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Palaeoenvironmental analysis of samples from Pits 01, 05 and 06 Crathes, Warren Field

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Introduction

Three pits were subject to environmental sampling (01, 05 and 06). Pit 01 relates to an individual small pit within Area 13 that had been sealed by a placed boulder. Pits 05 and 06 were from a line of pits, which appear to have been initially used in the Mesolithic and then re-used in the Neolithic. Previous radiocarbon dating of other pits in the same area has shown their primary fills to date between 8765±40 BP (GU-13936; 7970-7610 Cal. BC) and 8460±40 BP (GU-13938; 7590-7480 Cal. BC) and their secondary fills to between 5025±35 BP (3950-3710 Cal. BC) and 4975±45 BP (GU-13933; 3540-3360 Cal. BC). These findings suggest the period of the secondary fills is contemporary with the period when the Neolithic timber hall at Crathes was in occupation.

The purpose of the environmental analysis was to find material, which could be used for AMS radiocarbon dating that could be matched with those dates obtained from the 2004 and 2005 samples and also to look for any material that could aid in the interpretation of the pits functions.

Bulk soil samples ranging from 0.1 to 25 litres were taken from fill deposits of the three pits. These samples represent primary and secondary fills of Pit 01 and multiple fills of Pits 05 and 06.

Methods

Plant macrofossil analysis

Bulk soil samples were subjected to a system of flotation in a Siraf style flotation tank. The floating debris (flot) was collected in a 250 μm sieve and was then air-dried before being analysed. Any material remaining in the flotation tank (flot) was wet-sieved through a 1mm mesh and air-dried. This was then sorted and any material of archaeological significance removed. All plant macrofossil samples were analysed using a stereomicroscope at magnifications of x10 and up to x100 where necessary to aid identification. Identifications were confirmed using modern reference material and seed atlases including Cappers *et al* (2006).

Charcoal identification analysis

The charcoal fragments ranged from 1–15 mm in diameter. The charcoal was broken or fractured in order to view the three sectional surfaces (transverse (TS), tangential (TLS) and radial (RLS)) necessary for microscopic wood identification. The charcoal fragments were then mounted onto a slide and examined using an incident light microscope at magnifications of 100x, 200x and 400x, where applicable. Identifications were made using wood keys by Schweingruber (1978, 1990) and IAWA (1989).

Results

Plant macrofossil analysis

The results of the plant macrofossil analysis are presented in Tables 1 and 2. Samples identified with an asterisk (*) contain sufficient quantities of charcoal for identification and to obtain a single entity AMS date. Results are given for each pit individually, below.

Table 1

Table 2

Pit 01

Charcoal fragments were recovered from all samples of a size suitable for identification and AMS dating, with Samples 2006-20 (Context 01/04) and 2006-21 (Context 01/03) containing abundant quantities (see Tables 1 and 2). Charred cereal grains were also found within these two samples including barley (*Hordeum vulgare*) and oats (*Avena* sp.). Sample 2006-22 (Context 05/02) contained a small quantity of burnt bone fragments.

Comment [MSOffice1]: = context 01/02

Pit 05

Charcoal fragments were recovered from all samples, however, only seven samples contained fragments of a sufficient size for identification and AMS dating (see Tables 1 and 2). Two charcoal fragments within Sample 2006-03 (Context 05/08) were observed to have gnaw-marks. No charred cereal grains were recovered from any of the Pit 05 samples but charred seeds were found including sedge (*Carex* sp.), knotweeds (*Persicaria* sp.) and possible vetches (Fabaceae cf. *Vicia* sp.). Burnt bone fragments were found within Samples 2006-01 (Context 05/04) and 2006-02 (Context 05/06).

Pit 06

Small charcoal fragments were recovered from all samples, but with the exception of Sample 2006-19 (Context 06/11) were not of a size sufficient for identification or AMS dating (see Tables 1 and 2).

Charcoal identifications

Charcoal identifications were only carried out on those samples that had been selected for radiocarbon dating; the results are shown in Table 3. Arboreal species identified consist of: oak (*Quercus* sp.), alder (*Alnus glutinosa*), birch (*Betula* sp.), hazel (*Corylus avellana*) and willow/poplar (Salicaceae sp.).

