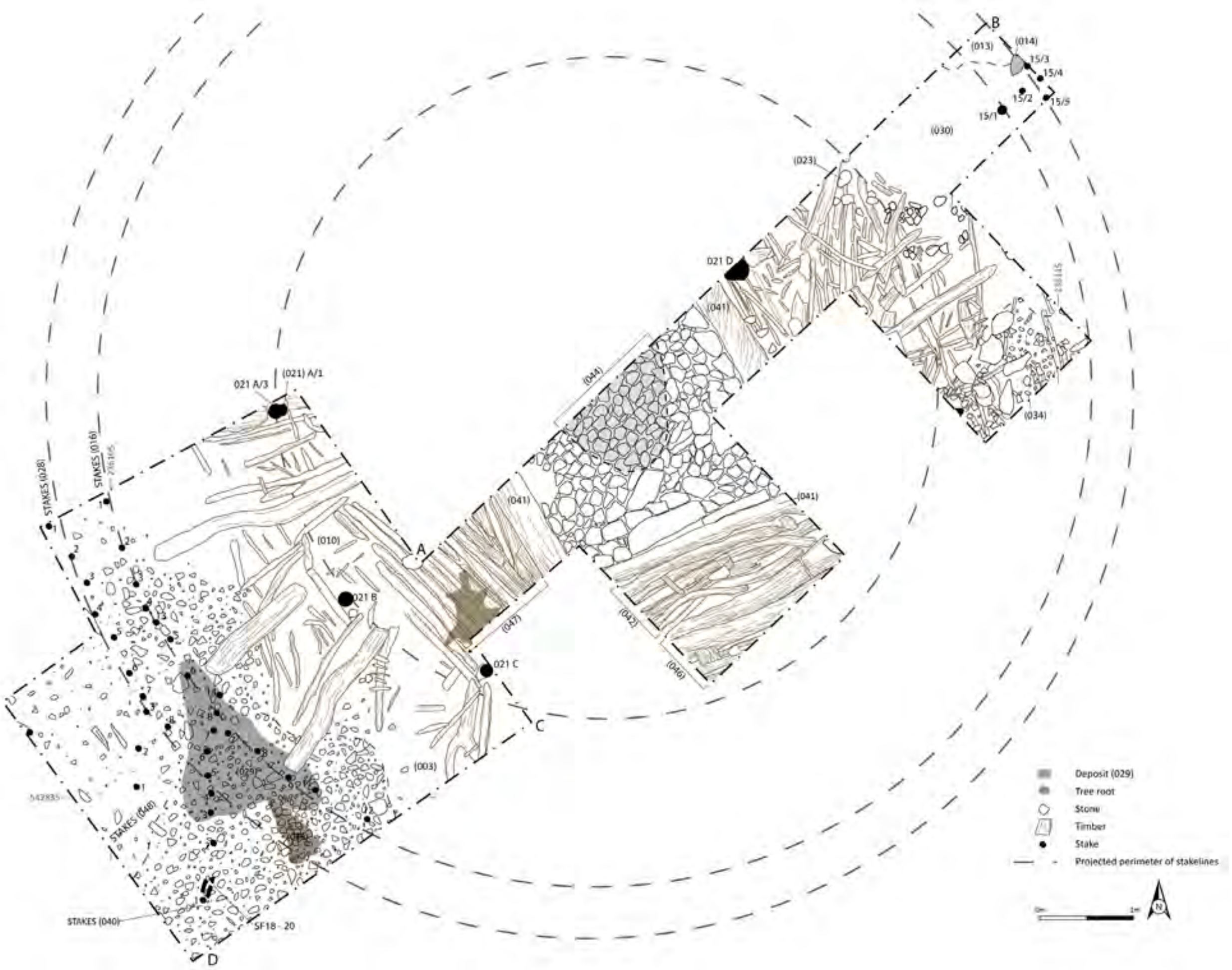


FIGURE 6: Plan of Structure 1 with Hearth 1 exposed

FIGURE 7: The E-facing section of Trench 1C. The log surface [046] has been sampled and below it the reeds and brush-wood layer [050] is visible. The compaction of the underlying peat surface caused by the weight of the hearth complex is pronounced in this section, the log surface sloping down to the right towards the hearths. The hearth debris [019], the dislodged packing [027] and the patches of clay [037] can be seen across the middle of the section, under the clay [002].

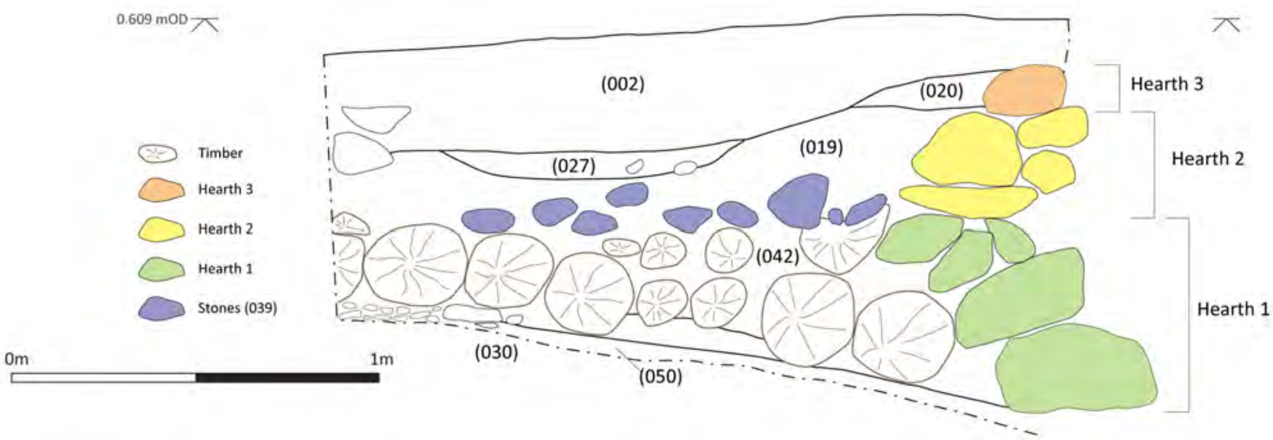


FIGURE 8: Section 2; E-facing section of Trench 1C.

FIGURE 9: Trench 1C looking S. In the foreground are the foundation stones [052] and behind them is the log surface [046]. The kerbstones of Hearth 1 lie in front of the logs and over the foundation stones.

FIGURE 10: The hearth complex in section – S-facing section of Trench 1B. In the base are the foundation stones, [052], above which are the cobbles and reddish clay base of Hearth 1. Above this are the cobble mound and hearthstone of Hearth 2. The hearthstone of Hearth 3 survives as an impression in the section but the red-orange gravel [005] is visible just under the top-soil. At the very base of the section on the left are the log surfaces [046] and [047] surmounted by the log framework [041].

FIGURE 11: Hearth 1 with clay surface in place. The cobble mound below is just visible, sandwiched between the log framework [041].

FIGURE 12: The cobbles of Hearth 1 after the removal of the clay hearth base. The corduroy surface [047] lies to the right of the hearth and the corresponding log surface [042] lies to the top of the photograph.

FIGURE 13: The radial timber framework [009] to the W of the hearth. The tangential bundles of brushwood [010] can be seen between the radial timbers. The stone surface [008] is visible as an arc beyond the end of the radial timbers, extending SW into the upper corner of the trench.

FIGURE 14: The radial timber framework [012] to the E of the hearth, with bundles of brushwood [022] between the radial timbers. Stones [023] lie along the edge of the radial timber framework defining a sharp edge over the natural peat surface.

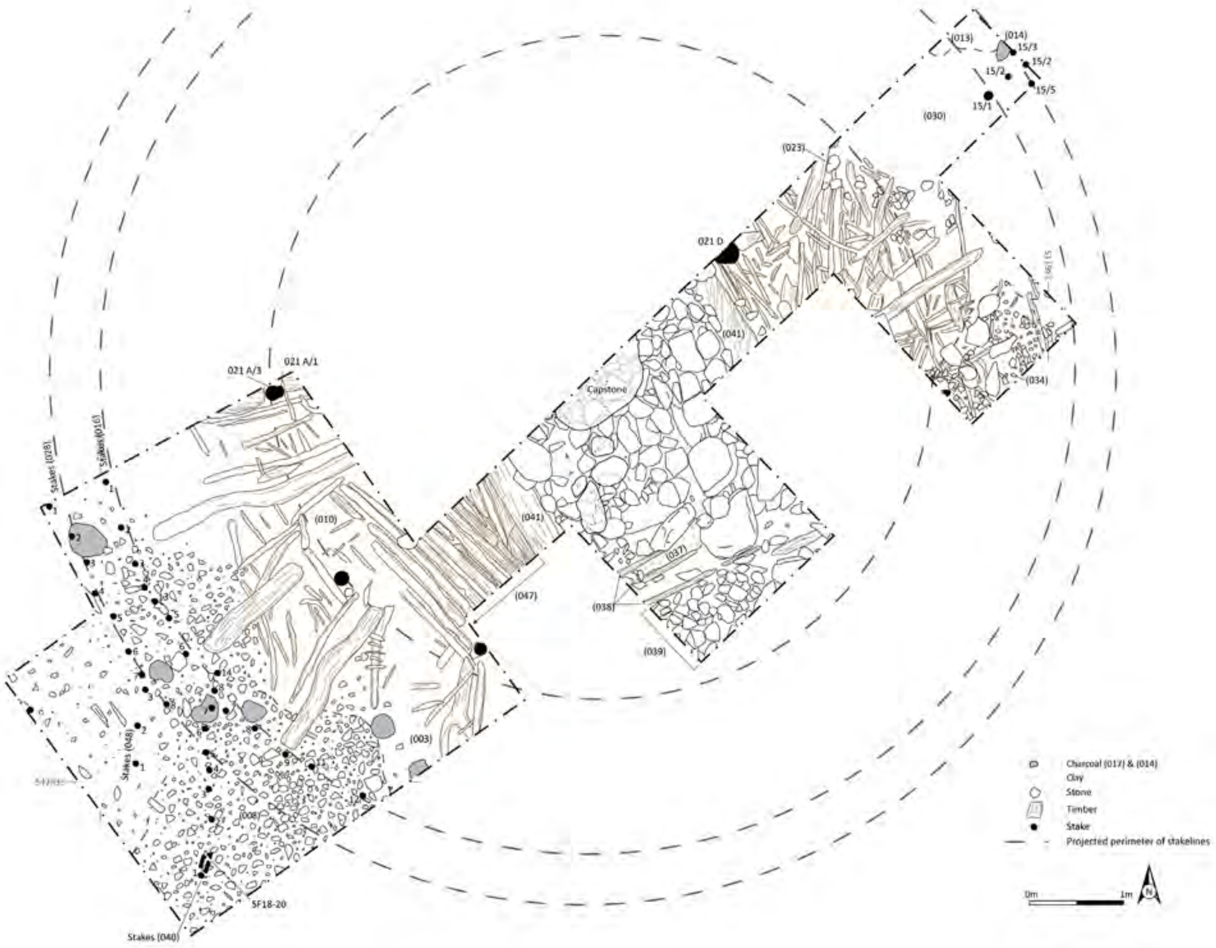


FIGURE 15: Plan of Structure 1 with Hearth 2 exposed

FIGURE 16: Hearth 2 with hearthstone in place. The associated cobble mound is visible in the space left by the removal of one of the Hearth 1 kerbstones and in the foreground are the flat slabs [043] of the Hearth 2 kerb.

FIGURE 17: Hearth 2 after the removal of the hearthstone (still visible in the section). The flat stones of kerb [043] lie in the mid-ground, the clay [037] and the roundwood [038] visible to the left, partially overlying some of the stones. In the foreground is the densely packed stone surface [039].

