Cut Hill, Dartmoor (phase 3)

Stone row chronology and landscape change

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On behalf of

Dartmoor National Park Authority

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1 Summary

The project background

1.1 In April 2004 a previously unrecorded stone row was discovered on Cut Hill, central northern Dartmoor. At least one of the stones rests on peat, and the stones within the row lie in an area of extensive erosion, resulting in areas of almost complete removal of the peat cover, and islands of peat up to 1.8 m deep, with extensive peat hags. Work has been ongoing since August 2005 to understand the chronology of the monument and its relationship to its contemporary environment.

1.2 This report represents the third phase of the project. Phase 1 focused on environmental analyses of a section excavated from immediately under one of the exposed stones (Fyfe, 2005; Straker, 2006). This suggested that peat formation locally began around 5510-5360 cal BC on a predominantly open heather-dominated heath, with burning as one of the primary controls on the character of the local vegetation. A date from immediately underneath the stone suggested a *terminus post quem* of 3710-3530 cal BC for placement of that element of the monument. Phase 2 focused on environmental analysis of a long section (1.9 m) excavated from a peat hag some 5 m from the section examined in phase 1 (Fyfe, 2007), and described the longer-term local landscape context of the monument.

1.3 This third phase undertook (1) high resolution pollen analysis through the period broadly contemporary with the construction of the monument; (2) a chronology for the long sequence; and (3) further chronological control on the monument through the dating of a new stone element of the monument located through probing within one of the peat hags.

Results of analysis

1.4 Probing along the line of the Cut Hill stone row located an additional stone, entirely sealed within a peat hag, at the southwestern end of the row. It is not clear whether there are more stones beyond this. Excavation has demonstrated that it lies in a similar stratigraphic position to that examined in 2005.

1.5 The excavated stone ended in its final (recumbent) position shortly after 3347-3100 cal BC (4505±24, UBA-8853), and was sealed by peat by 2476-2245 cal BC (3903±35, UBA-8855), the end of the late Neolithic/start of the early Bronze Age. It is not clear at this stage whether the stones were originally upright, or always recumbent. If they were originally upright, then the date for the construction of the monument may be earlier than the late 4th millennium BC.

1.6 Radiocarbon dates from section 2 confirm that peat initiation took place around 5510-5360 cal BC, and that the top of the peat hag sampled on Cut Hill dates to around cal AD 1090-1120. The local landscape context of the stones (in a recumbent position) was one characterized by a shift to grass-dominated local heath and heather-dominated blanket bog, followed by a local vegetation change to wetter bog and heath, probably as a result of climatic changes.

2 Project background

Location and archaeology

2.1 In April 2004 a previously unrecorded stone row was discovered on Cut Hill, central northern Dartmoor (Figure 1) and reported in the newsletter of the Prehistoric Society (Greeves, 2004). Greeves has reported that the visible, recorded, elements of the row comprise six recumbent granite monoliths (between 1.85-2.6 m long and 0.7-1.2 m wide) spaced evenly over a distance of 123 m. The alignment is approximately NE/SW.

2.2 The Cut Hill row is unusual for a number of reasons: (1) it is located at one of the highest points in the southern English landscape at 603 m, and 100 m higher than any other stone setting on Dartmoor; and (2) it is unlike other stone settings on Dartmoor, with wider stone spacing and unusually large stones. At least one of the stones was recorded by Greeves (2004) as sitting on peat, and the wider area of Cut Hill in characterized by extensive erosion, resulting in areas with no remaining peat cover, and islands of peat up to 1.8 m deep.

Previous work

2.3 Archaeological survey and palaeoecological analyses, undertaken by staff at the University of Plymouth and English Heritage, have been ongoing since August 2005 at Cut Hill to understand the chronology of the monument and the relationship of the stones to their contemporary environment. Phase 1 (2004/2005) of the Cut Hill project sampled two peat section at SX59928275 (Figure 1). Cut Hill section 1 was taken from underneath one of the stones, and is reported in Fyfe (2005) with dates from the section presented in Straker (2006). Cut Hill section 2 was taken from an adjacent peat hag which correlated with the section 1, and provides a longer palaeoecological context for the setting, including the environment contemporary with the construction of the monument, and is reported in Fyfe (2007).

Phase 3 objectives

2.4 The specific objectives of this phase of the project are to (1) date the long palaeoecological sequence presented in Fyfe (2007); (2) undertake targeted high-resolution pollen analysis on section 2 through the phase of monument construction and presumed use, based on stratigraphic correlation between the sections; and (3) attempt to locate a further stone within one of the peat hags, and recover dating samples to constrain the period of monument construction and use.

Schedule of works

2.5 The original field work which recovered the samples used for high-resolution pollen analysis presented here was undertaken on 18 August 2005. Laboratory work for phase 3 of the project was undertaken between October 2007 and February 2008. Further field work was undertaken on 15 November 2007.

Figure 1: Location of Cut Hill stone row. A: Location of Cut Hill and other sites detailed on Table 2 within Dartmoor National Park boundary. B: Reproduction of 1:25,000 OS map portion covering Cut Hill (Crown Copyright). C: Aerial photograph showing position of the known (exposed) stones on Cut Hill (white circles) and locations of sections.