Samples for radiocarbon dating

Material from 12 samples was chosen for radiocarbon dating. These are hoped to provide dates for the period of usage of the pits and will enable comparison with dates already obtained for other pits found at Crathes.

Table 3 Material identified for radiocarbon dating

Sample Number	Context Number	Dating material used	Identification	Number of samples
2006-01	05/04	Charcoal	*Quercus* sp.	1
2006-02	05/06	Charcoal	*Quercus* sp.	1
2006-05	05/14	Charcoal	*Alnus* sp x 2	2
2006-07	05/03	Charcoal	*Quercus* sp.	1
2006-09	05/10A	Charcoal	*Betula* sp and Salicaceae sp.	2
2006-11	05/04	Charcoal	*Quercus* sp.	1
2006-12	05/10B	Charcoal	*Corylus* sp. and *Betula* sp.	1
2006-19	06/11	Charcoal	Salicaceae sp. and *Corylus* sp.	1
2006-20	01/04	Cereal grain	*Avena* sp and *Hordeum vulgare*	2

Interpretation and Discussion

Pit 01

Five samples were from three contexts within this pit (01/02, 01/03 and 01/04). These contexts represent three phases of the use of this pit. The first phase represented is from Sample 2006-20 from Context 01/04, which contained charred cereal grains of hulled barley and oats together with abundant charcoal fragments. This may represent a waste deposit from domestic materials and is also evidence of agricultural practice from the inhabitants, although no evidence of grain processing was recovered. The presence of hulled barley and oats is also suggestive of a later prehistoric date, possibly late Bronze Age to Iron Age (Boyd, 1989).

Samples 2006-21 and 2006-23 from Context 01/03 represent a second phase of use. Charred cereal grains were also recovered from this context within Sample 2006-21. The grain from this sample was all fairly degraded so that exact identifications were not possible. The degradation of the grains also suggests they may have been exposed on the site for a long period before deposition within the pit. Grains recovered from this context have been identified as possible: emmer wheat (*Cerealia* cf. *Triticum dicoccum*), hulled barley (*Cerealia* cf. *Hordeum vulgare*) and rye (*Cerealia* cf. *Secale cereale*). Grains were also recovered, which could not be identified to genus (Cereal indet.) due to their being fragmented or too degraded. Both samples also contained charcoal fragments, which were present in abundant and common quantities (see Tables 1 and 2). This context would also appear to represent a mixture of different aged charred grain, which has been washed into the pit feature. The of possible emmer wheat in the same deposit as possible hulled barley is suggestive of the grains representing different periods of cultivation in the area and therefore possible reworking of material. Emmer wheat generally relating to late Neolithic to Bronze Age agriculture and hulled barley often relating to Late Bronze Age to Iron Age agriculture in prehistory (Boyd, 1989).

The last phase of use is represented in Samples 2006-22 and 2006-24 from Context 01/02. Both of these samples contained charcoal fragments of a size (up to 2cm in diameter) suggestive of either *in-situ* burning or deliberate discarding of charred material. Sample 2006-22 was also found to contain a small number of burnt bone fragments, which although not identifiable does indicate that this material is probably the remnants of a cooking fire.

Pit 05

Five phases of activity were recognised within Pit 05 (see Figure 1) and are represented by 14 samples (see Tables1 and 2). The first phase of activity is from the basal layers of the pit; Contexts 05/15 and 05/14. At this point the pit is U-shaped, with a diameter of approximately 2.4m and a depth of around 1.5m. There are three samples from these layers, Sample 2006-10 from the deepest context [05/15] Samples 2006-05 and 2006-08, from the layer directly above, Context 05/14. Only a small quantity of unidentified charcoal fragments, were recovered from Sample 2006-10. The small size of the charcoal fragments (less than 1cm) suggests they have been washed into the pit from fires in the area. This is in keeping with the current thinking regarding this deposit as in-washed material (Lancaster, pers comm.). Samples 2006-05 and 2006-08 from Context 05/14 also contained charcoal fragments with the main quantity within the former, which contains larger fragments (up to 1.5cm). This deposit is thought to represent a stable soil developed on top of the in-washed material (Context 05/15). The size of the charcoal fragments suggests they could represent the remains of *in-situ* burning or in-washed material from the surrounding area. Charcoal fragments have been identified as alder (*Alnus glutinosa*) from Sample 2006-05. The identification of alder wood suggests people were exploiting wet-woodlands for collection of firewood.