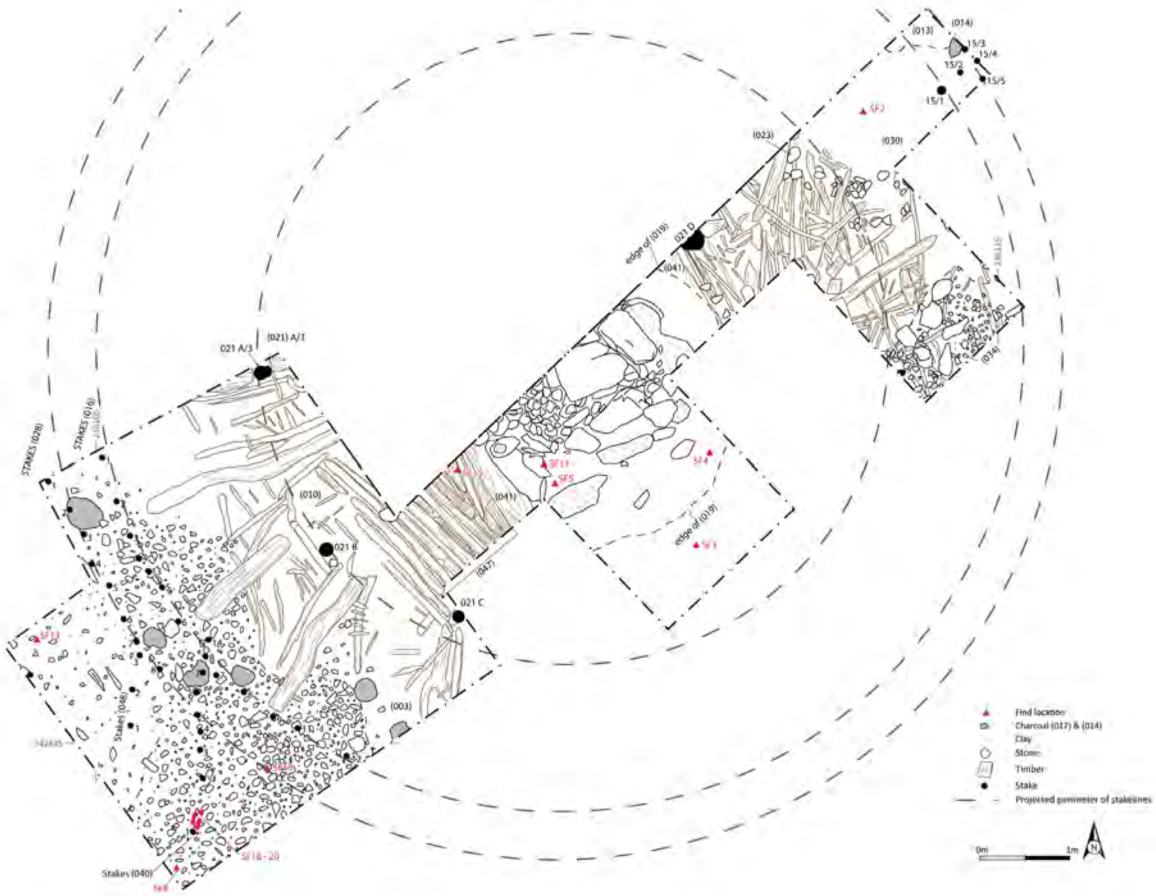


FIGURE 18: Structure 1 with Hearth 3 exposed. The distribution of artefacts around the structure is also shown.

FIGURE 19a: Hearth 3 with clay [020] in the foreground, packed around the hearthstone. The clay is visible to the left of the large kerbstone as a thin knobbly ridge, and above the scale is a patch of reddish burnt daub.

FIGURE 19b: Hearth 3 after the removal of the hearth debris [005] and the clay packing [020]. The massive stone kerb is visible in the foreground and to the left.

FIGURE 20a: Posts [021]A1 (to right) & [021]A3 (to left) in situ

FIGURE 20b: Post [021]A3 in situ after removal of [021]A1 and [021]A2

FIGURE 21: Trench 1A after the removal of the stone surface [008]. The stake-lines [016] and [028] are visible in the foreground marked by garden tags. Note the height of the hearth complex over the surrounding floor levels.

FIGURE 22: The stakes of stake-line [040] seen in section. Note the variation in size and depth.

FIGURE 23: The cluster of oak planks, SF18 – 20 in situ. The stake in the foreground is the most SW stake of stake-line [040].

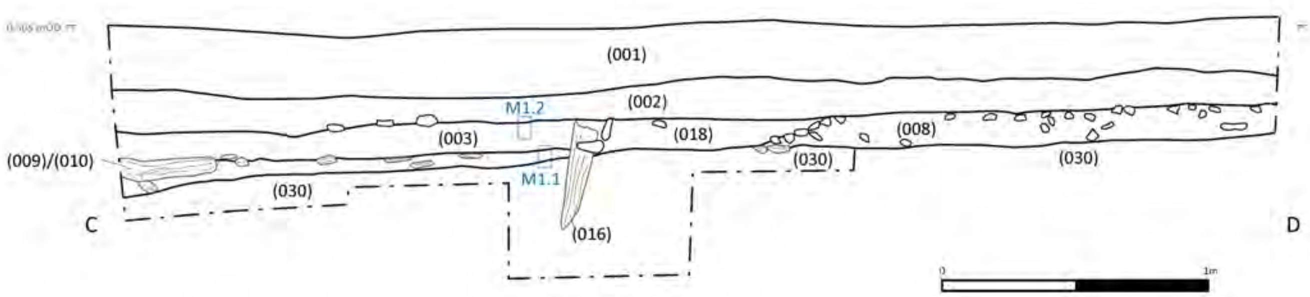


FIGURE 24: The N-facing section of Trench T1A showing stratigraphic sequence through occupation deposits in Structure 1

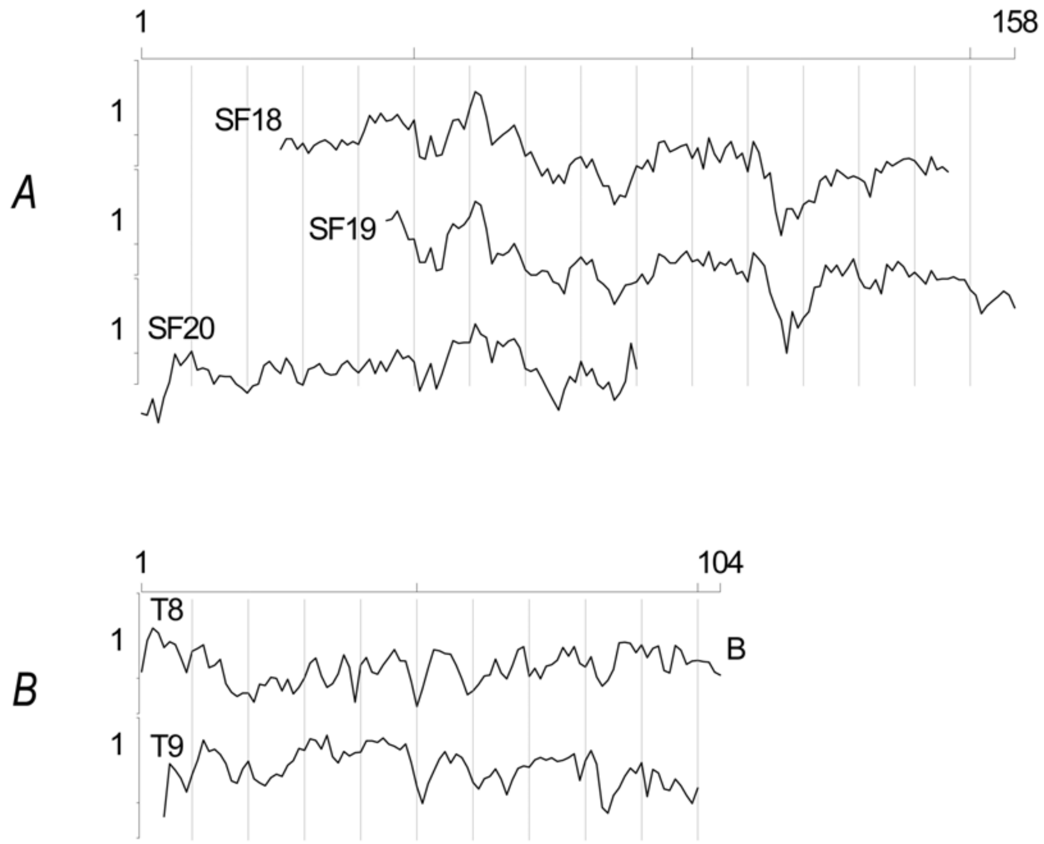


FIGURE 25: A; Visual correlations between the components of F40oakx3; B: Visual correlation between the components of PALx2

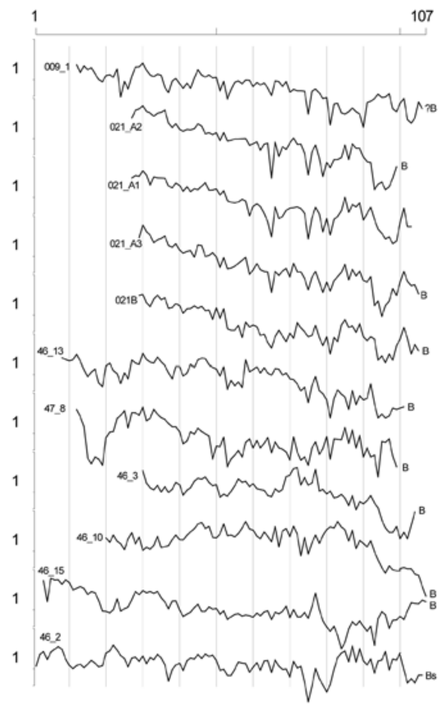


FIGURE 26: Visual correlations between the components of ALDERx11

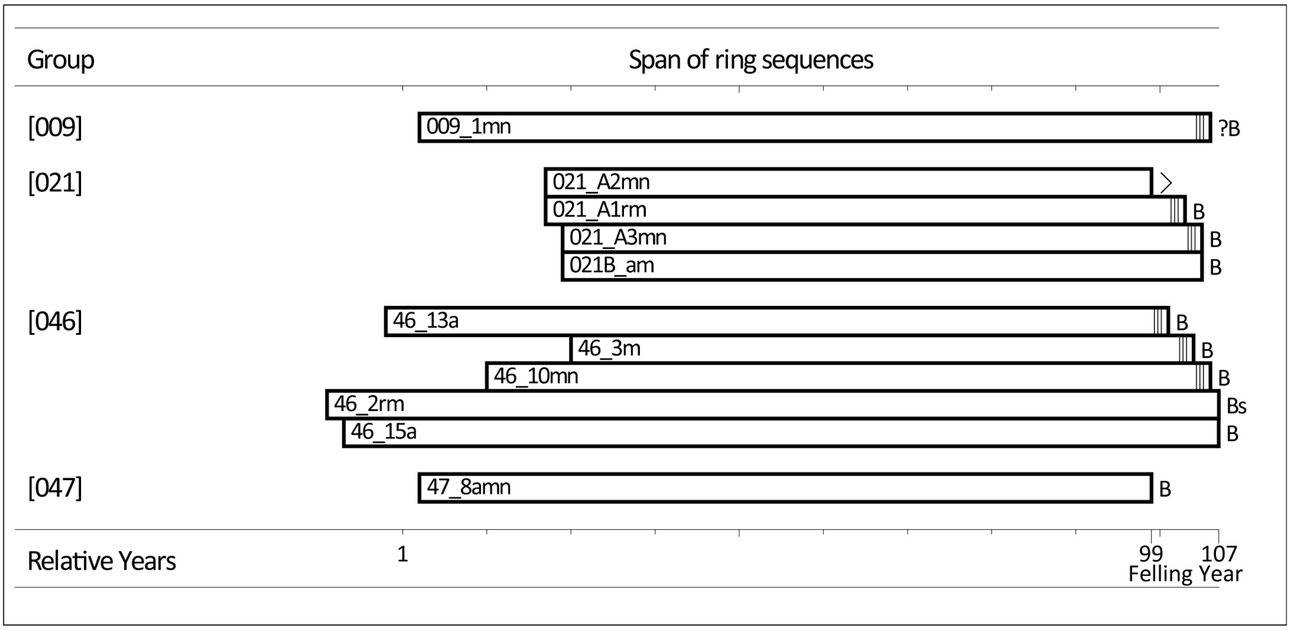


FIGURE 27: Chronological relationships within ALDERx11. The lines on some of the bars indicates the presence of bands of extremely narrow rings