Project archive

2.6 Monolith samples from section 2 are currently archived at the English Heritage Fort Cumberland laboratories. Monolith tins from section 3 are archived within the School of Geography at the University of Plymouth. Prepared samples are kept within the same archive. A paper archive is maintained at the University of Plymouth.

Pollen and vegetation nomenclature

2.7 Throughout this report the results are discussed by the taxonomic names of the pollen recorded in the sequence (following Bennett, 1994). The discussion section uses both taxonomic and the common (English) names for the plants that these pollen taxa represent.

3 Methodology

Field survey and sampling

3.1 Samples from Cut Hill section 2 were recovered using overlapping 0.5 m long monolith tins, from a peat hag that had been cut back to fresh peat. The location of the section was recorded using dGPS.

3.2 Exploratory probing for an additional megalith to extend the stone row was undertaken at the southwest end of the known stones, where the extant peat was more continuous. Parallel transects, each 1 m apart, were established along the orientation of the stone row, and a thin metal probe was used measure peat depths every 0.5 m along these transects between a distance of 15 and 40 m from the last known stone. The three-dimensional location of the top of each probing location was recorded using dGPS, giving a precision of c.2 cm.

3.3 Recovery of samples was undertaken by inserting a slot trench to the base of peat, allowing the megalith to be located in section. Monolith samples were recovered using 0.3 m tins from above, adjacent to, and below, the stone.

Palaeoecological analyses

3.4 Forty-six 1.0 cm^3 sub-samples were taken from the monolith tins from Cut Hill section 2 at 4 cm intervals, the results of which are presented in Fyfe (2007). An additional 32 samples were taken at 1 cm intervals between 147 and 106 cm depth. Samples were prepared using standard procedures (see Moore *et al*., 1991). An exotic marker tablet was added to facilitate calculation of pollen and charcoal concentrations (Stockmarr, 1971). Samples were screened through sieves, to retain the 10-106 micron fraction. Non-pollen organics were removed using an acetolysis digestion. The remaining material was mounted in silicon oil for identification.

3.5 A minimum of 300 land pollen grains (including Cyperaceae) were identified from each level. Grains were identified using the keys in Moore *et al*. (1991) and Andrew (1981). Identification was standardized to the taxonomy proposed by Bennett (1994). Charcoal fragments were counted from each pollen sample in two size classes (10-50 microns, 50-100 microns) and are expressed as number of charcoal fragments per cm^3 and as a charcoal:pollen ratio.

3.6 Eight radiocarbon assays were taken from 1 cm slices of peat from section 2, with the <500 micron humin fraction used for AMS dating. From section 3 two samples were recovered, and the <500 micron humin and the humic fraction were dated from each 1 cm slice. Dates are presented as calibrated ages BC/AD, with calibrations performed using the CALIB5.0.2 program (Stuiver and Reimer, 1993).

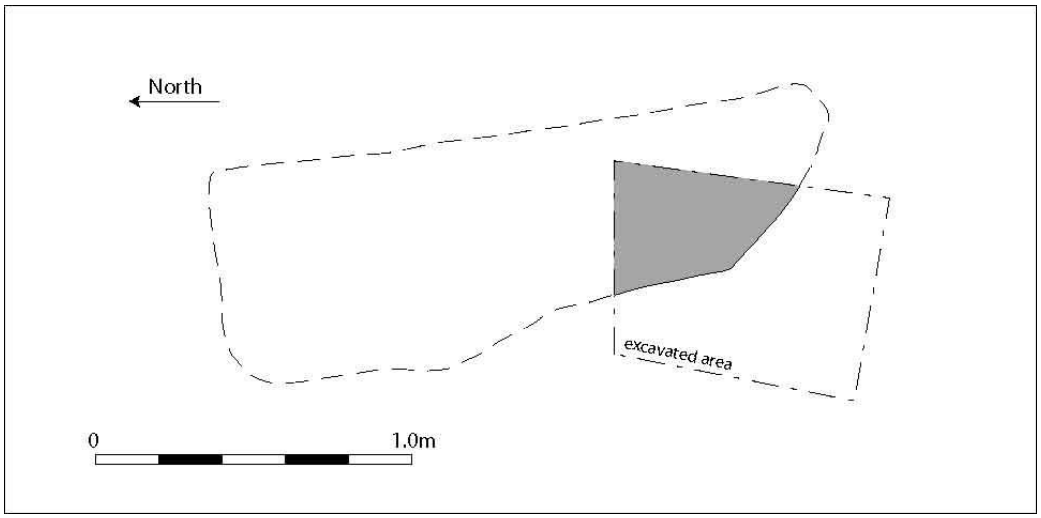
4 Results

Probing results and excavation

4.1 The probing survey was successful in locating a large stone within an area of intact peat on the line of the Cut Hill row, 24.5 m away from the last previously recorded stone. The difference in peat depths demonstrated that it lay under 1.05 m of peat, which was 0.7 m proud of the surrounding peat base.