Figure 1 – Phasing of Pit 05 and sample locations

Figure 2 – Phasing of Pit 06 and sample locations

The second phase of activity (see Figure 1) recognised sees the shape of the pit change from one that is U-shaped, to one which has a more V-shaped profile. This change in the morphology of the pit occurs following the slippage of material, which form the contexts discussed above, into the sides of the pit. The size of the pit, however, remains roughly the same. Within this phase there is the fill [05/16] of a possible stake or posthole, below which is a possible dump of material [05/13], which may have been used to support the stake/post. From the size of the fill [05/16] the possible stake/posts would have been roughly 0.10m in diameter and went to a depth of *c.* 0.2m. These measurements suggest that it is more likely this was a stake rather than a post. The presence of a stake within the pit, suggests this may be evidence for a pit-fall hunting trap. Unfortunately there are no samples available from the fill of the stake/posthole, which may provide further information.

Sample 2006-09 from Context 05/10A, which adjoins deposit [05/13] contained a large amount of charcoal fragments, two of which have been identified as birch (*Betula* sp.) and willow/poplar (Salicaceae sp.). Although charcoal fragments were abundant within this sample many were of a small size (less than 1cm) indicating this deposit is also accrued from in-washed or deliberately dumped material. The arboreal species identified from the charcoal analyses are again indicative of wet-woodland, although may also indicate possible woodland edge. The other samples from this phase come from the layers above the possible stake/posthole. Sample 2006-06 is from a possible stable soil horizon [05/11] (Lancaster pers comm.), which may relate to the same period as the stake/posthole. Charcoal fragments were found within this sample, which were all of a small size and therefore may represent in-washed material. A small number of charcoal fragments were also found in the layer above [05/10B]. Charcoal identifications from this sample reveal hazel (*Corylus avellana*) and birch wood was being burnt. The sizes of the charcoal fragments are again fairly small (*c.* 1cm) suggesting they are not representative of *in-situ* material. Lancaster (pers comm.) suggests this deposit may be slippage of upcast material from the pit; therefore the charcoal fragments may be from fire debris in the area surrounding the pit. This also suggests the upcast material was not deposited very far from where the pit was dug.

The third phase of activity (see Figure 1) relates to a small pit dug within Pit 05, which has three recognised charcoal-rich fill layers [05/12, 05, 19 and 05,21] and is represented by Samples 2006-04 and 2006-13 from the top layer [05/12]. During this phase the size of the pit diminished from the previous two phases following an infill of material [05/10B and 05/17]. The pit now has a depth of 0.6m (excluding the depth of the small pit) and is approximately 1.8m in diameter. At the level of the pit there is a possible stable accumulation surface [05/08] indicating that this was the level of the pit during this phase, which has been incised by the digging of the small pit (see Figure 1). Sample 2006-03 from this layer [05/08] contained abundant charcoal fragments (not identified) again these fragments are all of a small size (less then 1cm) indicating they may represent fire debris from nearby.

Two of the charcoal fragments from Sample 2006-03 were observed to have gnaw-marks, the sizes of which (*c.* 1.5mm in diameter) are consistent with having originated from a bank vole (*Clethrionomys glareolus*, see Plate 1). Bank voles inhabit woodland environments and are active bark gnawers and able climbers, often gnawing high up in trees such as willow (*Salix* sp.) (Brown *et al*, 1995; Bang and Dahlstrøm, 2001). Another gnawing practise undertaken by bank voles is that of *stick gnawing* where small sticks (*c.* 20cm in length) on the ground are peeled and gnawed along the sides presenting numerous distinctive tooth marks, which is consistent with the gnaw marks present on the charcoal. Gnawing activity up in the trees generally takes place in the summer (July-August), while stick gnawing may occur in the summer or winter (Bang and Dahlstrøm, 2001). The degree of preservation of the marks is very good and indicates the wood was burned soon after they had made. Therefore this gnawing indicates that the charcoal represents the remains of a fire, which took place either in the summer or winter, burning wood from the woodland floor, where vole activity had taken place.

