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Medieval archaeological features at Dunglass Burn, Borders Region, Scotland

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with a contribution by D Henderson

ABSTRACT

An assemblage of small archaeological features from an eroding coastal section on the Dunglass Burn, near Cockburnspath, in south-east Scotland is described. The immediacy of the threat from coastal storms necessitated a salvage excavation of the features, and because this approach may be increasingly needed given the impacts of global climate change, this approach is evaluated. One component of the assemblage is a series of four small, well preserved wood charcoal accumulations resting on bedrock. A fragment of Corylus *(hazel) from one accumulation is ^{14}C dated to 1010–1190 cal* AD*. These are interpreted as beacon fires used to guide fishing boats landing on this rocky coast. The second component of the assemblage is a collection of large mammal bones, which includes both wild and domestic animals. Some bones have been worked by human beings. An antler of red deer (*Cervus elaphus*) is ^{14}C dated to 980–1160 cal* AD*. The stratigraphic and dating controls indicate that the two components are contemporary but no clear causal link between the fires and the faunal remains can be established. The absence of archaeological features after* c *1100 cal* AD *may reflect abandonment through increasing numbers or impacts of coastal storms, demonstrated from the sediment stratigraphy, but equally this part of the coast may have ceased to be used because of its catastrophic inundation by flood sediments descending the burn.*

INTRODUCTION

Global climate change is predicted to result in northern Britain in higher relative sea levels and greater frequencies or strengths of North Atlantic storms (Dawson 2003; Tsimplis et al 2005). Relative sea levels are probably already rising (Woodworth et al 1999) and waves in both the North Atlantic Ocean and the North Sea have been growing steadily bigger (Bacon & Carter 1991). In this context, many coastal archaeological sites are threatened by accelerated erosion (Ashmore 2003). There is, however, a current debate as to how to counter this threat (Dawson 2003) which contrasts the need to rapidly rescue what remains (Turner 2005), perhaps with voluntary groups as excavators, with the need to maintain professional standards of recording (Toolis 2005, 6–7).

Against this background, the author was asked by Patrick Ashmore (Historic Scotland) and Rory MacDonald (Borders Region Council) in September 2005 to interpret the complex sediment stratigraphy related to a confusing collection of animal bones and charcoal eroding from a cliff section at the foot of the Dunglass Burn, near Cockburnspath, on the boundary of the Borders Region. Radiocarbon dating of these elements led to the rapid recognition of archaeological features fortuitously preserved