4.2 Excavation of the "submerged" stone took place on 15 November 2007. The shape of the object was initially mapped by probing and established that it was similar in size and shape to the existing exposed megaliths (Figure 2). The stone is c.1.96 by 0.7 m wide. A small (0.7 m by 1.0 m) slot was placed across the southern part of the stone to minimize disturbance: this side was closest to a degraded peat section which meant that minimal disturbance to the surrounding peat would be caused.

Figure 2: Plan of newly-discovered Cut Hill megalith. Dashed outline indicates unexcavated shape established by probing.

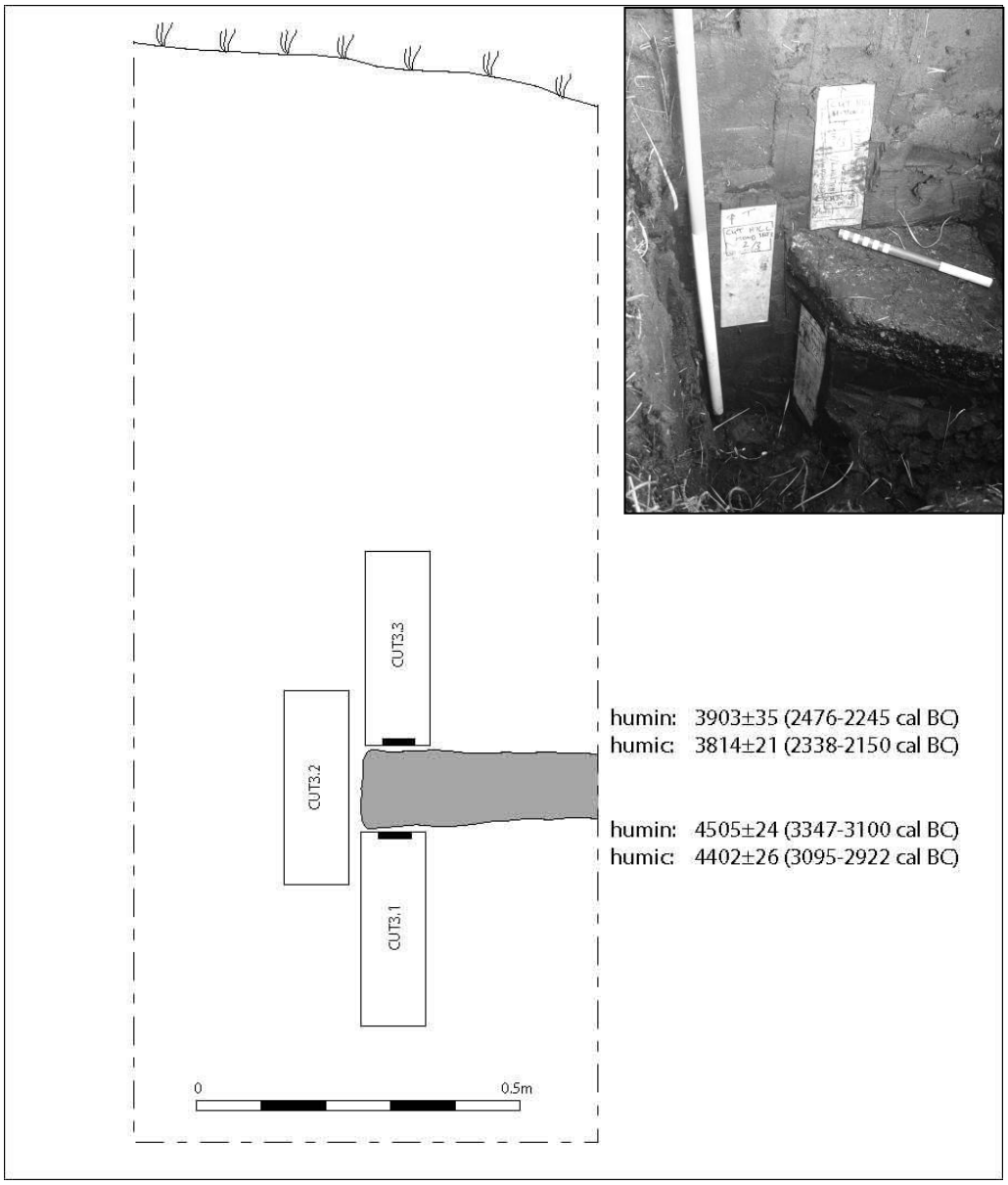


4.3 The excavation trench revealed the end of the granite stone in section (Figure 3), and proved the existence of a comparable megalith within the peat on Cut Hill. Radiocarbon assays from above and below the stone are presented in Table 1 (samples UBA-8853, -8854, -8855 and -8856), along with dates from the section 2. The humic acid fraction dates are both about 100 years younger than the humin fraction dates (see section 5.2). Based on these dates the monument was constructed no later than the mid- to late-third millennium BC.