Plate 1 – The bank vole (*Clethrionomys glareolus*) (www.bbc.co.uk/nature)

Samples 2006-04 and 2006-13 from Context 05/12 contained charcoal fragments (not identified) in varying quantities with the former containing abundant amounts and the former containing only a small amount, which shows the variation, which can occur within the same deposit. This deposit is suggested (Lancaster pers comm.) to have been a deliberate deposit of fire debris, with no signs of the pit being used as a hearth. Within these samples were found charred sedge (*Carex* sp.) nutlets, knotweeds (*Persicaria* sp.) fruits and vetches (*Vicia* sp.) fruits (see Table 2), which all suggestive of open damp areas of land (Stace, 1997). This ties in well with the information from the charcoal fragments that indicate wet woodland existed in the area. It is also worthy of note that the seeds of knotweeds and vetches have been suggested to be plants of economic value during the Later Mesolithic (Price, 1989). This feature is then overlain by Context 05/07, which is though to represent a slippage phase of material into the pit possibly from upcast material near to the pit surface (Lancaster pers comm.).

The fourth phase of activity within the pit (see Figure 1) is represented by Contexts 05/06 and 05/18. At this time the pit has now become smaller and shallower, at 1.5m in diameter and 0.48m in depth. The lowest deposit in this phase is Context 05/06, which appears to be the fill of a small pit around 0.2m in diameter and 0.1m in depth on the northern side of the pit, cut into the underlying deposit (Context 05/07). Sample 2006-02 from the fill of the pit contained abundant charcoal fragments (up to 1.5cm), which have been identified as oak (*Quercus* sp.), together with charred buttercup fruits, possibly greater spearwort (*Ranunculus* cf. *lingua*) and burnt bone fragments (see Table 2). Greater spearwort can be found in damp places such as marshes and stream banks (Stace, 1997) and again suggests wet places near to the site. It is likely these fruits became incorporated into the fire accidentally and suggests that the original location of the fire was near to a wet area. The fill material appears to have been deliberately dumped into the pit (Lancaster pers comm.) and its contents suggest this material represents the remains of a cooking fire.

Overlying the debris pit deposit is another layer of probable slippage material (Context 05/18) from above the pit surface (Lancaster pers comm.). Sample 2006-14 from within this layer contained only a very small amount of charcoal fragments, all less than 1cm in size. The small size and amount of charcoal fragments is suggestive of redeposited material indicating the charcoal was secondary material entering the pit with the slippage material.

The final, fifth phase of the life of the pit (see Figure 1) is represented by Contexts 05/03, 05/04 and 05/01. During this phase the size of the pit continues to diminish. At the start of this phase the pit is now 1.2m in diameter and 0.4m deep, becoming more saucer-shaped. Context 05/03 represents the basal context of this phase overlying Context 05/18. Lancaster (pers comm.) suggests this deposit is an inwash of soil into the pit. Sample 2006-07 contained high numbers of charcoal fragments, of which some of have been identified as oak (*Quercus* sp.), of sizes around 1cm (see Tables 1 and2). This sample shares similarities with that from the small pit (Sample 2006-14, Context 05/06) in that the size and quantity of charcoal fragments is the same and that they are both dominated by oak fragments. This also suggests a switch in burning material from the earlier deposits, which were all non-oak charcoal. It is probable that these charcoal fragments have been washed into the pit from the remnants of a fire in the surrounding area, along with the soil.

Context 05/04 overlies this deposit and contains large stones at the base, which may have fallen into the pit or have been deliberately deposited. Lancaster (pers comm.) suggests this deposit represents a mixture of deliberately deposited material and inwash material. Two samples (2006-01 and 2006-11) were taken from this deposit, with both containing abundant oak charcoal fragments of sizes up to 1.5cm. It is likely that these samples represent the remnants of fires from nearby, which have either been deliberately dumped or washed into the deposit. Charcoal fragments of oak from this deposit have previously been dated to the Neolithic period at 5025±35 BP (3950-3710 Cal. BC), which relate to the period of use of the timber hall at the site. Overlying this deposit is Context 05/01, which seals the pit. At the time of deposition of this context the pit is now only 0.65m in diameter and 0.13m in depth and has a rough semi-circular shape. This final deposit is thought to represent a zone of mixing between the covering topsoil and the underlying archaeological deposit (Context 05/04) and has evidence of reworking from earthwork activity (Lancaster pers comm.). No samples were taken from this context.