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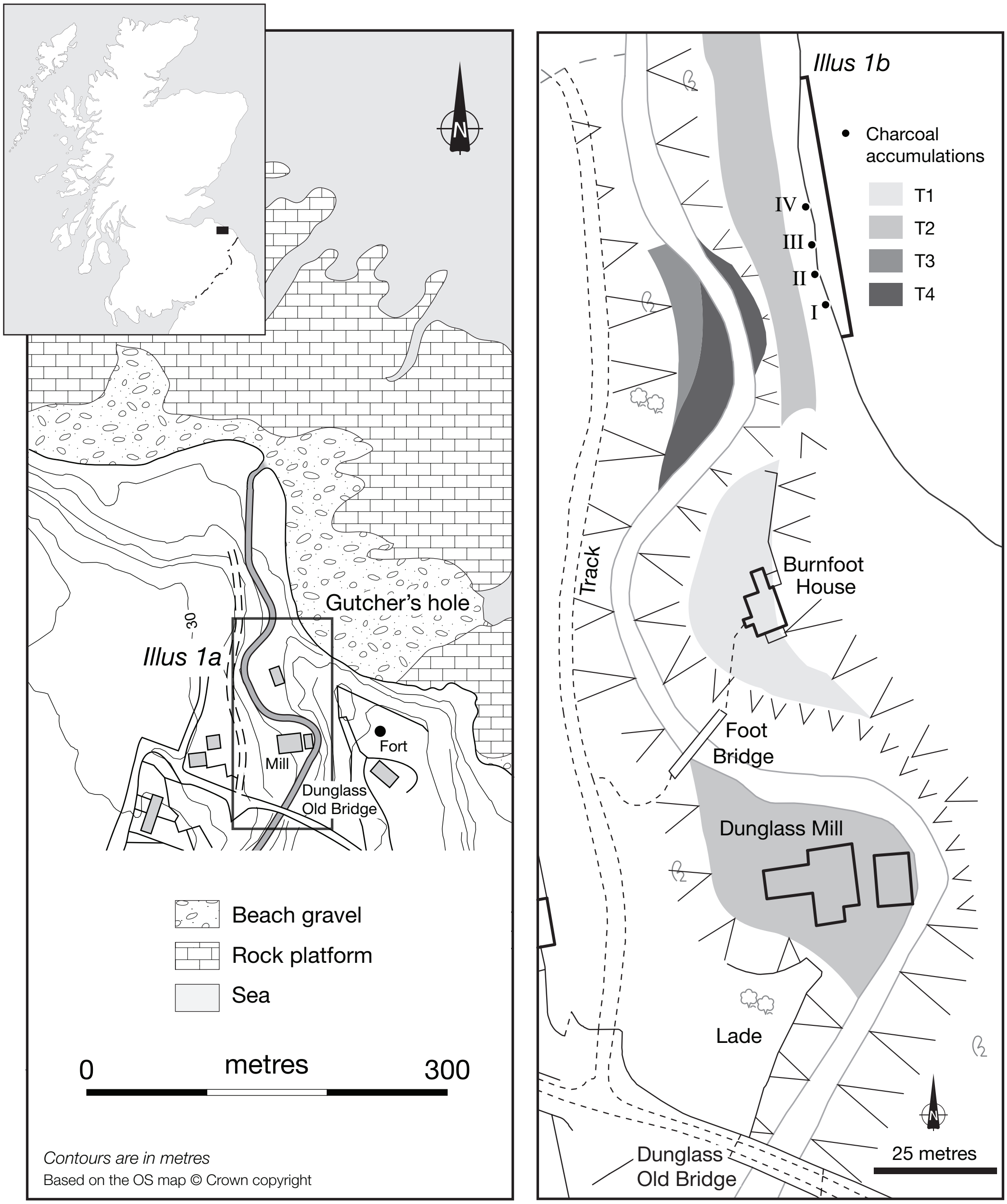
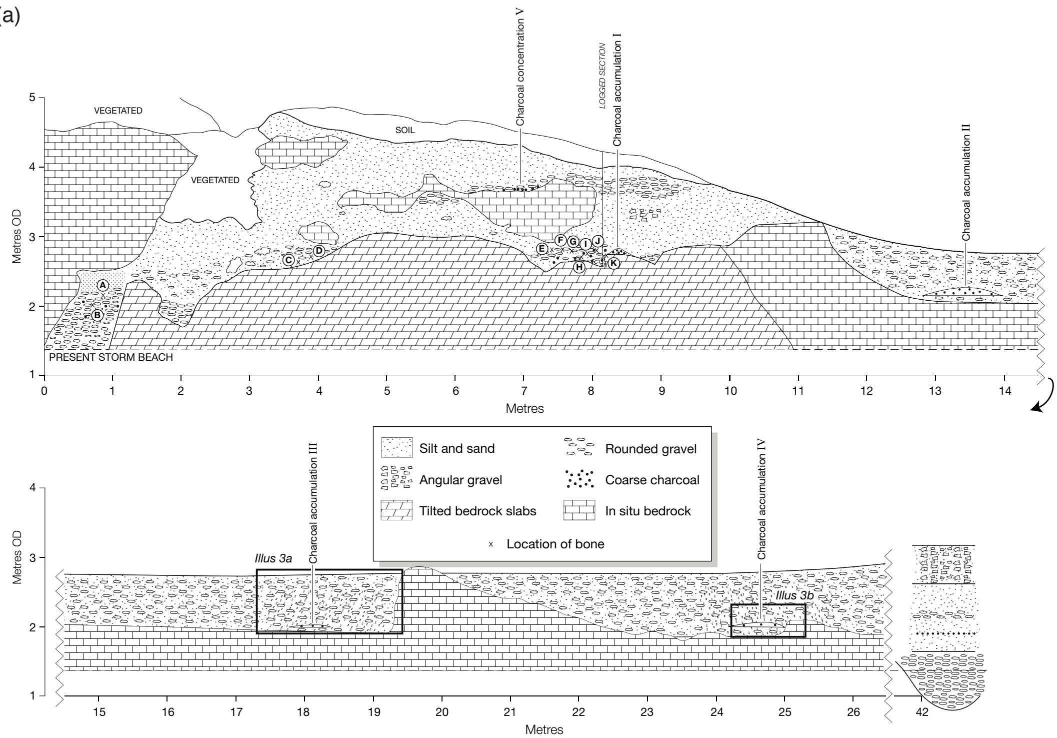