Pollen stratigraphy and radiocarbon dates, section 2

4.4 The results of the radiocarbon analyses from section 2 are given on Table 1, and illustrated on Figure 4, which also presents the full results of the pollen

Figure 3: South-facing section, Cut Hill section 3, showing location of monolith samples and radiocarbon assays. The stone is shaded grey. The inset photograph shows the slab-like shape of the block.



analysis from section 2 (including samples presented in Fyfe, 2007). There are no inversions within the radiocarbon sequence. Discussion of ages of samples within this report is based on simple linear interpolation between the calibrated age ranges of the dates. The pollen data in Figure 4 is expressed as percentage total land pollen, and sample levels expressed as depth below the surface of the peat hag. Eight local pollen assemblage zones have been differentiated.

4.5 **CUT2 lpaz1** *Corylus-Calluna*-Poaceae

188-176 cm: c.5325-4700 cal BC

The lowest pollen zone is marked by levels of *Corylus* between 25 and 25%, with other tree taxa present at levels around 5% (*Alnus*, *Betula* and *Quercus*). A range of additional tree taxa are recorded at low levels throughout (*Ulmus*,

Figure 4: Percentage pollen, spore and charcoal diagram, Cut Hill section2

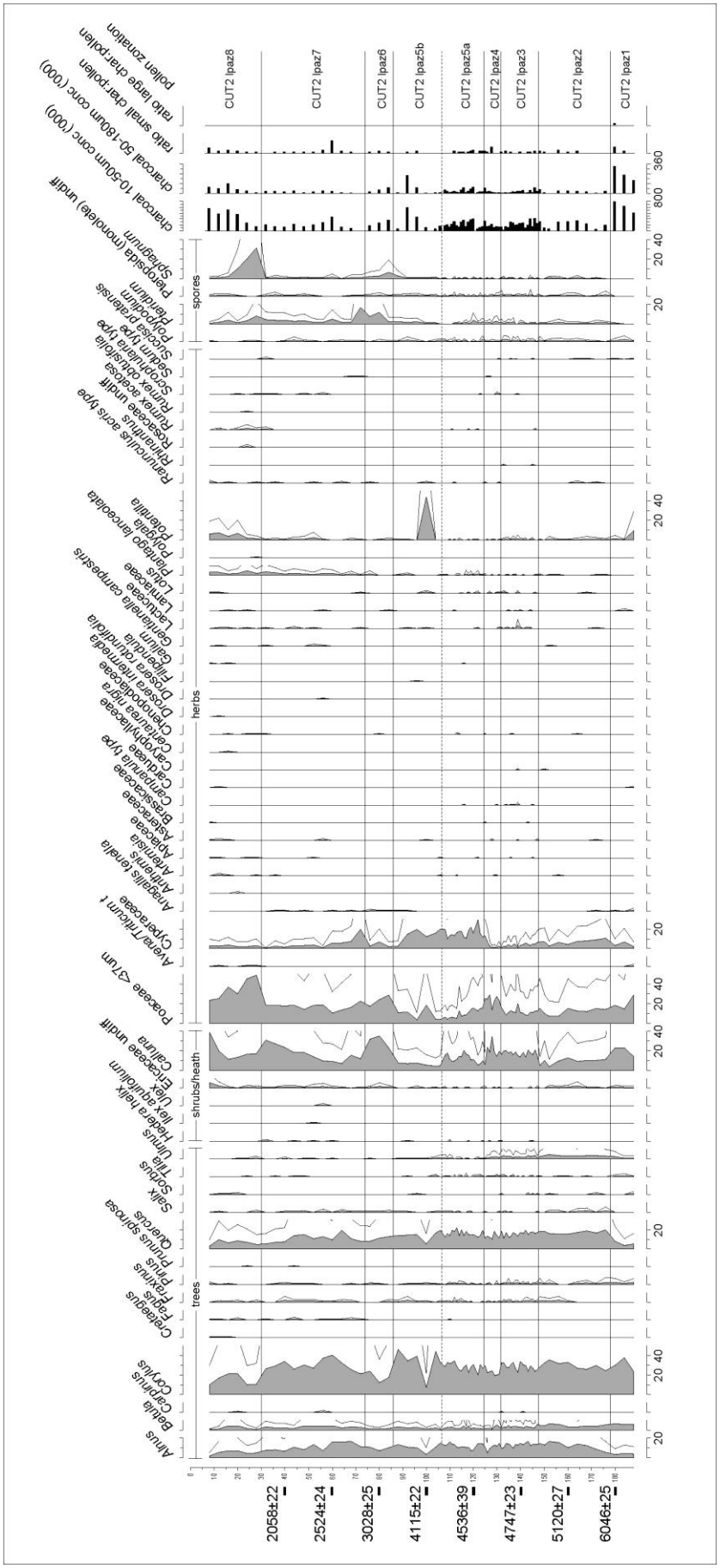


Table 1: Radiocarbon assays from Cut Hill sections 2 and 3

Depth (cm)	14C age	lab code	fraction	δ13C	cal range BC
Section 2					
40-41	2058±22	UBA-8852	humin	-28.8	163-0
60-61	2524±24	UBA-8851	humin	-28.9	790-545
80-81	3028±25	UBA-8850	humin	-30.4	1388-1213
100-101	4115±22	UBA-8849	humin	-30.1	2860-2580
120-121	4536±39	UBA-8848	humin	-30.0	3366-3099
140-141	4747±23	UBA-8846	humin	-29.3	3635-3383
160-161	5120±27	UBA-8845	humin	-34.1	3978-3804
180-181	6046±25	UBA-8844	humin	-30.8	5020-4848
Section 3					
104-105	3903±35	UBA-8855	humin	-31.3	2476-2245
104-105	3814±21	UBA-8856	humic	-30.3	2338-2150
120-121	4505±24	UBA-8853	humin	-33.6	3347-3100
120-121	4402±26	UBA-8854	humic	-39.7	3095-2922

Tilia, *Pinus*). *Calluna* rises to over 20% in the zone. Herbaceous taxa include Poaceae at c.20% and Cyperaceae at 5%, and *Potentilla*, which starts at 10% in the basal sample before declining to trace values in subsequent samples.

4.6 **CUT2 lpaz2** *Corylus-Quercus*

176-146 cm: c.4700-3610 cal BC

The zone in marked by an increase in arboreal types, in particular *Quercus* (to 17%) and *Alnus* (to between 10 – 15%). Other tree taxa continue to be recorded at levels comparable to those recorded in zone CUT2 lpaz1 (e.g. *Ulmus*, *Betula*). *Fraxinus* appears mid-way through the zone. Dwarf shrubs and heath (*Calluna*) are at lower levels than zone CUT2 lpaz1 (around 10%). Herbaceous taxa, including Poaceae and Cyperaceae, continue at similar levels to the preceding zone. *Pteridium* and Pteropsida appear at elevated values for the first time in the diagram.

4.7 **CUT2 lpaz3** *Corylus-Calluna-Quercus*

146-133 cm: c.3610-3405 cal BC