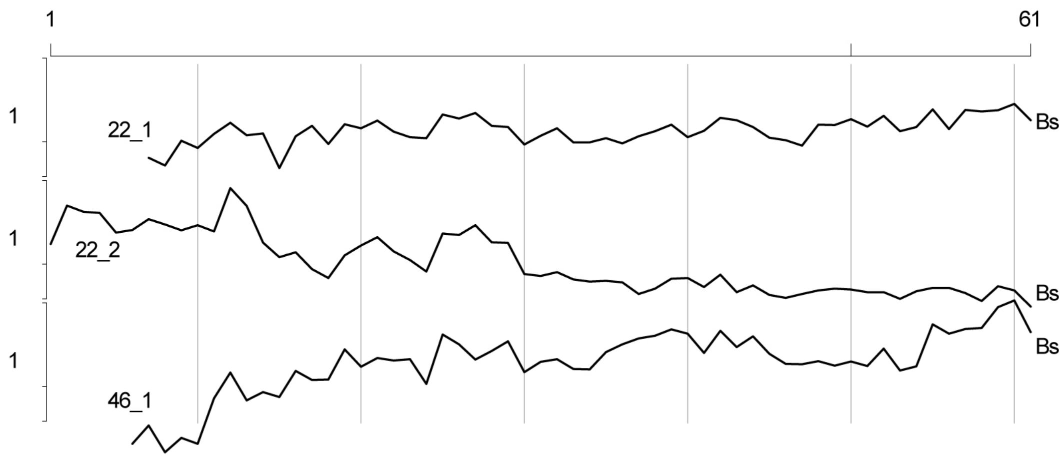


FIGURE 28: Visual correlations between the components of ASHx3 s

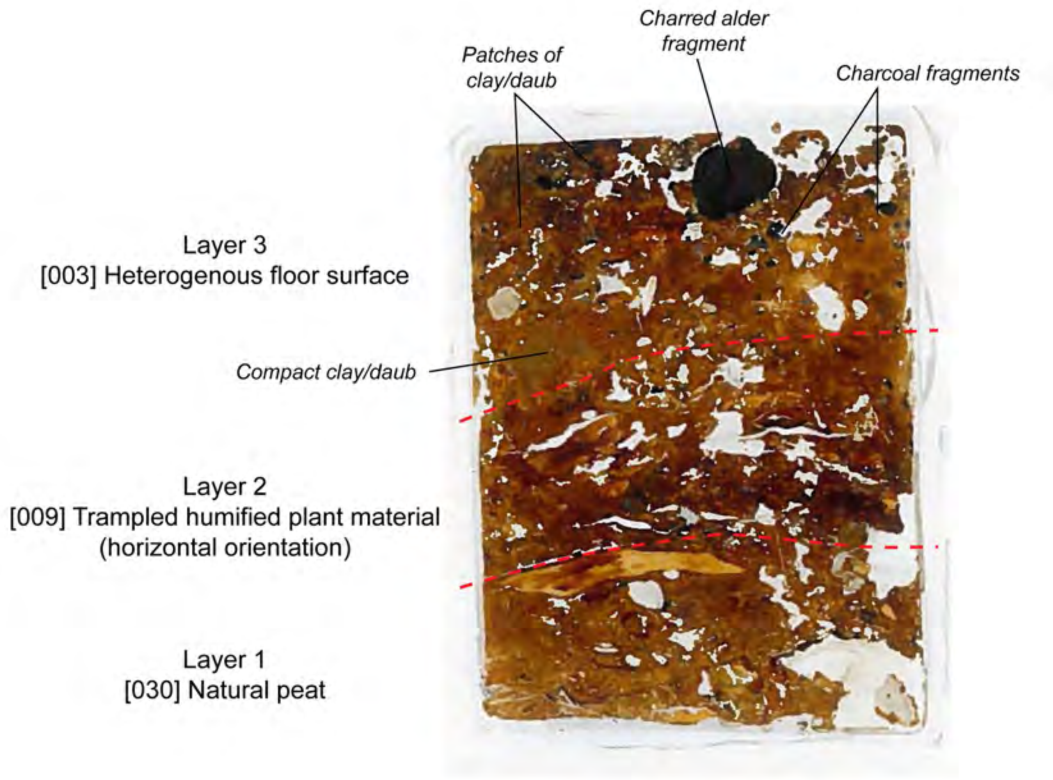


FIGURE 29: Thin-section M1.1

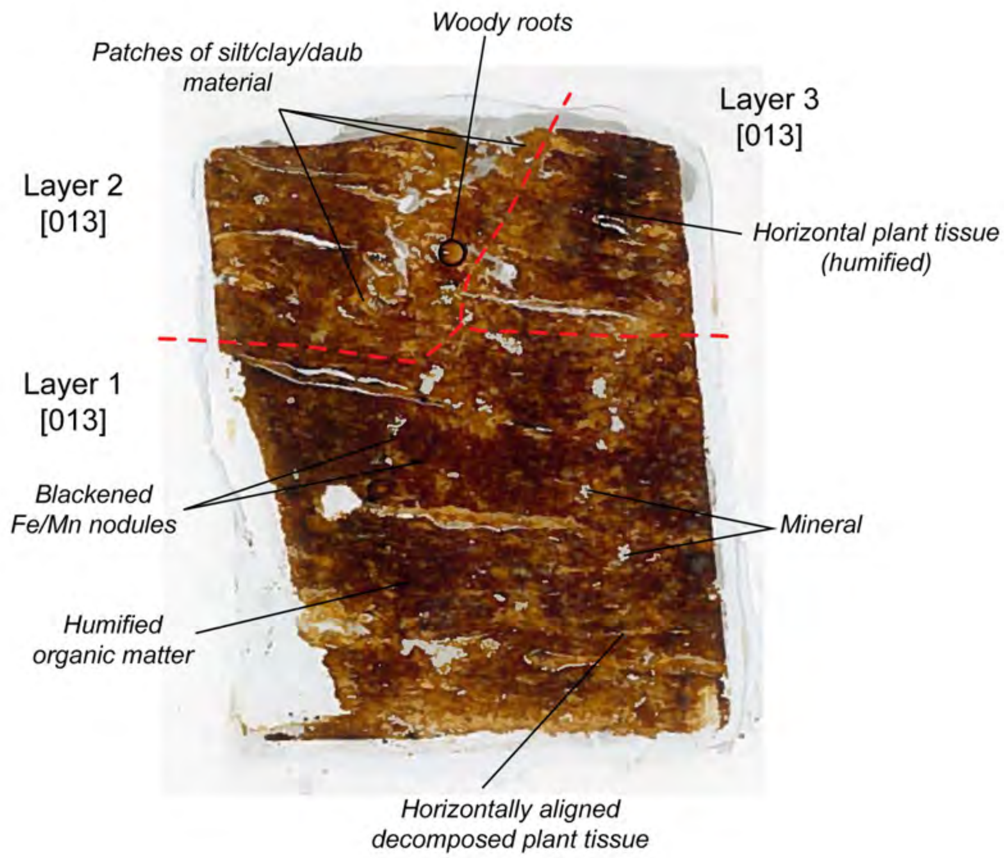


FIGURE 30: Thin-section K1

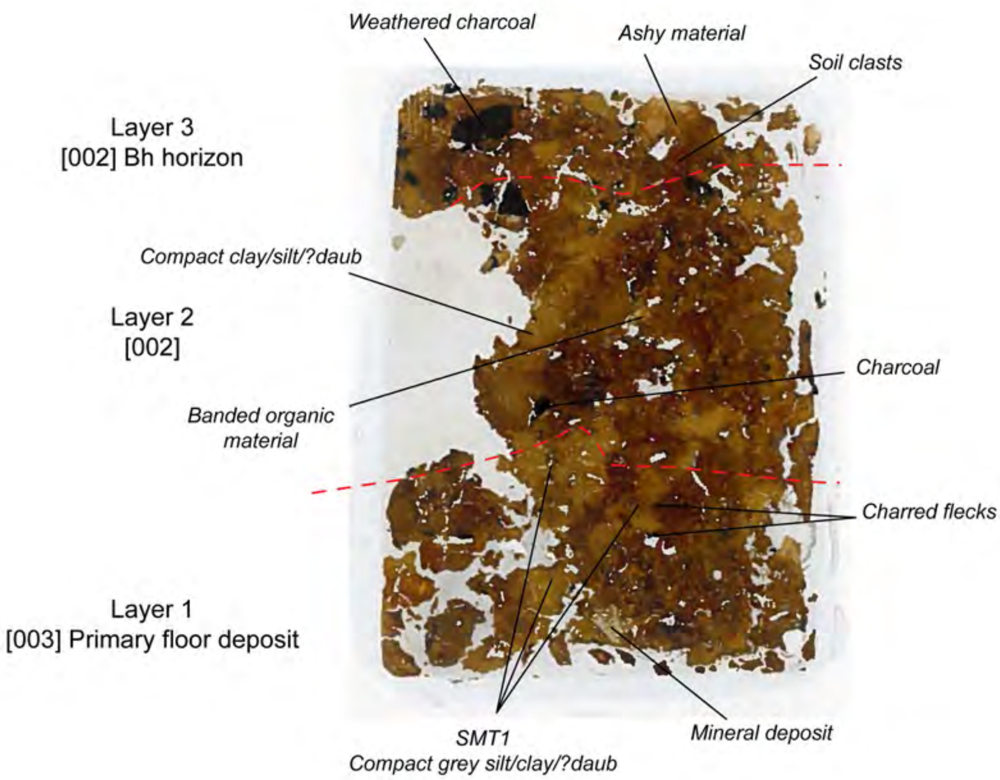


FIGURE 31: Thin-section M1.2

FIGURE 32: Thin-section M2

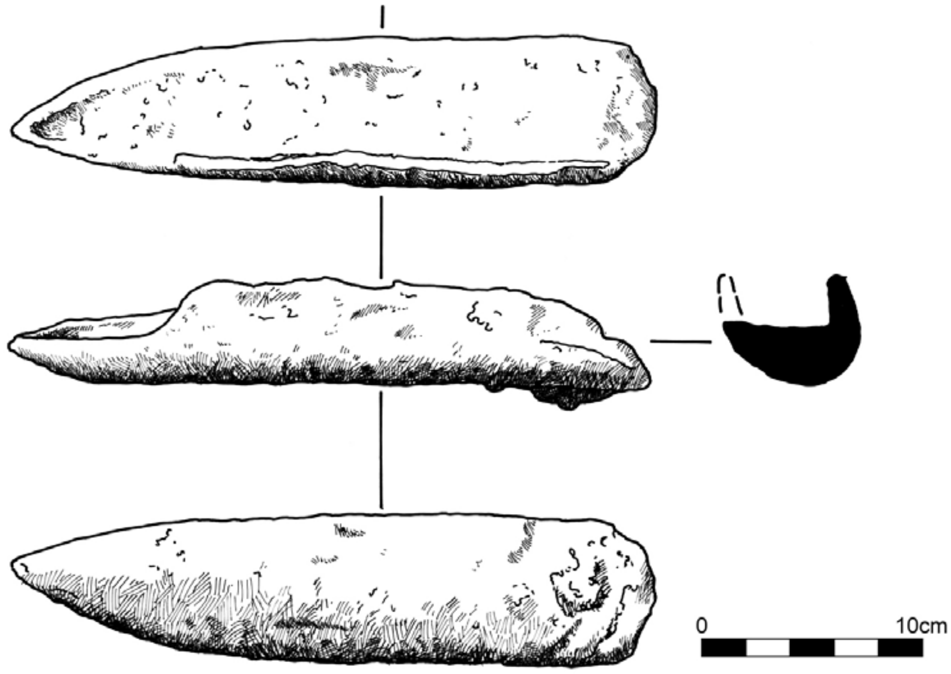


FIGURE 33: The iron ploughshare tip, SF 03