Pit 06

Five phases of activity have also been recognised from within Pit 06 (see Figure 2) and are represented by five samples (see Tables1 and 2). The first phase of activity within the pit follows its construction, when it measures 1.6m in diameter by 0.8m deep and is represented by four Contexts 06/12, 06/05, 06/06 and 06/07. Context 06/12 can be seen to accumulate at the base of the steep eastern side of the pit while on the gentler sloping western side of the pit Contexts 06/05-06/07 accrue. This suggests that these deposits represent slippage material into the pit on both sides with a more gradual shift of material into the pit on the western side, which allowed for the formation of a stable soil development horizon, Context 06/07. Two samples were taken from this phase Sample 2006-15 from Context o6/07, which was found to be archaeologically sterile and Sample 2006-16 from Context 06/06, which contained rare amounts of charcoal. The charcoal fragments were all of a small size of less than 1cm and it is likely that this material is a secondary deposit, which has been transported into the pit with the slippage material.

The second phase of activity within the pit is represented by Contexts 06/08, 06/09, 06/10 and 06/11 (see Figure 2). During this period the pit has become slightly shallower than before and now is 0.52m in depth, length wise the pit remains the same. At the base of the pit there appears to be a possible stakehole/posthole similar to that from within Pit 05 and may be of comparable date. This stakehole/posthole measures 0.17m in diameter by 0.2m in depth, therefore having similar proportions to that within Pit 05 (see above). This suggests that Pit 06 had the same function. Sample 2006-19 from Context 06/11, which lines the stakehole/posthole fill, was found to contain only a small amount of charcoal. Two of these fragments have been identified as willow/poplar (Salicaceae sp.) and hazel (*Corylus avellana*), which, suggests the fuel wood was collected from wet woodland or the woodland edge. Overlying this stakehole/posthole are Contexts 06/08 and 06/09, which possibly represents another phase of slippage of material into the pit.

Context 06/03 represents the third phase of activity within the pit (see Figure 2). The size of the pit has decreased once more into this phase and now measures 1.4m in diameter by 0.3m in depth. This phase is likely to represent another period of slippage of material into the pit and may be similar to Pit 05, representing upcast material, which has fallen back into the pit. Sample 2006-17 from this context was found to contain only a rare amount of charcoal of a small size (less than 1cm), which is again likely to represent secondary material that has been transported into the pit with the slippage material.

Phase four of the pit is also represented by a single context [06/04], which is cut into the underlying deposit [06/03] and may represent a deliberately dug pit similar to that represented by Context 05/06 within phase four of Pit05 (see Figure 2). Sample 2006-18 from this context contained charcoal fragments but again of only small size and low yield. This suggests that if this phase does represent a deliberately dug pit it was not used to discard fire waste. Therefore this phase may also represent a further period of slippage material infill.

The last phase (phase five) of the pits life is shown by Contexts 06/01 and 06/02 (see Figure 2), which as with Pit 05 are thought to represent a zone of mixing between the covering topsoil and the underlying archaeological deposit (Contexts 06/03 and 06/04). No samples were taken from this context. During this final phase, the pit measures only 0.5m in length by 0.12m in depth before becoming completely infilled.

The possible function of the pits – hunting traps to conflagration waste deposits

The two largest pits discussed, Pits 05 and 06 are part of an alignment of approximately 19 pits, and of which four of the pits have produced early Mesolithic radiocarbon dates from material within their primary fills. Charcoal fragments of alder have been dated from Pit 19 to 8755±40 BP (GU-13934; 7960-7610 Cal. BC), hazel charcoal fragments from Pit 18 date to 8765±40 BP (GU-13936; 7970-7610 Cal. BC) and hazel nutshell from Pit 22 dates to 8710±40 BP (GU-13935; 7840-7590 Cal. BC). Two charcoal fragments of alder/hazel and hazel have dated from the primary fill of Pit 16 to 8530±40 BP (GU-13937; 7600-7525 Cal. BC) and 8460±40 BP (GU-13938; 7590-7480 Cal. BC) respectively. These dates suggest that the period of activity is more or less contemporaneous.