The zone is marked by an increase in *Calluna* from 7% to around 20%. *Corylus* continues to dominate the assemblage (between 25 and 30%) and other tree taxa continue to be represented at the levels recorded in CUT2 lpaz2. Diversity in herbaceous taxa increases and *Campanula* and Lactuceae present throughout the zone. Poaceae remain between 10 and 15%, but Cyperaceae declines gradually towards the top of the zone.

4.8 **CUT2 lpaz4** Poaceae-*Calluna-Corylus*

133-124 cm: c.3405-3280 cal BC

The zone is characterised by an increase in non-arboreal taxa, predominantly Poaceae which rise to 25%. *Calluna* remains at levels similar to those recorded

in zone Cut2 lpaz3, with a single sample rising to 32%. Cyperaceae reach a minimum in the zone (at <12%) before starting to rise again to the top of the zone. Within the arboreal taxa *Corylus* decline by c.12%, although most of the other taxa remain at similar levels to those recorded in the preceding zones.

4.9 **CUT2 lpaz5a** *Corylus*-Cyperaceae-*Quercus*
124-106 cm: c.3280-2860 cal BC
The zone is characterised by increased values of Cyperaceae, to c.16%. Other herbaceous taxa, particularly Poaceae, gradually decline at the start of the zone to a minimum of 8%. *Calluna* initially decline, but then values rise and then fluctuate at levels between 10 and 20%. Herbaceous diversity is low. Arboreal taxa continue to dominate the assemblage, with *Corylus, Quercus* and *Alnus* the main taxa. *Ulmus* declines at the start of the zone.

4.10 **CUT2 lpaz5b** *Corylus*-Cyperaceae-*Quercus*
106-86 cm: c. 2860-1690 cal BC
The sub-zone is marked by a decline in *Calluna* and a final decline in *Ulmus*. There is a sample dominated by *Potentilla*; this most likely represents the inclusion of an anther in the pollen preparation. The representation of all other taxa remains similar to the preceding sub-zone.

4.11 **CUT2 lpaz6** *Calluna*-Poaceae
86-74 cm: c.1690-1090 cal BC
The zone is marked by an expansion of *Calluna* and Poaceae, to maximum values of 35 and 24% respectively. Herbaceous diversity remains low, and Cyperaceae is reduced to levels below 5% in the zone. In the arboreal taxa *Corylus* is reduced from values of around 40% to 12% at the start of the zone. Values gradually increase through the zone. The zone is also marked by a rise in *Pteridium* in the upper part, and a small peak in *Sphagnum* at the start of the zone.

4.12 **CUT2 lpaz7** *Corylus*-Poaceae-*Calluna*
74-30 cm: c.1090-225 cal BC
Corlyus values gradually return to around 30-35%, and *Quercus* values start to decline towards the top of the zone. Values of Poaceae and *Calluna* decline at the start of the zone, although *Calluna* subsequently increases through the zone from values of 7 to 30%. *Plantago lanceolata* is recorded continuously for the first time in the diagram, and *Pteridium* also continues to be represented at significant levels. Cyperaceae continue to be recorded, but generally at low levels.