Illus 1 (a) Location of the Dunglass Burn in southern Scotland (inset), and topography, buildings and other features near and on the coast of the Dunglass Burn; (b) geomorphological map of the terrace surfaces (T1–T4) in the reach indicated in Illus 1a, the locations of the four charcoal accumulations I–IV buried by T2 on the present coast and the location of the section drawn in illus 2a

(a)



Illus 2 (a) Simplified cross-section surveyed to OD of the sediment stratigraphy of the cliff, showing rock outcrops, the generalized sediment stratigraphy, location of the logged section in table 1, locations of collections of animal bones (Table 3: A–K), locations and schematic sections in the four charcoal accumulations I–IV, the location of charcoal concentration V and the outlines of sections drawn in illus 3; (b) enlargement of the sediment stratigraphy at the east end of the cliff

(b)

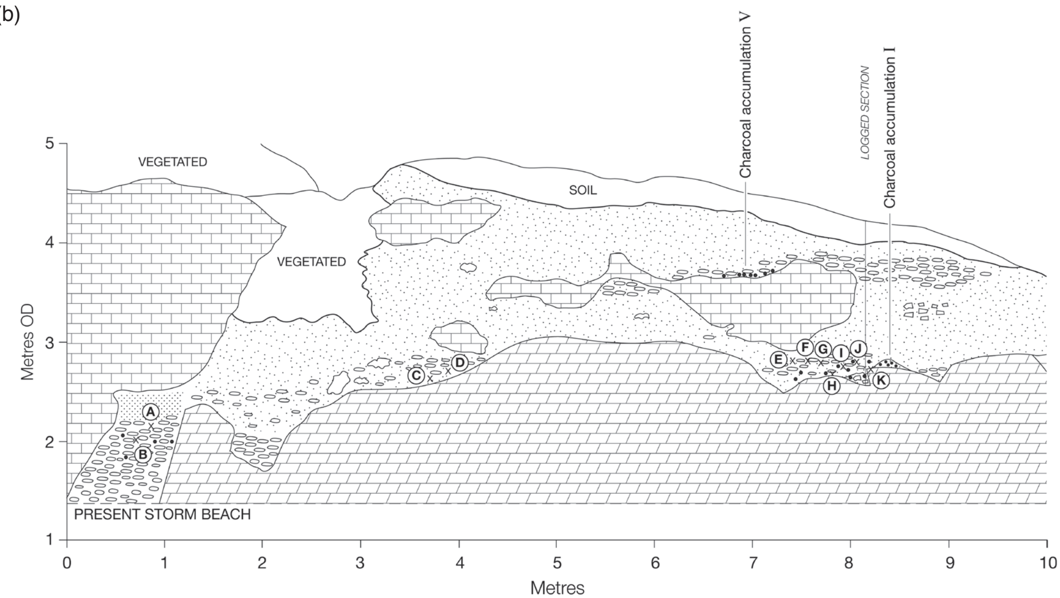


Table 1
Sediment description of the logged section in the Dunglass cliff

Unit 1a (0–12cm above bedrock) 2.60 to 2.72m OD:

5YR 4/4 reddish-brown structureless silty clay with sand filling interstices between large to very large clast-supported rounded to subrounded calciferous sst. gravels and boulders containing rare rounded igneous and ORS pebbles, rare bone fragments and rare small to large charcoal fragments; sharp irregular boundary to

Unit 1b (12–18cm) 2.72 to 2.78m OD:

5YR 4/4 reddish-brown structureless sandy clay-rich silt surrounding abundant small to medium rounded igneous and ORS pebbles, the largest with a-axis 6cm; pebbles are commonly matrix-supported (matrix:clasts 50:50) but are occasionally clast-supported, not demonstrably imbricated; matrix contains common small and common large angular, unabraded charcoal fragments; gradual boundary to

Unit 1c (18–33cm) 2.78 to 2.95m OD:

5YR 4/4 reddish-brown structureless sandy clay-rich silt surrounding abundant small to medium rounded igneous and ORS pebbles, most commonly matrix-supported with matrix:clasts 70:30, but rarely clast-supported, not demonstrably imbricated; charcoal absent; gradual boundary to