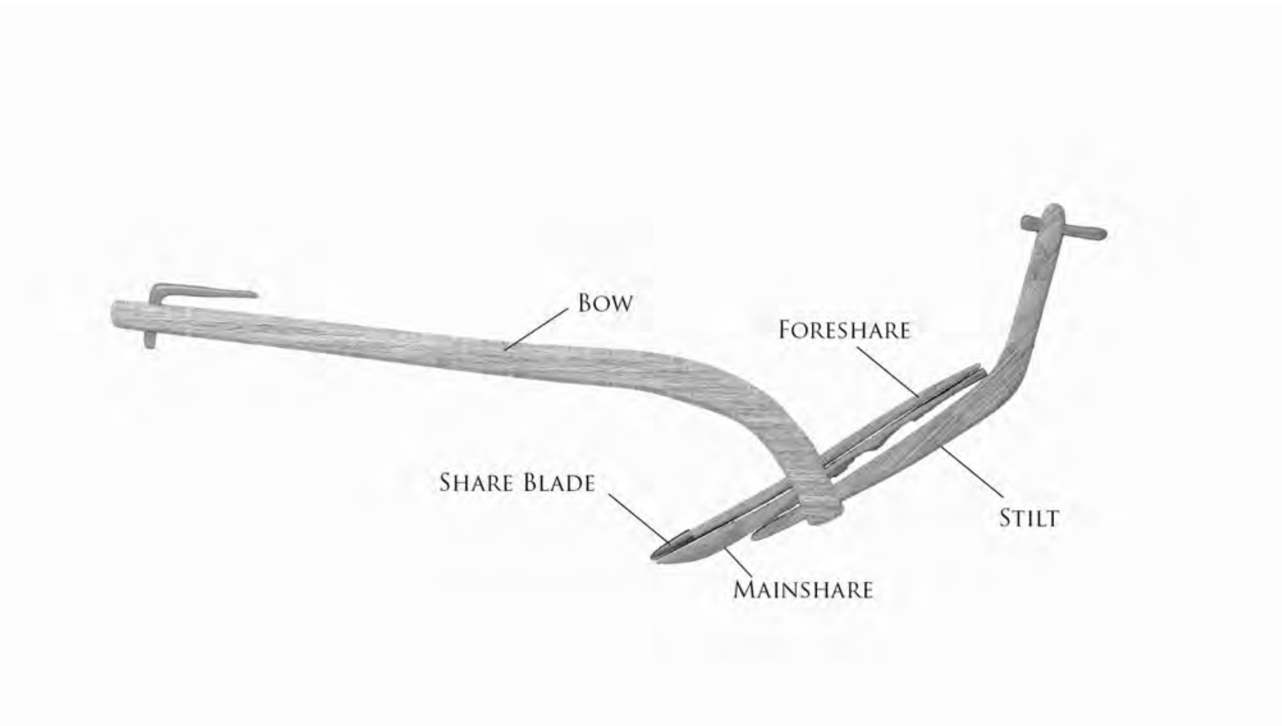


FIGURE 34: A bow ard, showing the position of the share.

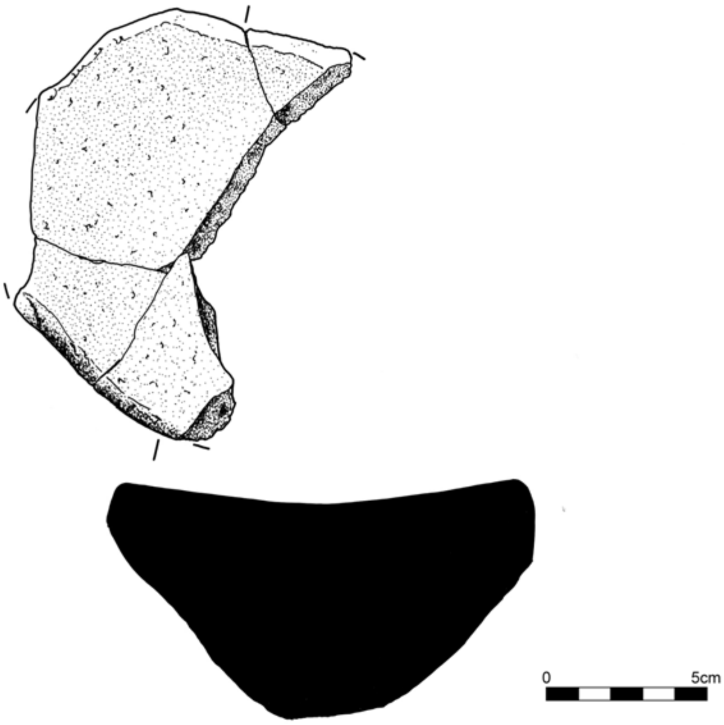


FIGURE 35: The fragmented saddle quern SF 05 and SF 11

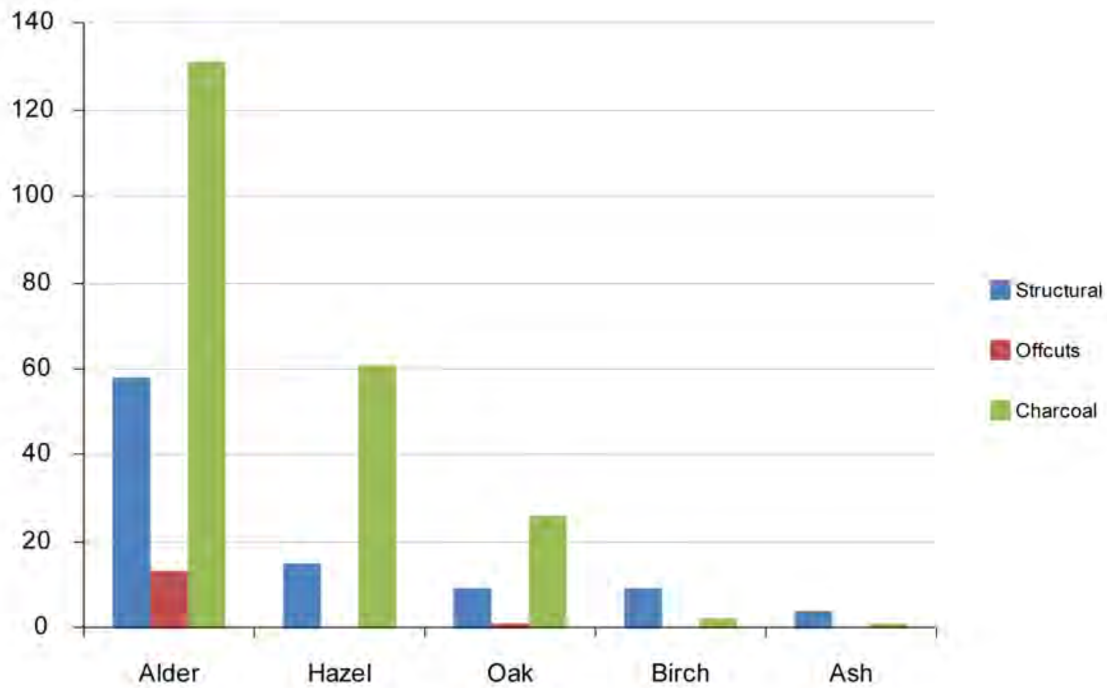


FIGURE 36: Histogram showing wood species composition

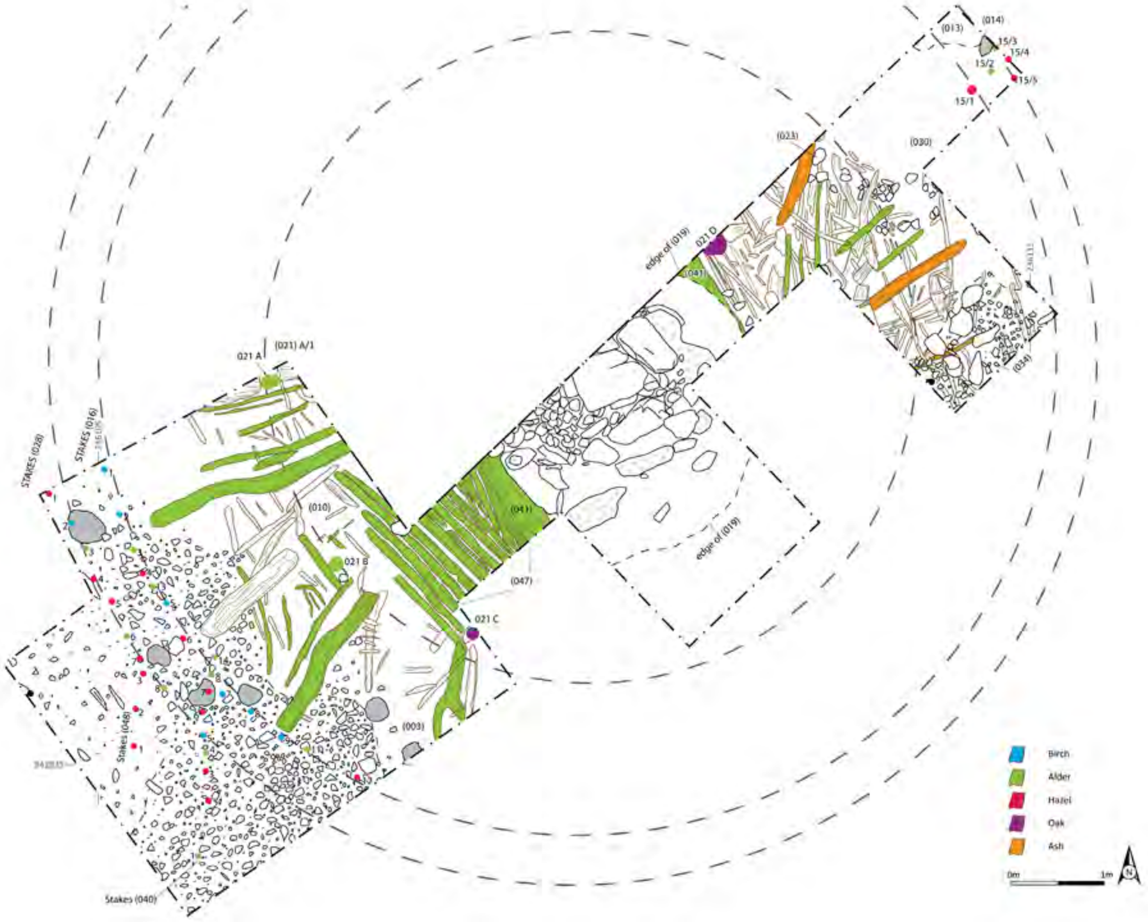
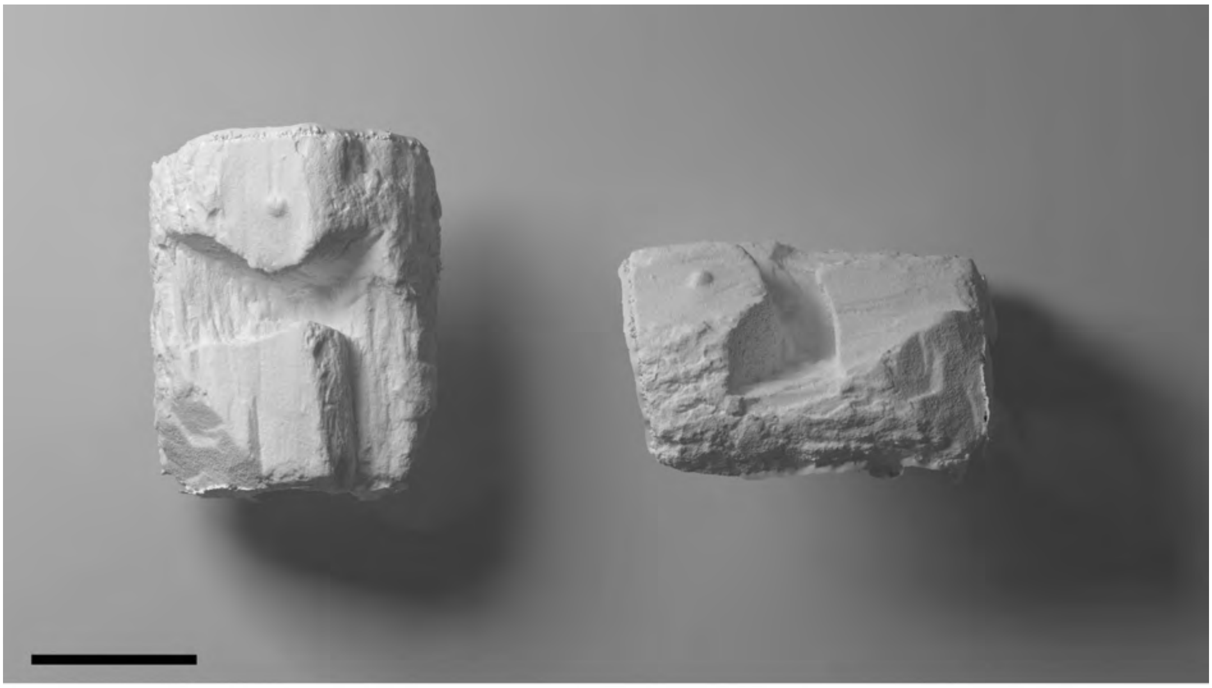
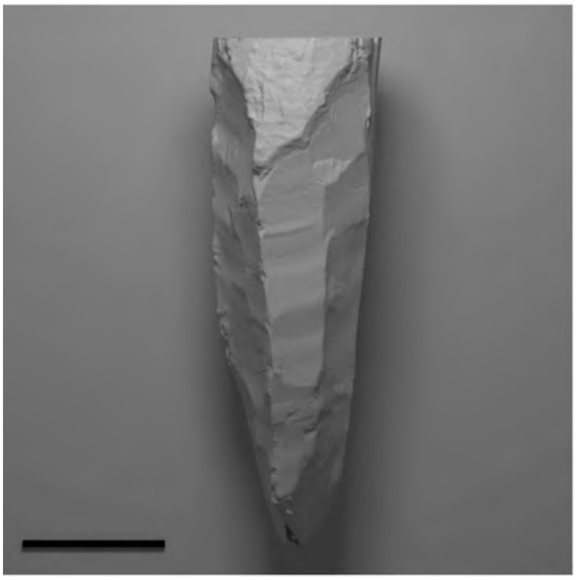