4.13 **CUT2 lpaz8** Poaceae-*Calluna*
30-0 cm: c.225 cal BC-1100 cal AD
The uppermost zone is dominated by open ground taxa, including Poaceae (exceeding 40%) and *Calluna* (20%), and herbaceous diversity increases. Both

Plantago lanceolata and *Potentilla* increase to their highest consistent values in the diagram. Both *Corylus* and *Quercus* are reduced at the opening of the zone.

5 Discussion

The age of the monument

5.1 The radiocarbon results presented from section 3 (table 1) and those from section 1 (Straker, 2006) allow discussion of the age of the monument based on two of the stones which comprise the Cut Hill row. The date from above the stone in section 3 must provide a *terminus ante quem* for the monument, in effect sealing it within the peat.

5.2 The fine humin fraction and humic acid assays from section 3 are statistically different for both samples, with the humic fraction around 100 years younger than the humin fraction. Both fractions can be affected by post-depositional processes: Shore *et al*. (1995) present various scenarios. The humin fraction can be affected by the intrusion of fine rootlets from younger plants, resulting in an artificially young date. It can be made older by incorporation of older, reworked, carbon. The humic fraction can be similarly affected by intrusive rootlets decay contributing younger carbon. This fraction could also be made younger through net transportation of water-soluble organics down the profile.

5.3 The position of the section on high Dartmoor makes incorporation of older carbon unlikely, and as a result, the humin fraction in this instance is considered a more reliable estimate of the true age of the peat. It is likely that the humic acid fraction has been made younger through down-profile movement of younger water-soluble carbon. Thus the stone in section 3 was sealed by peat by 2476-2245 cal BC (3903±35, UBA-8855), broadly the transition between the late Neolithic and early Bronze Age.

5.4 The dates under the stones, both from section 1 and section 3, have two possible meanings. If the stones were originally standing, the dates from the peat samples underneath represent the time at which the stones fell, sealing the underlying surface. If the stones have always been recumbent, then they represent a *terminus post quem* for the construction of the monument. Only one of the six exposed stones is associated with any packing material which suggests it may once have stood upright. The absence of packing material from the other exposed stones supports a model of a recumbent setting; however, any packing stones which may have been present on the surface could have been moved from their *in situ* position. The 2007 excavation (Figure 2; 3) did not identify packing, however, if present this is more likely to be around the northern, wider (unexcavated) end.

5.5 The humin date (see discussion in section 5.2) from under the stone in section 3 gives an age of 3347-3100 cal BC (4505±24, UBA-8853). The date from under the stone in section 1 gives an age of 3700-3540 cal BC (4858±25, combined humin and humic fraction: SUERC-10212 and SUERC-10211). Under the standing model these dates represent a *terminus ante quem* for the fall of individual stones; under the recumbent model a *terminus post quem*.

Landscape context

5.6 The longer term vegetation history at Cut Hill can now be placed within a firm chronology owing to the 8 radiocarbon assays from the sequence. The basal date corroborates a date for peat initiation in the mid-late 6th millennium BC from section 1 (5510-5360 cal BC). Extension of the linear rate of peat growth between 160 and 180 cm depth in section 2 gives a date at 188 cm of between 5440-5210 cal BC. The dates all lie in their correct stratigraphic order, and indicate continual peat growth until the historic period. The uppermost dated sample from section 2 gives a date of 163-0 cal BC (Table 1): by extension of the rate of peat growth this dates the surface of the peat to between cal AD 1090-1120.

5.7 If the model of recumbent stones is applied to the row at Cut Hill, the period during which the stones were in place and visible (i.e. not subsumed beneath peat) lies broadly between 3350 and 2400 cal BC, with construction at the start of this period. This falls between 130-100 cm depth in section 2 (Figure 4). It is also worth noting that this is only the third sequence on Dartmoor that is unequivocally dated to the Neolithic and the only one directly associated with Neolithic archaeology (see Caseldine, 1999; the other are Tor Royal: West, 1997, and Stonetor Brook: Fyfe *et al*., in press).

5.8 The interpretations of the outline vegetation sequence presented in Fyfe (2007) have not changed with the addition of the extra samples; however, the dating allows these to be placed in a firm chronological framework. The basal samples confirm a model of later Mesolithic burning on Dartmoor between 5700-4100 cal BC, as seen at Black Ridge Brook (Hatton, 1991), Pinswell (Caseldine and Hatton, 1993) and Blacklane (Simmons, 1964; Simmons *et al*., 1983). The dates from section 2 suggest this ends locally around 4500 cal BC. The continual low levels of charcoal in the sequence may reflect continuation of burning elsewhere on the upland, but also show that these charcoal records may be highly localised with peaks reflecting burning close to individual sites.

5.9 The persistence of woodland taxa such as hazel (*Corlyus*), oak (*Quercus*) and alder (*Alnus*) imply that woodland remained within the wider upland landscape, most likely on lower slopes and more sheltered valleys within the higher, exposed plateau. The character of the local open vegetation is also likely to be spatially diverse: although some areas were already forming blanket peat by the

end of the Mesolithic, in other areas peat formation did not begin until the third millennium BC (Table 2), resulting in a mix of peat and dry or wet heath.