Unit 1d (33–50cm) 2.95 to 3.12m OD:

5YR 4/4 reddish-brown structureless sandy clay-rich silt surrounding abundant medium and occasional small rounded igneous and ORS pebbles, largest up to 8cm long, commonly matrix-supported with matrix:clasts 50:50 but also commonly clast-supported, not demonstrably imbricated; common complete large bones; charcoal absent; sharp irregular boundary to

Unit 2 (50–88cm) 3.12 to 3.50m OD:

5YR 4/3 reddish-brown blocky clay-rich silt with faces 5Y 6/1 gray, internally structureless with rare to common matrix-supported stones distributed irregularly within unit; average matrix:clast ratio is 80:20 to 90:10 but rare poorly defined lenses and concentrations have ratios of 30:70; stones comprise 85–90% small to very large (largest 15cm long), most commonly subangular and occasionally subrounded calciferous sst. clasts, isolated and matrix-supported and equally as matrix- and clast-supported, poorly stratified but unsorted lenses and concentrations; 10–15% of stones are small to medium rounded igneous and ORS pebbles, largest 5.5cm long, as isolated matrix-supported clasts and rare concentrations of matrix-supported clasts; lenses of calciferous sst. do not contain rounded pebbles and vice versa; bones and charcoal absent; sharp horizontal boundary to

Unit 3 (88–105cm) 3.50 to 3.67m OD):

Clast-supported gravel of unsorted small to very large (longest 18cm) rounded igneous and ORS pebbles showing strong seaward imbrication and common fresh percussion marks in probably secondary matrix of 7.5YR 5/4 brown silt, with very rare small to large subangular calciferous sst. clasts, rare woody roots and rare live fine fleshy roots; sharp wavy boundary to

Unit 4 (105–138cm) 3.67 to 4.00m OD:

7.5YR 6/2 pinkish gray blocky to prismatic sandy silt, internally structurelesswith a matrix:clast ratio of 80:20 and occasional small (longest 2.5cm) subangular to subrounded matrix-supported calciferous sst. clasts; common live fine fleshy roots.

beneath an alluvial valley fill. A complete excavation could not be supported, however, and in view of the apparent rapidity of cliff collapse, an attempt to make sense of the features was undertaken in a series of visits by the author, with financial support from the Hunter Archaeological Trust and Historic Scotland. The author is a geologist, not an archaeologist, although a professional scientist might in this regard be thought of as an amateur. In this paper the methods employed are described and evaluated, results and interpretations presented, and the success of amateur salvage considered. The geomorphological context of the site is described in detail elsewhere (Tipping 2007).