The large size of Pits 05 and 06 both in diameter and depth, with steep sides does suggest possible use as pit-fall traps for use in the hunting of animals such as deer and wild boar. There appears to have been two methods used by people at the site the first phase of each pit represents a large, deep pit, which may have been covered over creating a pit fall trap to catch animals, which have been pursued or herded into the trap. The second phase of the pit-fall trap involves the possible application of a wooden stake, which would have been used to spear the animals that had fallen into the pit and so making the kill easier in terms of effort and manpower together with securing that the animal would have had little means of escape. The finding of potential early Mesolithic hunting traps is rare in the British Isles and thus adds to the importance of this site.

Large pits of early Mesolithic date were found at Stonehenge during the excavation of a car park. Here four large pits were found, which date to between 9130±180 BP (HAR-455; 8900-7700 Cal. BC) and 8090±140 BP (HAR-456; 7500-6650 Cal. BC) (Allen, 1995a). All of the pits contained fills attributed to them having held former wooden posts. However, the post sizes are much larger than those seen in Pits 05 and 06 (*c.* 1m in diameter by 0.8m in depth compared to *c.* 0.1m in diameter and 0.2m in depth) and have been speculated as containing large upright pine timbers, which may have stood individually or together as totem-poles, such as seen used by hunting communities in North America (Allen, 1995a, 1995b). There was also evidence, within Pits B and C that these posts were supported by smaller timbers with a number of small wedge features and traces of decayed wood identified surrounding the main timbers (Allen, 1995a). It is unlikely that the pits at Crathes held timbers for a similar purpose as they are of much smaller size and any upright pole is likely to have toppled over fairly easily in a strong wind without support. This then further suggests that the timbers within the pits were most likely small stakes, indicating use in hunting activities.

Wood charcoal evidence from Pits 05 and 06 suggests that at the time the pits were in use the area was one of wet woodland, with species such as alder, birch, willow/poplar and hazel all present. Rodwell (1990) notes that such woodland (e.g. willow-birch woodland) generally has a fairly open canopy and is often found to inhabit locations such as fens and along water channels. This wet woodland scenario also ties in with the aerial photography evidence for a system of palaeochannels running across the site (Murray pers comm.). If found to be contemporary with the pits as indicated by the environmental information from the charcoal this would suggest hunting was being carried out in a largely open environment of streams with probable associated grass and sedge vegetation and wet woodland. This type of environment would also have been an ideal place for the congregation of grazing animals, such as deer and wild boar and would have been a factor in attracting people to the site. The hypothesis of Mesolithic hunting taking place in open areas attractive to grazing animals is often quoted in the literature (e.g. Simmons, 1975, 1996, 2001; Carter, 2001), however, rarely has there been the opportunity to demonstrate this through combined archaeological, palaeoenvironmental and stratigraphical evidence.

The aerial photography evidence indicates that the alignment of pits is situated on a rise above and between the palaeochannels. This location would have enabled the traps to catch animals walking between the streams to graze and served as a good target to drive animals towards, forcing them into the traps. The driving of animals, such as deer towards targets is a practice seen in some North American sites (Allen, 1995b). There is little doubt that the hunting of animals played a significant part of the economy in the early Mesolithic (Simmons, 1975) and the use of constructing large pits for this task implies a high level of social and economic organisation, which is slowly being accredited to people of this time (e.g. Allen, 1995b). These large pits also show that early Mesolithic activity can leave lasting traces in the archaeological record.

Some caution must still be expressed, however, due to the dearth of artifactual evidence in association with the site such as animal bone and small quantity of flints recovered (including one burnt flint). Further finds may be discovered in any future excavations, such as through the palaeochannels, which run through the site.