FIGURE 37: Plan of site showing species composition of different structural elements



A



B

FIGURE 38: Laser scans of A: timber 46/15, B: timber 21/B and C: timber 21/D.

C

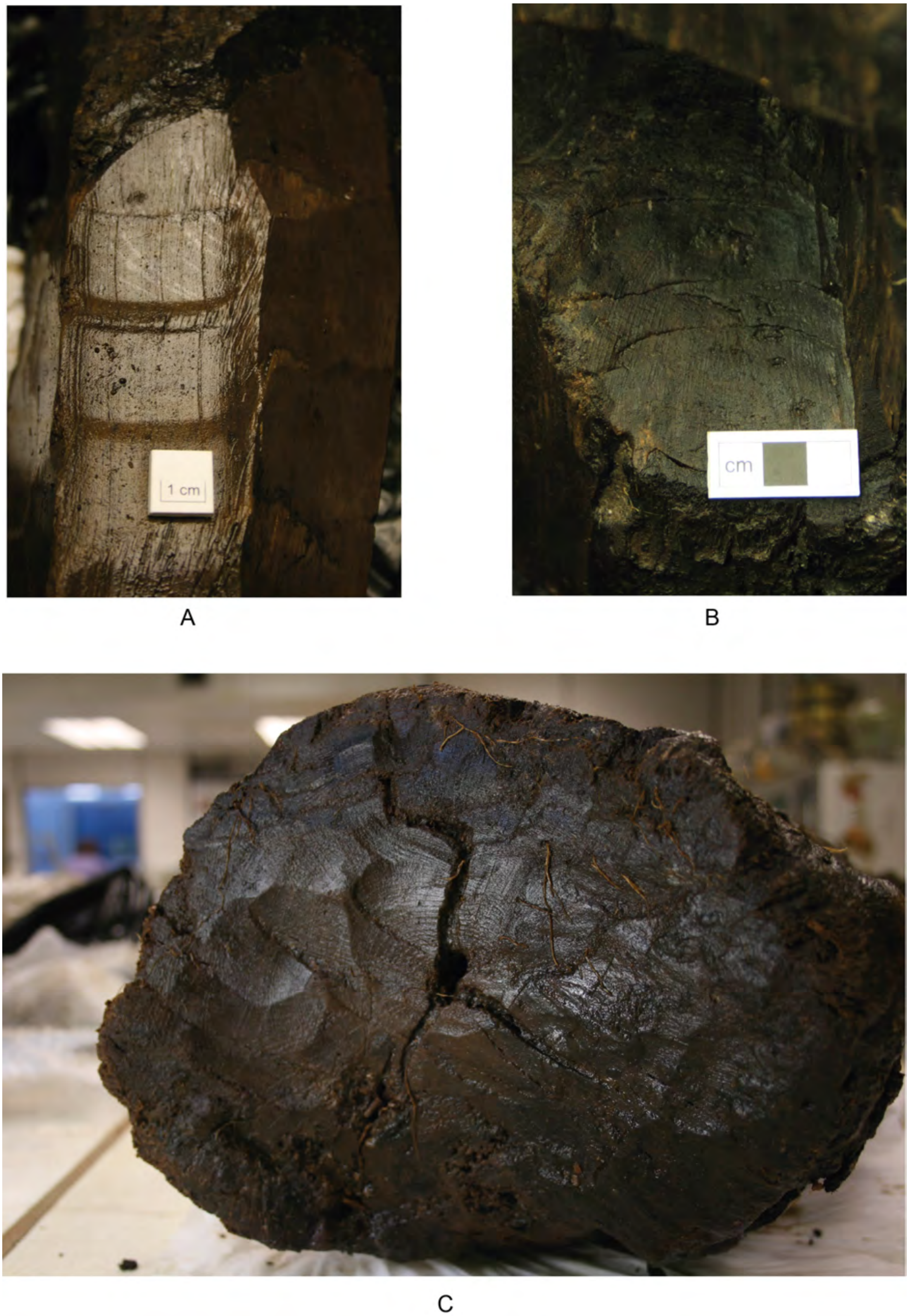
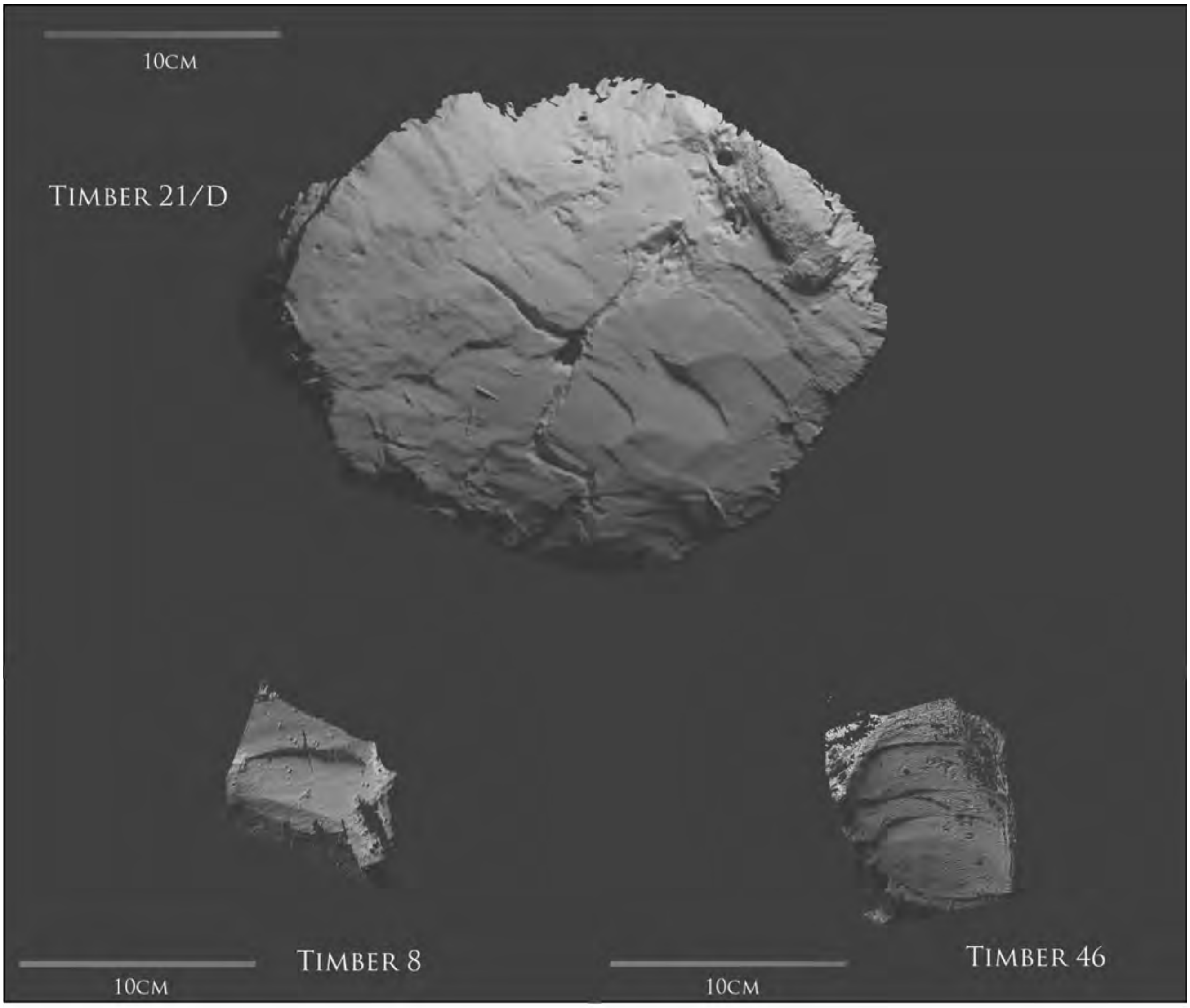


FIGURE 39: A: Tool facets with signatures on timber 21/B; B: complete axe profiles on timber 46/15; C: Toolmarks on the worked base of timber 21/D.



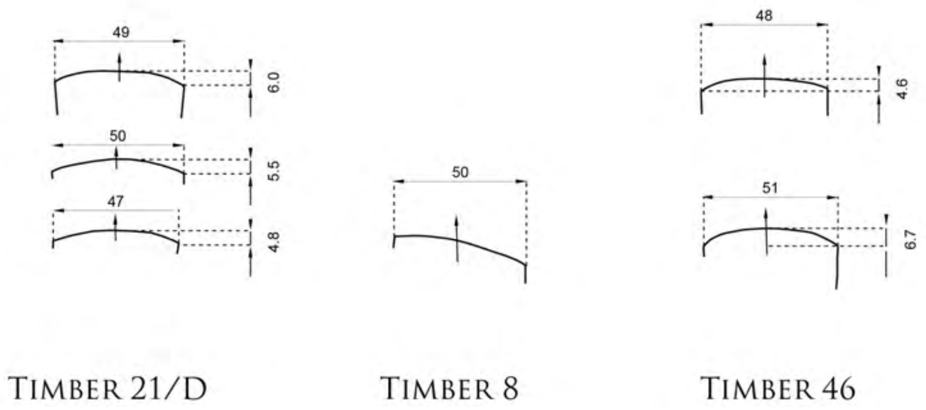


FIGURE 40: Laser scanned tool profiles on timbers 21/D, 8 and 46/15.

FIGURE 41: Tool marks lef by a gouge-type chisel on timber 21/D.