Table 2: Timing of blanket peat initiation: northern Dartmoor (oldest 14C dates, which are generally within 10cm of the peat base, with the exception of Black Ridge Brook).

Site	Date	Lab code	Cal range BC	Reference
Amicombe Hill	4010±50	BETA-239097	2830-2460	Fyfe, 2008
Broad Amicombe Hole	4350±50	SRR-2022	3260-2890	Maguire, 1983
White Horse Hill	4625±50	SUERC-10199	3650-3100	Straker, 2006
Cut Hill (S2)	6046±25	UBA-8844	5020-4848	this report
Pinswell	6460±60	GU-2046	5520-5320	Caseldine and Hatton, 1993
Blacklane Brook	7660±140	HAR-4462	7020-6230	Simmons et al., 1983
Black Ridge Brook	>8785±85	GU-1700	>8200-7610	Caseldine and Maguire, 1986

Local vegetation changes 3600-3000 cal BC

5.10 The high resolution analysis between 148 and 110 cm in section 2 reveal local vegetation changes between 3600 and 3000 cal BC (zones CUT2 lpaz 3, 4 and 5: Figure 4) that were not apparent from the coarse resolution analysis (at 4 cm) presented in Fyfe (2007). Although the wide general landscape scale picture shows little change, in particular the level of landscape openness (i.e. the representation of the arboreal taxa such as hazel and oak), the nature of the local vegetation shows some clear shifts through time. Between c.3610 and 3405 cal BC (zone CUT2 lpaz3) heather (*Calluna*) has a phase of greater representation in the pollen record, with grasses (Poaceae) and very little sedge (Cyperaceae) which most likely represents one or both of the cotton grasses (*Eriphorum* sp.) on the blanket peat.

5.11 At the start of CUT2 lpaz4 (around 3405 cal BC) and for a period lasting about 125 years, grasses expand in the pollen record, most likely reflecting a shift in the surrounding heath to grass-dominance, whilst the blanket mire continues to be dominated by heather. Herbaceous diversity remains low, which suggests that this is not reflecting any significant period of deliberate grassland management. At c.3280 cal BC the pollen diagram records a shift to sedge-dominated local vegetation, probably reflecting an expansion of cotton grass on the local bog (CUT2 lpaz5), although there is some see-sawing between sedge and heather through sub-zone CUT2 lpaz5a. The position of sedges in the local vegetation remain constant until the start of CUT2 lpaz6, at c.1690 cal BC.

5.12 There are several possible explanations for this pattern of local vegetation change. The first, and most likely, is that the character of the upland bog and heath is controlled by climatic variability. Switches between heather (a dry indicator), grasses (dry to intermediate) and sedges (wetter indicators) may reflect the changing hydrology of the local upland soils. If this is the case, then the record reflects a climatic deterioration around 3280 cal BC. The lowest levels of sedges (driest period?) are recorded coincidental with the grass expansion, from 3405 cal BC. An alternate explanation might invoke human manipulation of the high moorland vegetation, either deliberately or incidentally. There is no clear relationship between heather representation and charcoal after the end of zone CUT2 lpaz1, which rules out the deliberate use of fire to manage the vegetation. Management of grazing herds on the high moorland may have lead to vegetation change through incidental addition of manure to the local soils and trampling, particularly through zone CUT2 lpaz4, but as described in section 5.9 floristic diversity remains low, and there is no evidence to support this model.

5.13 The data presented here are insufficient to resolve this speculative discussion; however, it is expected that the parallel work in progress by Hazell (English Heritage) developing a proxy climate record from section 2 will contribute to this. It is, though, remarkable that the zone that has been dated as the most likely to reflect the contemporary environment of the stone row (CUT2 lpaz4) is that with a clear indication of expansion of grass heath, prior to a shift to sedge-dominated blanket peat.

Phases of subsequent upland improvement

5.14 Fyfe (2007) identified two phases which he described as reflecting improved moorland conditions (an expansion of grasses and associated grassland taxa such as plantain [*Plantago lanceolata*] and tormentil [*Potentilla*]). These are zones CUT2 lpaz6 and the first half of CUT2 lpaz8 (Figure 4). These can now be dated to c.1690 to 1090 cal BC and the c.225 cal BC to cal AD 400. The earlier phase broadly equates with the period of enclosure of the upland fringes during the middle Bronze Age (e.g. Fleming, 1988), although the start of the phase is earlier than the most recent dates for vegetation improvement associated with areas characterized by field systems (see Fyfe *et al*., in press). The remoteness of Cut Hill from the prehistoric field systems on Dartmoor mean that it is much less sensitive to localized changes in the lowland fringes, and this shift may reflect a broader pattern of upland landuse earlier in the Bronze Age.

6 Conclusions

6.1 Probing and excavation along the line of the Cut Hill stone row located and revealed an additional stone entirely sealed within peat. When excavated (section 3) this stone was demonstrated to be in a similar stratigraphic position (i.e. 0.5 m above the base of the peat) as the stone examined and dated in 2005/06.