Following the natural infilling of these pits and their possible use as pit fall traps they take on a different use and purpose, which is not entirely understood. The fills show they collected the debris of fires some possibly used for cooking. This activity is recorded in phases 3-5 in Pit 05 and possibly phase 4 of Pit 06. The uppermost charred material in Pit 05 (phase 5) has been radiocarbon dated from oak charcoal fragments to the period of occupation of the Neolithic timber hall constructed at the site; 5025±35 BP (3950-3710 Cal. BC). The upper pit fills of Pit 05 (Contexts 05/04, 05/06) were found to contain abundant charcoal fragments (primarily oak), together with some small pieces of burnt bone, suggesting during the Neolithic, people were either discarding the remnants of cooking fires into these pits possibly as a means of disposal of waste or they were collecting in washed material from fires nearby. Stratigraphic evidence also suggests that these deposits are not representative of the remnants of *in-situ* fires.

The small pit within phase 3 of Pit 05 is of an earlier date to those overlying and may date to the Late Mesolithic. Preserved bank vole gnaw marks observed on two fragments of charcoal from the stable soil horizon indicates wood burnt was from the woodland floor. Charred seeds suggest that the area still contained open damp areas of land, possibly relating to streamside (palaeochannel) vegetation or communities, which would have inhabited the infilling sediments of these channels (e.g. peats). This may represent the burning of encroaching woodland, to preserve the grazing area a practice, which has been seen in the Later Mesolithic (Simmons, 1996). Provocatively seeds of knotweeds and vetches have been suggested to be plants of economic value during the Later Mesolithic (Price, 1989) and therefore this charred material may represent the remnants of a meal cooked from this fire.

Charcoal evidence from Pits 06 and 05 also suggest that there is a changing woodland environment from the early Mesolithic into the Neolithic. Charcoal identifications from Phase 1 and 2 deposits of the pits provide evidence of wet woodland (e.g. alder, birch), which would have been present along the fringes and areas of the palaeochannels at the site. While identifications from the upper fills of Phases 4 and 5 are dominated by oak fragments, suggesting succession from this wet woodland to oak woodland. Rodwell (1990) notes that this is a natural succession of such woodland types. This may also signal the gradual infilling of the palaeochannels as oak woodland colonises the area. This succession of woodland generally follows that suggested by pollen records for Britain with postglacial woodland consisting of arboreal species such as birch and willow (e.g. Edwards, 1989) being succeeded by oak woodland. Pollen isochrone maps such as those of Bennett (1989) and Birks (1989) show that by approximately 5000 BP oak-dominated woodland was present across Aberdeenshire reflecting the charcoal evidence.

This change in arboreal species being burnt may also represent a change in the advance of technology from the early Mesolithic through to the Neolithic. During the early Mesolithic the tree species being burnt are all smaller trees than during the Neolithic, including brushwood types (e.g. willow and hazel) in contrast to the much large oaks evidenced in the Neolithic charcoal deposits. Therefore as well as environmental change this may also show the advance in the ability of people to be able to manipulate much larger tree species in the Neolithic due to an increase in knowledge and tool technology.

Later concentrations of charred waste material collecting in pits is evidenced in Pit 01, showing the continued use of the site post the Neolithic and Mesolithic period. These deposits are though to represent the remains of domestic cooking fires with the presence of large pieces of charcoal together with charred cereal grain including hulled barley, oats and wheat varieties. The finding of fragments of burnt bone within these deposits is also suggestive of domestic fires. The date for this activity will be gained from the radiocarbon dating of cereal grain.

Conclusions

The large pits 05 and 06 are likely to represent early Mesolithic pit fall traps (Murray pers comm.) used in the hunting of animals across a landscape criss-crossed by palaeochannels fringed by wet woodland. Two phases of hunting strategy were used, the first involving covering over a large steep-sided pit and a second involving the use of wooden stakes.

The nature of the smaller pits used during the late Mesolithic into the Neolithic are still not fully understood. They may have collected charred plant material from the inwash of fires nearby or they could represent deliberate depositing of waste material possibly from small cooking fires. Charcoal evidence suggests that during this transition there is a vegetation change from wet woodland to oak dominated woodland as seen in pollen records.

A later phase of activity is suggested at the site represented by Pit 01, which contains charred cereal remains of hulled barley and spelt wheat, which are associated with the later prehistoric period onwards. These deposits are also thought to represent the remains of domestic cooking fires.