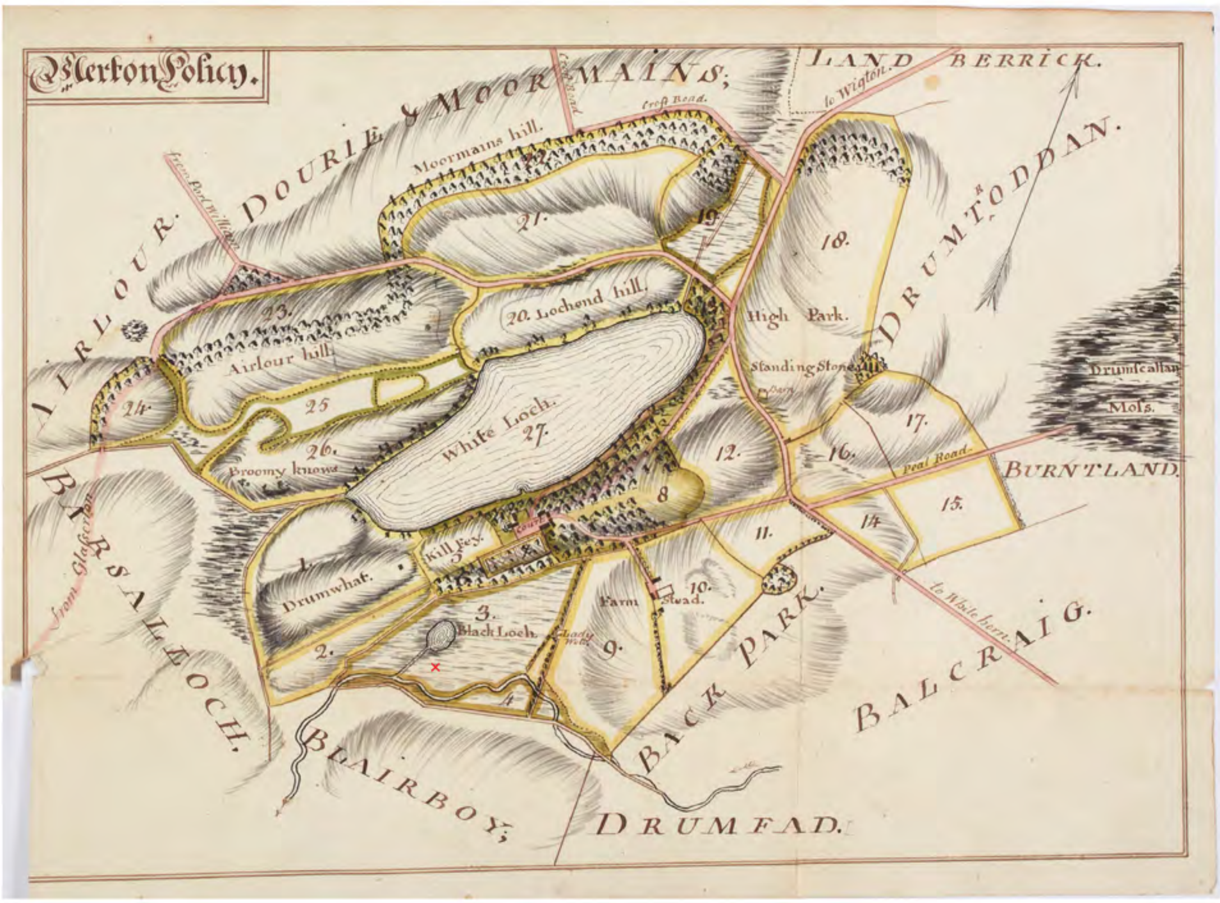


FIGURE 42; John Gilone's plan of the Merton Policy (Monreith Estate) drawn in 1777/8. The Black Loch is visible and the approximate location of the site is marked with a cross.

Context	Sample	No. rings	*pith*	*Sapwood*	*bark edge*		felling range
Structure 1							
021/C	021/C	45	y	21	be		
021/D	021/D	144	y	51	be		
40	SF18	120	/	6	/	]	
40	SF19	114 +3	/	14	/	] F40oakx3	461 - 429 BC
40	SF20	90	/	/	/	]	
Structure 2							
Testpit	TP1	90	5 - 10	21	/	inner 16 yrs not used	
Palisade?							
u/s	T8	104	y	27	be	] PALx2	
u/s	T9	96	5 - 10	26	/	]	

Table 1: Oak dendrochronology data.

	SF18	**SF19**	**SF20**
SF18	/		
SF19	7.62	/	
SF20	6.96	6.54	/

Table 2: Statistical correlations within *F40oakx3*

Context	Sample	No. rings	pith	outer rings
9	1	95	y	be?
9	3	78 +1?	y	be?
9	4	49	y	be
15	3	14	y	be?
16	11	32	y	be s/s
021/A1	1	77	y	be
021/A2	2	73	y	be
021/A3	3	77	y	be
021/B	021/B	77	y	be
28	6	24	y	be
40	1	10	y	be s/s
41	3	100+	y	be?
41	5	103	y	be
42	1	90	y	be
46	2	107	y	be s/s
46	3	75	y	be
46	4	60	y	be
46	5	47	<5	be w?
46	6	186	y	be
46	7	98	<5	be
46	8	154	y	be
46	9	90	y	be
46	10	87	y	be
46	11	71+	y	be
46	13	94	y	be
46	14	75	y	be
46	15	105	<5	be w?
47	9 (8A)	88	y	be

Table 3: Alder dendrochronological data.

A	021x4mn				
	021/A1	021/A2	021/A3	021/B	
021/A1	/				
021/A2	8.88	/			
021/A3	8.44	10.53	/		
021/B	6.87	3.76	3.97	/	
B	mn46x5				
	46/2	46/13	46/3	46/10	46/15
46/2	/				
46/13	6.47	/			
46/3	3.50	4.00	/		
46/10	-	4.20	6.17	/	
46/15	6.29	3.26	-	-	/

Table 4: A) Statistical correlations within *mn021x4* B) Statistical correlations within *mn46x5*

			47_8amn	009_1mn	021_A1rm	021_A2mn	021_A3mn	021b_am	46_2rm	46_3m	46_10mn	46_13a	46_15a
	starts	*ends*											
47_8amn	12	99	*	3.44	3.64	3.54	3.19	5.57	3.11	-	3.41	6.97	-
009_1mn	12	106	*	*	6.38	3.63	4.18	4.19	4.70	-	-	5.29	3.51
021_A1rm	27	103	*	*	*	8.88	8.44	6.88	5.51	3.01	-	5.00	-
021_A2mn	27	99	*	*	*	*	10.53	3.76	6.80	3.46	-	4.47	5.63
021_A3mn	29	105	*	*	*	*	*	3.97	5.95	-	3.21	5.35	-
021b_am	29	105	*	*	*	*	*	*	-	-	-	5.26	-
46_2rm	1	107	*	*	*	*	*	*	*	3.50	-	6.47	6.29
46_3m	30	104	*	*	*	*	*	*	*	*	6.30	4.00	-
46_10mn	20	106	*	*	*	*	*	*	*	*	*	4.22	-
46_13a	8	101	*	*	*	*	*	*	*	*	*	*	3.26
46_15a	3	107	*	*	*	*	*	*	*	*	*	*	*

Table 5: Statistical correlations within *ALDERx11*

	46_1	22_1	22_2
46_1	/		
22_1	4.40	/	
22_2	4.85	4.27	/

Table 6: Statistical correlations within *ASHx3*

Table 7: The waterlogged assemblage

Feature																							
Context			**2**	**3**	**4**	**5**	**11**	**17A**	**17B**	**18**	**19**	**20**	**25**	**27**	**29**	**32**	**33**	**35**	**36**	**37**	**44**	**50**	**51**
Area			TR 1	TR 1	TR 1	TR 1	TR 1		TR 1	TR 1		TR 1	TR 1	Tr 1	Tr 1	TR 1	Tr 1	Tr 1	Tr 1	Tr 1	Tr 1		TR 1
% Sorted			100 %		100 %	100 %	50 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	35 %	100
Sample Vol (Kg)			4	4	4	4	2.5	0.3	0.5	4	4	4	3.5	2.5	4	4	4	3	4	2	3	4	2.5
Flot Vol (ml)			1000	1200	200	150	2000	120	70	450	150	150	300	150	590	150	450	390	90	70	170	1500	1500
Vernacular name	**Common name**	**Plant part**																					
Wild Food																							
***Corylus avellana* L.**	Hazel nut	Nutshell frg(s)								*			***		*	*	*		*				*
***Rubus idaeus* L.**	Raspberry	seed(s)			**	*				**	**	*	*	**	*	**	*	*	*	*			
***R. fruticosus* agg**	blackberry/bramble	seed(s)					*																
***Fragaria ananassa* L.**	Strawberry	seed(s)														*							
Woodland																							
***Pteridium aquilinum* (L.)**	Bracken	Pinnule frg(s)					*											*				****	****
***Betula*sp(p).**	birch	fruit(s)		**	*		*				*					*	*		**				*
***Betula*sp(p).**	birch	bud(s) and/or bud-scale(s)															*						
Alnus glutinosa	Alder	seed(s)								*													
Leaf			*	**				*		**	*		**	*	*	**	***		**		*	**	**
Bark						*											**						
Bud										*			*						*			**	**
Worked wood				*																		*	***
Weed Taxa																							
***Urtica diocia* L.**	Stinging nettle	achene(s)			*											**							
***U. urens* L.**	Annual nettle	achene(s)											*										
***Polygonum aviculare* agg.**	knotgrass	fruit(s)										*											*
		perianth(s)																					*
***P. lapathifolium* L.**	Pale Persicaria	fruit(s)			*																	**	*
***Bilderdykia convolvulus* L.**	Black bindweed	fruit(s)													*								**
***Rumex acetosella* L**	Sheep's sorrel	fruit(s)					*								*								
***Chenopodiaceae* sp(p).**	Goosefoot	seed(s)	*	**	*					***	*				*					*		**	**
***Chenopodium album* L.**	Fat hen	seed(s)		**			*			**	*				*							****	****
***Atriplex* sp(p).**	Oraches	seed(s)								**					*							*	*
***Atriplex hortensis* L.**	Red orach	seed(s)		*						*					*							***	***
***Amaranthus* sp(p).**	Pigweeds	seed(s)																				*	*
***Stellaria media* L.**	Common chickweed	seed (s)																					*
***Stellaria* sp(p).**	Chickweed	seed(s)			*									*									
***Lychnis flos-cuculi* L.**	Ragged robin	seed(s)		*											*								
***Cardamine flexuosa* L.**	Wavy bitter cress	seed(s)														*							
***Ranunculus* sp**	meadow/creeping/bulbous buttercup																					*	*
***Brassica/sinapis* sp(p)**	Cabbage/mustard	seed(s)																					***
***Potentilla* sp(p).**	Cinquefoils, etc	achene(s)					*																
Aphanes avensis	Slender parsley piert	achene(s)					*																
Galeopsis* Subgenus *Galeopsis	Hemp nettle	nutlet(s)					*								*								
Viola sp(p)	Violets/pansies	seed(s)																				**	
***Nuphar* sp(p).**	Yellow water lillies	seed(s)					*																
***Juncus* inflexus/effusus/conglomeratus**	Hard/soft/compact rush	seed(s)													*								
***J. bufonius* L.**	Toad rush	seed(s)					*																

J. cf. *Articulatus* L.	Jointed rush	seed(s)					**															**	*
***Juncus* sp(p).**	Rushes	seed)s)					*				*					*						*	
***Juncus* sp(p).**	Rushes	capsule																					*
***Carex* sp(p).**	Sedges	Nutlet(s)			*		***		*			*	*		*		*					**	*
carex flacca	Glaucous sedge	Nutlet(s)					**															*	
carex hirta	Hairy sedge	Nutlet(s)					**															**	
carex curta	White sedge	Nutlet(s)					*																
***Digitaria* sp(p).**	Finger grasses	fruit(s)		**						**	*					*	*		*				***
seed indet	Indet	Fruit/seeds/buds									*												*
plant stems				***			****			**					*				*			****	**
Moss																							
moss				*		*	*			*	*		*	*		*	****	*	*		*	*	**
Other Finds																							
Clay			****		***	*		*	*	*	**	*		*		*	*	*		*			
compact peat with embedded plantstems etc							*																
Midden type material			**	***			*		*	***					**	*						*	*
Peat							****			*			*					*				*	*
Roots	twisted/matted		**	****	**	***		*	*	***	**	*	*	**	**		****	***		***			
Key:* infrequent, ** occasional, * frequent, **** abundant**																							