6.2 This new stone ended in its final (recumbent) position shortly after 3347-3100 cal BC (4505±24, UBA-8853), and was finally sealed by peat by 2476-2245 cal BC (3903±35, UBA-8855), the end of the late Neolithic/very beginning of the early Bronze Age. The date from under the stone dated in 2005/06 suggests a slightly earlier emplacement; however, this may be less reliable owing to exposure and degradation of the peat plinth from which the sample was taken. It is not clear at this stage whether the stones were originally upright, or always recumbent. If they were originally upright, then the date for the construction of the monument may be earlier than the late 4th millennium BC given above.

6.3 Radiocarbon dates from section 2 confirm that peat initiation took place around 5510-5360 cal BC, and that the top of the peat hag sampled on Cut Hill dates to around cal AD 1090-1120. Section 2 has at least regional significance as the only sequence securely dated to the Neolithic with a robust independent chronology and a direct association with Neolithic archaeology.

6.4 The local landscape context of the stones (in a recumbent position) was one characterized by a shift to grass-dominated local heath and heather-dominated blanket bog. At this stage of the project the most likely explanation is that this reflected a drier climatic phase, followed by a change to wetter bog and heath, as reflected in an expansion of sedges. Ongoing work by Hazell (English Heritage) will test the hypothesis of climate-forced local vegetation change. An alternate, if highly speculative and unlikely, explanation may be that local management of grazing herds on high Dartmoor lead to incidental additions of manure which may have changed vegetation development pathways around Cut Hill.

6.5 Two later phases of moorland improvement have now been dates at between 1690 and 1090 cal BC, broadly contemporaneous with the middle Bronze Age enclosure of the Dartmoor upland fringes, and between 225 cal BC and cal AD 400.

7 References

Andrew, R (1984) *A practical pollen guide to the British flora.* QRA technical guide no. 1: Quaternary Research Association.

Bennett, KD (1994) *Annotated catalogue of pollen and pteridophyte spore types.* Unpublished report, Department of Plant Sciences, University of Cambridge.

Caseldine, CJ (1999) Archaeological and environmental change on Prehistoric Dartmoor – current understandings and future directions. *Quaternary Proceedings* 7, 575–583.

Caseldine, CJ and Hatton, J (1993) The development of high moorland on Dartmoor: fire and the influence of Mesolithic activity on vegetation change. In Chamber, F.M. (ed.) *Climate change and human impact on the landscape*. Chapman and Hall, London, 119-131.

Caseldine, CJ and MaGuire, DJ (1986) Late glacial/early Flandrian vegetation change on northern Dartmoor, south west England. *Journal of Biogeography* 13, 255-264.

Fleming, A (1988) *The Dartmoor Reaves*. London: B.T. Batsford Ltd.

Fyfe, RM (2005) *Cut Hill, Dartmoor: pollen analysis from Cut Hill section 1* Unpublished report for Dartmoor National Park Authority, University of Exeter

Fyfe, RM (2007) *Cut Hill, Dartmoor: pollen analysis from Cut Hill section 2* Unpublished report for Dartmoor National Park Authority, University of Plymouth

Fyfe, RM, Brück, J, Johnston, R, Lewis, H, Roland, T and Wickstead, H (in press: 2008) Historical context and chronology of Bronze Age land enclosure on Dartmoor, UK *Journal of Archaeological Science*

Greeves, T (2004) Megalithic Stone Row Discovered On Dartmoor's Remotest Hill. *PAST* 47 [http://www.ucl.ac.uk/prehistoric/past/past47.html#Dartmoor]

Hatton, J (1991) Environmental change on northern Dartmoor during the Mesolithic period. Unpublished M.Phil Thesis, University of Exeter

Maguire, DJ (1983) *The inception and growth of blanket peat: a study of northern Dartmoor* Unpublished PhD thesis, University of Bristol

Moore, PD, Webb, JA and Collinson, ME (1991) *Pollen analysis.* Oxford: Blackwell.

Simmons, IG (1964) Pollen diagrams from Dartmoor *New Phytologist* 63, 165-180.

Simmons, IG, Rand, I and Crabtree, K (1983) A further pollen analytical study of the Blacklane peat section on Dartmoor, England *New Phytologist* 94, 655-667.

Shore, JD, Bartley, DD and Harkness, DD (1995) Problems encountered with the 14C dating of peat *Quaternary Science Reviews* 14, 373-383.

Stockmarr, J. (1971). Tablets with spores used in absolute pollen analysis. *Pollen et Spores* 13, 615-621.

Straker, V (2006) *Dartmoor 2005: Palaeoenvironmental sampling from Cut Hill and Whitehorse Hill* Unpublished interim report for Dartmoor National Park Authority, English Heritage

Stuiver, M, and Reimer, P J (1993) Extended 14C database and revised CALIB radiocarbon calibration program *Radiocarbon* 35, 215-230

West, S (1997) *Geochemical and palynological signals for palaeoenvironmental change in south-west England*. University of Plymouth: Unpublished PhD thesis.