Recommendations

Radiocarbon dates suggest these hunting pits could be one of the earliest Mesolithic sites in Scotland and may have no contemporaries in the whole of the UK. Therefore this phase of activity at the site warrants further research.

The excavation of the palaeochannels surrounding the pit features may provide archaeological evidence of hunting activity, such as bone and flints, which would help us to more fully understand the early functions of these pits and the activities taking place at the site.

Palaeoenvironmental sampling of these palaeochannels for plant macrofossils to reconstruct the local environmental history of the site will also provide information on the changing local environment, which is hinted at within this study.

A background study of early Mesolithic hunting practices including European and North American sites will aid in the interpretation of these pits and their likely use as hunting traps. Also more reading on Mesolithic and Neolithic pits in the UK and abroad is needed to elucidate the nature of the smaller charcoal-rich pits cut into phases of the pits. At present these are still not fully understood.

The results of the site so far are very interesting and warrant publication to disseminate this knowledge into the public realm once investigations are complete.

References

Allen M.J.A. (1995a) Mesolithic features in the car park, in Cleal R.M.J., Walker K.E. and Montague R. (eds.) *Stonehenge in its landscape. Twentieth-century excavations*. English Heritage Archaeological Report 10, 43-51.

Allen (1995b) Before Stonehenge: Mesolithic human activity in a wildwood landscape, in Cleal R.M.J., Walker K.E. and Montague R. (eds.) *Stonehenge in its landscape. Twentieth-century excavations*. English Heritage Archaeological Report 10 470-473.

Bang P. and Dahlstrøm P. (2001) *Animal tracks and signs* (Oxford University Press, Oxford).

Bennett K.D. (1989) A provisional map of forest types for the British Isles 5000 years ago. *Journal of Quaternary Science* **4, 2** 141-144.

Birks H.J.B. (1989) Holocene isochrone maps and patterns of tree-spreading in the British Isles. *Journal of Biogeography* **16** 503-540.

Brown R.W., Lawrence M.J. and Pope J. (1995) *Animals tracks, trails and signs* (Bounty Books, London).

Boyd W.E. (1989) Cereals in Scottish antiquity. *Circaea* **5**, **2** 101-110.

Cappers R.T.J., Bekker R.M. and Jans J.E.A. (2006) *Digital seed atlas of the Netherlands* (Barkhuis Publishing and Groningen University Library, Groningen).

Carter R.J. (2001) New evidence for seasonal human presence at the early Mesolithic site of Thatcham, Berkshire, England. *Journal of Archaeological Science* **28** 1055-1060.

Edwards K.J. (1989) Meso-Neolithic vegetational impacts in Scotland and beyond: palynological considerations, in Bonsall C. (ed.) *The Mesolithic in Europe* (John Donald, Edinburgh) 143-155.

IAWA Committee, EA Wheeler, P Bass and PE Gasson (eds.) 1989, *IAWA List of Microscopic Features for Hardwood Identification,* Published for the International Association of Wood Anatomists.

Price T.D. (1989) The reconstruction of Mesolithic diets, in Bonsall C. (ed.) *The Mesolithic in Europe* (John Donald, Edinburgh) 48-59.

Rodwell J.S. (ed) (1990) *British Plant Communities Volume 1: Woods and scrub* (Cambridge University Press, Cambridge).

Schweingruber F. H. (1978) *Microscopic Wood Anatomy: Structural Variability of Stems and Twigs in Recent and Subfossil Woods from Central Europe.* Kommissionsverlag Zücher AG, Zug

Schweingruber F.H. (1990) *Microscopic wood anatomy* (3rd edition) (Paul Hupt Berne and Stuttgart Publishers, Stuttgart).

Simmons I.G. (1975) Towards an ecology of Mesolithic man in the uplands of Great Britain. *Journal of Archaeological Science* **2** 1-15.

Simmons I.G. (1996) *The environmental impact of Later Mesolithic cultures. The creation of moorland landscape in England and Wales* (Edinburgh University Press, Edinburgh).

Simmons I.G. (2001) Ecology into landscape: some English moorlands in the Later Mesolithic. *Landscapes* **I** 42-55.

Stace C. (1997) *New flora of the British Isles* (2nd Edition) (Cambridge University Press, Cambridge).