Table 8: The charred macroplant

Feature																						
Context			**2**	**3**	**4**	**5**	**11**	**17A**	**17B**	**18**	**19**	**20**	**25**	**27**	**29**	**32**	**33**	**35**	**36**	**37**	**44**	**50**	**51**
Area			TR 1	TR 1	TR 1	TR 1	TR 1		TR 1	TR 1		TR 1	TR 1	Tr 1	Tr 1	TR 1	Tr 1	Tr 1	Tr 1	Tr 1	Tr 1		
% Sorted			100%		100%	100%	50%	100%	100%			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		
Sample Vol (Kg)			4	4	4	4	2.5	0.3	0.5	4	4	4	3.5	2.5	4	4	4	3	4	2	3	4	
Flot Vol (ml)			1000	1200	200	150	2000	120	70	450	150	150	300	150	590	150	450	390	90	70	170		
Vernacular name	**Common name**	**Plant part**																					
Cereal																							
***Hordeum vulgare* L**	Six row barley	Caryopsis/es		1						2	3				1	1	1				1		
		Rachis						1			2												
***Hordeum* sp(p).**	Barley	Caryopsis/es	1	5						1	2	3	2		1	3	1			3			
***Triticum aestivum*-type**	Bread club wheat	Caryopsis/es		1						4	1							1					
		Rachis									17												
***Triticum dicoccum* L.**	Emmer	Caryopsis/es								10	10	1	1			1	1	1					
		Spikelet forks		1						1	28						1				1		
		Glumes	1	1						3	65		2		1						1		
***Triticum spelta* L.**	spelt	Caryopsis/es		1																			
		Glumes		1				1															
	cf spelt	Caryopsis/es													1	1	1						
***Triticum dicoccum/spelta* L.**	Emmer/spelt	Caryopsis/es	1	4				1		2			1				8	1		1			
***Triticum* sp(p).**	Wheat	Caryopsis/es		2	1					16	3					3	3			1			
***Cerealia* indet**	Cereal	Caryopsis/es		5	3			1		11	2	3	1		2	2	6	4	2	3			
		Glumes						1		1	7	3					1						
Wild food																							
***Corylus avellana* L.**	Hazel	Nutshell frg(s)	7	8	6	2		1		96		13	112		2	28	3	8	2	1			
		Nut(s)		1						2			2			1							
***Rubus idaeus* L.**	Raspberry	seed(s)									7		5										
Woodland																							
***Pteridium aquilinum* (L.)**	Bracken	Pinnule frg(s)								8					9								
Leaf													1										
Weed Taxa																							
***Chenopodium album* L.**	Fat hen								1	1													
***Carex* sp(p).**	Sedges	Nutlet(s)							1	1											1		
***Ranunculus* sp(p).**	meadow/creeping/bulbous buttercup	Achene(s)					1		1														
charred moss stem										1											1		
seed charred indet		Fruit/seeds/buds													1						1		
Other finds																							
charred peat			*	**					*	*	*		**		***						***		**
Charred dung											*		*										

Key:* infrequent, ** occasional, *** frequent, **** abundant

Context	Species	Vernacular	rw	twig	total frags	weight (g)	Comments
2	*Quercus* sp.	Oak			4		
2	*Alnus glutinosa*	Alder			2		
2	*Corylus avellana*	Hazel	3		1	3.1	
3	*Alnus glutinosa*	Alder	1		7		
3	*Corylus avellana*	Hazel	1		1	39.2	
4	*Alnus glutinosa*	Alder			6		
4	*Corylus avellana*	Hazel	3		1	45	
5	*Alnus glutinosa*	Alder			3		
5	*Corylus avellana*	Hazel			2	1.6	
17A	*Alnus glutinosa*	Alder			4		
17A	*Corylus avellana*	Hazel	6			13.2	
17B	*Quercus* sp.	Oak			6		Large frags
17B	*Alnus glutinosa*	Alder	3		6		
17B	*Corylus avellana*	Hazel	3	1	1	51.6	
18	*Alnus glutinosa*	Alder	1				8mm
18	*Corylus avellana*	Hazel	3		1		8mm
18	*Alnus glutinosa*	Alder	1				4mm
18	*Corylus avellana*	Hazel	3		1	87.4	4mm
19	*Fraxinus excelsior*	Ash	1				
19	*Quercus* sp.	Oak			1		
19	*Alnus glutinosa*	Alder			8	17.8	
20	*Quercus* sp.	Oak			1		
20	*Alnus glutinosa*	Alder			2		
20	*Corylus avellana*	Hazel			2	3.8	
25	*Quercus* sp.	Oak			1		
25	*Alnus glutinosa*	Alder			6		
25	*Corylus avellana*	Hazel	1				
25	*Betula* sp.	Birch			1		

25	Maloideae	Apple/pear/hawthorn/quince			1	14	
27	*Quercus* sp.	Oak			5	1.3	
29	*Quercus* sp.	Oak			3		8mm
29	*Alnus glutinosa*	Alder	3				8mm
29	*Corylus avellana*	Hazel	4				8mm
29	*Quercus* sp.	Oak			1		4mm
29	*Alnus glutinosa*	Alder			1		4mm
29	*Corylus avellana*	Hazel	4		4	403.5	4mm
32	*Quercus* sp.	Oak			1		
32	*Alnus glutinosa*	Alder			9	45.3	
33	*Quercus* sp.	Oak			1		
33	*Alnus glutinosa*	Alder	2		10		
33	*Corylus avellana*	Hazel	5		2	49.2	
35	*Quercus* sp.	Oak			2		
35	*Alnus glutinosa*	Alder	2		13		
35	*Corylus avellana*	Hazel	2				
35	*Betula* sp.	Birch			1	110.8	
36	*Alnus glutinosa*	Alder	1		3		
36	*Corylus avellana*	Hazel			1	11.1	
37	*Alnus glutinosa*	Alder			7		
37	*Corylus avellana*	Hazel			3	29.8	
44	*Alnus glutinosa*	Alder	2		6		
44	*Corylus avellana*	Hazel	1		1	45.5	
50	*Alnus glutinosa*	Alder			2	0.5	
51	*Alnus glutinosa*	Alder			20	39.2	Large frags/ 15 from 8mm/ 5 from 4mm

Table 9: Charcoal identifications.

Context	Element	Species	No frags	Size	Burnt	Weight (g)
2	Frag	I/M	1	A	Yes	0.08
3	Frag	L/M	3	B	Yes	
3	Frag	I/M	16	A	Yes	
3	Frag	I/M	1	B	No	
3	Frag	I/M	1	B	Yes	
3	Frag	I/M	9	A	Yes	3.5
4	Frag	I/M	43	A	Yes	
4	L/B	M/M	3	B	Yes	
4	Frag	M/M	9	B	Yes	
4	Frag	I/M	55	A	Yes	12.6
5	Frag	I/M	16	A	Yes	1.1
6	Frag	L/M	1	B	Yes	0.09
8	Phalanx	M/M	1	B	Yes	
8	L/B	M/M	1	B	Yes	
8	Frag	L/M	8	B	Yes	
8	Frag	L/M	23	A	Yes	4.5
18	Frag	I/M	109	A	Yes	
18	Frag	M/M	4	B	Yes	
18	Carpal/tarsul	M/M	1	B	Yes	
18	Frag	M/M	8	B	Yes	
18	Frag	I/M	113	A	Yes	
18	Tooth frag	L/M	1	A	Yes	22.4
19	Rib	M/M	1	A	Yes	
19	Frag	M/M	6	B	Yes	
19	Frag	I/M	58	A	Yes	
19	Frag	M/M	20	B	Yes	
19	Frag	I/M	44	A	Yes	41.7
20	Frag	I/M	4	A	Yes	
20	Frag	I/M	16	A	Yes	
20	Frag	M/M	2	B	Yes	1.9
25	L/B	M/M	3	B	Yes	
25	Frag	M/M	6	B	Yes	
25	Frag	I/M	184	A	Yes	
25	Frag	M/M	1	B	No	
25	Frag	M/M	8	B	Yes	
25	Frag	I/M	105	A	Yes	29.2
29	Frag	I/M	5	A	Yes	
29	Vertebra	S/M	1	A	No	
29	Frag	I/M	7	A	Yes	1.2
32	Frag	L/M	2	B	Yes	
32	Frag	M/M	45	B	Yes	
32	Frag	I/M	87	A	Yes	
32	Canine	Pig	1	B	Yes	
32	Rib	M/M	1	B	Yes	

32	Rib	L/M	1	B	Yes	
32	Metapodial	L/M	1	B	Yes	
32	Frag	L/M	3	B	Yes	
32	Frag	L/M	7	B	Yes	
32	Frag	L/M	8	A	Yes	38.4
33	Frag	I/M	20	A	Yes	
33	Frag	I/M	3	B	Yes	
33	Frag	I/M	26	A	Yes	
33	Frag	M/M	2	A	Yes	3.8
35	Tibia	M/M	1	B	Yes	
35	Frag	M/M	11	B	Yes	
35	Frag	I/M	76	A	Yes	
35	Rib	M/M	1	B	Yes	
35	Frag	M/M	8	B	Yes	
35	Frag	I/M	71	A	Yes	30.8
36	Frag	I/M	231	A	Yes	
36	Frag	L/M	15	B	Yes	
36	Rib	M/M	2	B	Yes	
36	Tooth frag	M/M	1	B	Yes	
36	Molar	Pig	1	B	Yes	
36	Phalanx 2	Pig	1	B	Yes	
36	Metapodial	Pig	1	B	Yes	24.3
37	Frag	I/M	4	A	Yes	0.05
43	Frag	L/M	3	B	Yes	
43	Frag	L/M	1	B	Yes	1
44	Frag	I/M	160	A	Yes	
44	Frag	I/M	12	B	Yes	
44	Frag	I/M	81	A	Yes	
44	Frag	I/M	1	A	Yes	
44	Frag	M/M	21	B	Yes	
44	Phalanx	M/M	1	A	Yes	
44	Rib	M/M	1	B	Yes	
44	Rib	M/M	1	A	Yes	
44	Rib	M/M	2	B	Yes	
44	Canine	Pig	1	B	Yes	26.2
51	Frag	M/M	2	B	Yes	1
17B	Frag	I/M	5	A	Yes	0.1
Site 2/Test pit	Molar	Cattle	5	B	No	2.5
Key: size (mm) A<10, B 10-50, C= 50-100, D=100-150, E=150-200, F>200, Stain 1= , 2=, 3=50-75 4 >75-100%						

Table 10: The bone assemblage.

d – damp ground or waterside taxa
g – grain-associated taxa
l – wood-associated taxa
m – moorland taxa
oa – certain outdoor taxa (unable to live and breed either within buildings or in accumulations of organic material)
ob – probable outdoor taxa
p – strongly plant-associated taxa
rd – dry decomposers
rf – foul decomposers
rt – generalized decomposers
RT - total decomposers (rd + rf + rt)
ss – strong synanthropes (very rare in natural habitats)
st – typical synanthropes (typically present in man-made habitats but capable of living in natural situations)
sf – facultative synanthropes (found in man-made and natural habitats)
S - total synanthropes (ss + st + sf)
w – aquatic taxa
u – uncoded taxa

Table 11: Ecological groups used in insect analysis following Kenward *et al* (1986) and Kenward (1997)

Species	**Food and habitat preferences**
Phyllopertha horticola	Poor quality permanent grassland on light soils where there is a diversity of flowering plants and a high proportion of weeds. The larvae feed on the roots of turf
Dascillus cervinus	The larvae feed at the roots of short vegetation. The adults appear on flowers and shrubs in the spring
Meligethes sp.	Larvae feed on wild and cultivated Brassiceae, adults feed on pollen of various flowers and are particularly attracted to yellow ones
Donacia or *Plateumaris* sp.	On aquatic and marginal plants
Phyllotreta nemorum group	On wild and cultivated Brassicaceae
Longitarsus spp.	Members of the genus are found on various herbaceous plants, especially Boraginaceae, Scrophulariaceae and Labiatae
Crepidodera spp.	On willows (*Salix*) and poplars (*Populus*)
Chaetocnema concinna or *picipes*	Usually on members of the knotweed family (Polygonaceae) including *Polygonum*
Apionidae sp.	Most species live on herbaceous vegetation often in grassland
Mecinus pyraster	On ribwort plantain (*Plantago lanceolata*)
Limnobaris sp.	In marshes, bogs and fens on sedges (*Carex*)
Strophosoma sp.	Members of the genus are polyphagous
Otiorhynchus ligneus	Ground-living and polyphagous
Sitona spp.	On various Fabaceae (pea family) often in grassland
Hypera spp.	Members of the genus are found on herbaceous plants, often in grassland

Table 12: Habitat and food preferences of plant-associated beetles and bugs. Main sources: Cox 2007, Harde 2000, Morris (1997, 2012)

Context	[051]	[011]
Sample volume	**2L**	**4L**
MINIMUM NUMBER ADULT BEETLES AND BUGS	340	120
AQUATIC TAXA		
Minimum number aquatic individuals	30	37
% Aquatics (of whole assemblage)	9%	31%
TERRESTRIAL TAXA		
Minimum number terrestrial individuals	310	83
% Dry decomposers [rd]	18%	1%
% Foul decomposers [rf]	3%	15%
% General decomposers [rt]	43%	6%
% Total decomposers [RT]	64%	22%
Diversity (α) of decomposer component	11	-
Standard error of α for decomposer component	1	-
% Outdoor taxa [oa]	15%	54%
% Outdoor + probable outdoor taxa (oa+ob)	19%	68%
% Damp ground/waterside taxa [d]	2%	25%
% Plant-associated taxa [p]	10%	24%
% Grain pests [g]	0%	1%
% Wood-associated taxa [l]	<1%	0%
% Scarabaeoid dung beetles	3%	13%
% House/building fauna	18%	1%
SYNANTHROPES (% of terrestrial individuals)		
% Strong synanthropes [ss]	0%	2%
% Typical synanthropes [st]	11%	2%
% Facultative synanthropes [sf]	22%	2%
% Total synanthropes [S]	33%	5%

Table 13: Main statistics of the beetle and bug assemblages (The proportion of aquatics is expressed as a percentage of individuals in the whole assemblage. Abundance of other ecological groups is expressed as a proportion of terrestrial individual. Percentages have been rounded to the nearest whole number)

Context	51	36	11	32
Sample volume (litres)	2L	4L	4L	4L
Paraffin flot volume (ml)	20ml	<10ml	70ml	10ml
Treatment	Analysed	Scanned	Analysed	Scanned
ANNELIDA				
Oligochaeta sp. (earthworm egg capsules)	P	-	P	-
CRUSTACEA				
Ostracoda spp.	P	-	-	-
INSECTA				
Dermaptera (earwigs):				
Dermaptera sp. [u]	P	-	C	-
Hemiptera (true bugs):				
Lygaeidae spp. [oa-p]	-	-	1	-
Saldidae sp. [oa-d]	-	-	1	-
Heteroptera sp(p). (water bug nymphs) [oa-w]	P	-	P	-
***Aphrophora* sp. [oa-p]**	-	-	1	-
Delphacidae spp. [oa-p]	3	-	-	-
Auchenorhyncha spp. [oa-p]	5	-	8	-
Psylloidea sp. [oa-p]	-	+	-	-
Coccoidea sp.	P	-	-	-
Trichoptera (caddis flies):				
Trichoptera sp. (larval fragments)	-	-	P	-
Diptera (flies):				
Diptera spp. (puparia)	P	P	P	-
Siphonaptera (fleas):				
Siphonaptera sp. (indet. body segments)	P	-	-	-
Hymenoptera (bees, wasps and ants)				
Hymenoptera Aculeata sp.	-	-	P	-
Hymenoptera Parasitica spp.	P	-	P	-
Coleoptera (beetles):				
***Haliplus* sp. [oa-w]**	-	-	1	-
***Agabus sturmii* (Gyllenhal in Schönherr) [oa-w]**	1	-	-	-
***Agabus* or *Ilybius* spp. [oa-w]**	-	-	1	-
***Colymbetes fuscus* (Linnaeus) [oa-w]**	-	-	1	-
Hydroporinae spp. [oa-w]	4	+	2	+
***Carabus* sp. [oa]**	1	-	-	-
***Leistus* sp. [oa]**	-	+	-	-
***Nebria brevicollis* (Fabricius) [oa]**	-	+	-	+
***Elaphrus cupreus* Duftschmid [oa-d]**	1	-	-	-
***Dyschirius globosus* (Herbst) [oa]**	-	-	1	-
***Bembidion* spp. [oa]**	1	+	1	-
***Poecilus* sp. [oa]**	1	-	-	-
***Pterostichus minor* (Gyllenhal) [oa-d]**	1	-	1	-
***Pterostichus ?diligens* (Sturm) [oa-d]**	1	-	-	-
***Agonum thoreyi* Dejean [oa-d]**	-	-	1	-

Lebiini sp. [oa]	1	+	-	+
Carabidae spp. [ob]	2	+	-	-
***Helophorus* spp. [oa-w]**	2	-	1	-
***Anacaena globulus* (Paykull) [oa-w]**	5	-	-	-
***Anacaena* sp. [oa-w]**	-	-	1	-
***Laccobius bipunctatus* (Fabricius) [oa-w]**	-	-	2	-
***Laccobius* sp. [oa-w]**	-	-	1	-
Hydrophilinae spp. [oa-w]	-	-	2	-
***Cercyon analis* (Paykull) [rt-sf]**	8	+	-	-
***Cercyon* sp. indet. (decomposer group) [rt]**	2	-	-	-
***Cercyon* spp. indet. [u]**	-	++	2	++
***Megasternum concinnum* (Marsham) [rt]**	3	-	-	-
***Sphaeridium* sp. [rf]**	1	-	1	-
Histeridae sp. [u]	1	-	-	-
***Hydraena* sp. [oa-w]**	18	-	23	-
***Ochthebius minimus* (Fabricius) [oa-w]**	-	-	1	-
***Ptenidium* sp. [rt]**	-	+	-	-
***Acrotrichis* spp. [rt]**	17	-	3	-
***Choleva* or *Catops* sp. [u]**	-	+	-	+
***Silpha atrata* Linnaeus [u]**	-	-	1	-
Silphidae sp. [u]	1	-	-	-
***Lesteva sicula* ssp. *heeri* Fauvel [oa-d]**	2	-	6	-
***Olophrum* sp. [oa]**	1	-	-	-
Omaliinae spp. [u]	1	-	-	-
***Micropeplus staphylinoides* (Marsham) [rt]**	1	-	-	-
Pselaphinae spp. [u]	-	+	1	-
***Tachinus laticollis* or *marginellus* [u]**	2	-	-	-
***Tachinus* sp. and sp. indet. [u]**	1	-	-	+
Tachyporinae sp. [u]	1	-	-	-
***Cordalia* or *Falagria* sp. [rt-sf]**	1	-	-	-
Aleochariinae spp. [u]	27	++	5	+
***Anotylus rugosus* (Fabricius) [rt]**	5	+	1	-
***Anotylus sculpturatus* group [rt]**	1	-	-	-
***Oxytelus sculptus* Gravenhorst [rt-st]**	2	-	-	-
***Carpelimus bilineatus* or *erichsonii* [rt-sf]**	5	-	-	-
***Carpelimus* spp. [u]**	8	+	1	-
Scydmaeninae spp. [u]	1	-	-	-
***Stenus* spp. [u]**	3	-	4	-
***Euaesthetus ruficapillus* Lacordaire [oa-d]**	-	-	1	-
***Lathrobium* spp. [u]**	2	+	1	+
***Gyrohypnus fracticornis* (Müller) [rt-st]**	1	-	-	-
Xantholinini sp. [u]	1	-	-	-
Staphylininae spp. [u]	5	+	2	+
Geotrupinae sp. [oa-rf]	1	-	1	-
***Aphodius depressus* (Kugelann) [rf]**	3	-	-	-

Aphodius rufipes **(Linnaeus) [oa-rf]**	-	-	3	-
Aphodius ater **(De Geer) [oa-rf]**	1	-	-	-
Aphodius prodromus **or** ***sphacelatus*** **[ob-rf]**	1	-	-	-
Aphodius ?fossor **(Linnaeus) [oa-rf]**	1	-	-	-
Aphodius **spp. and sp. indet. [ob-rf]**	1	-	7	+
Phyllopertha horticola **(Linnaeus) [oa-p]**	5	-	-	-
Scarabaeoidea sp. (?chafer)	-	-	1	-
Clambus pubescens **Redtenbacher [rt-sf]**	27	-	-	-
?*Clambus* **sp. [rt-sf]**	-	-	1	-
Cyphon **spp. [oa-d]**	1	+++	8	++
Dascillus cervinus **(Linnaeus) [oa-p]**	1	-	-	-
Oulimnius **sp. [oa-w]**	-	-	1	-
Dryops **sp. [oa-d]**	-	-	1	-
Elateridae spp. [ob]	4	+	3	+
?Elateridae spp. [ob]	1	-	-	-
Cantharidae spp. [ob]	1	-	1	-
Meligethes **sp. [oa-p]**	1	-	-	-
Oryzaephilus surinamensis **(Linnaeus) [g-ss]**	-	-	1	-
Cryptophagus **spp. [rd-sf]**	12	-	-	-
Atomaria **sp. [rd-sf]**	11	-	-	-
Orthoperus **sp(p). [rt]**	44	-	-	-
Latridius minutus **group [rd-st]**	30	-	1	-
?*Enicmus* **sp. [rd-sf]**	2	-	-	-
Corticaria **spp. [rt-sf]**	13	-	-	-
Corticariinae spp. [rt]	3	-	-	-
Salpingus planirostris **(Fabricius) [l]**	1	-	-	-
?Cerambycidae spp. [l]	2	-	-	-
Donacia **or** ***Plateumaris*** **sp. [oa-p-d]**	1	-	1	-
Phyllotreta nemorum **group [oa-p]**	1	-	-	-
Longitarsus **sp. [oa-p]**	7	-	-	-
Crepidodera **sp. (Fabricius) [oa-p]**	1	-	-	-
Chaetocnema concinna **or** ***picipes*** **[oa-p]**	2	-	-	-
Apionidae sp. [oa-p]	1	-	-	-
Mecinus pyraster **(Herbst) [oa-p]**	1	-	-	-
Limnobaris **sp. [oa-p-d]**	-	-	1	-
Ceutorhynchinae sp. [oa-p]	-	-	1	-
Strophosoma **sp. [oa-p]**	1	-	-	-
Otiorhynchus ligneus **(Olivier) [oa-p]**	-	-	1	-
Hypera **sp. [oa-p]**	-	-	1	-
Curculionidae sp. [oa-p]	1	-	4	-
Coleoptera spp. and sp. indet. [u] (fragments)	6	++	2	++
Insecta spp. indet. larval fragments	C	P	C	-
ARACHNIDA				
Acarina spp. (mites)	A	C	C	P
Aranae sp. (spiders)	P	-	-	-

BRYOZOA				
Cristatella mucedo **Cuvier (statoblasts)**	-	-	C	-
Bryozoa sp. (statoblasts)	-	-	P	-
TOTAL INDIVIDUALS BEETLES AND BUGS	**340**	**40***	**120**	**25***
Concentration of beetles and bugs/litre	170	10*	30	6*
*** Estimate based on scanning**				

Table 14: Insects and other invertebrates recorded from the samples (Ecological codes are shown in square brackets, see Table 11. Minimum numbers of adult beetle (Coleoptera) and bug (Hemiptera) individuals are given for the analysed samples. Estimated abundances for the scanned samples are as follows: +1-2 individuals, ++ 3-5 individuals, +++ 6-10 individuals. Taxa other than adult beetles and bugs were recorded as: present (P), common (C) or abundant (A)

AOC Archaeology Group, Edgefield Industrial Estate, Edgefield Road, Loanhead EH20 9SY
tel: 0131 440 3593 | **fax:** 0131 440 3422 | **e-mail:** edinburgh@aocarchaeology.com