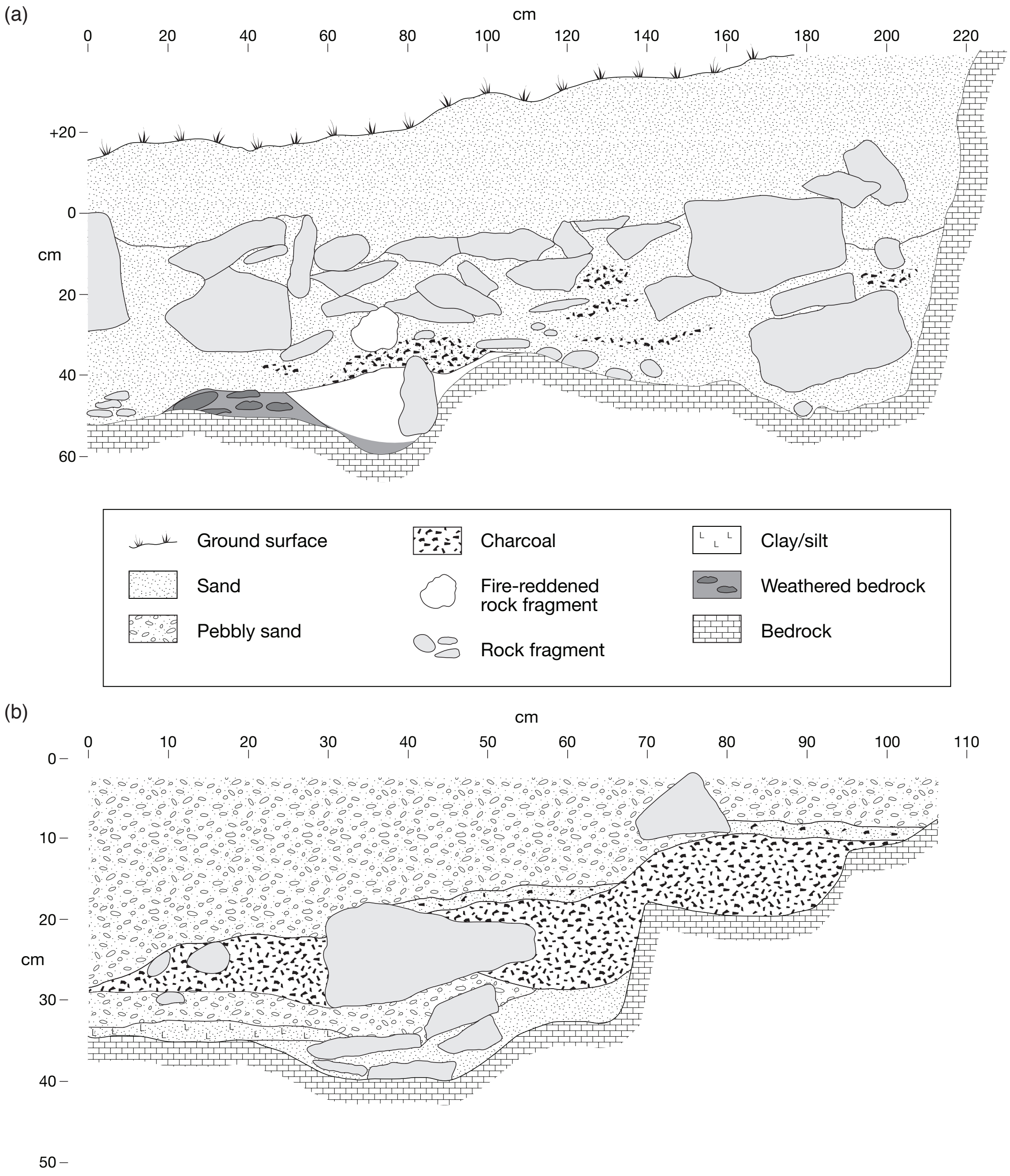
Dunglass Burn is a 12km-long river rising in the Lammermuir Hills at 400m above sea level (OD). As the Dunglass Burn approaches the coast, downstream of Dunglass Old Bridge (illus 1a), the valley contains a number of terraces in unconsolidated sediments (illus 1b) before the stream flows to the sea near a traditional landing place for boats at Gutcher's Hole (Graham 1968, 244). There are four terrace surfaces (illus 1b): T1 is at 7m OD; T2 is at 5m OD; T3 and T4 are below 3m OD. The terrace surface T2 is the top of a fluvial and colluvial valley fill that has buried and sealed a number of archaeological features at National Grid Reference NT 7721 7248 (lat. 55º 56' 42" N long 2º 21' 53" W).

METHODS

In the reach of the Dunglass Burn north of Dunglass Old Bridge, terrace surfaces were surveyed to OD. The sediments in the cliff shown in illus 2a were surveyed along a 42m length, as was the altitude of the present-day shingle beach ridge. The sediment stratigraphy of the cliff section at Dunglass was logged in detail at its most complete (logged section: illus 2b) (Table 1) and observations at other points were related to this sequence. Naturally accumulating sediments are called Units in this paper: anthropogenic deposits are called Contexts.

Several large animal bones were reported as exposed in the sediments of the cliff in the summer of 2005. The positions of these were recorded by reference to two temporary bench marks in October 2005. The cliff section was visited on eight occasions from then until November 2006 to search for more bones revealed by cliff collapse or wave erosion. On each occasion bones were located with reference to the measured stratigraphy (illus 2b). Visible bones were carefully excavated to establish their in situ or slumped sedimentary context before being removed, placed in labelled bags and submitted for identification to the highest taxonomic level by David Henderson (Table 3). Sediments surrounding the bone assemblage were not sieved and, although small bones were searched for, these may have been missed. The assemblage comprises only those bones exposed: others may remain to be revealed in the future.

A form of tapestry excavation was undertaken on the cliff face wherever archaeological features were seen, which consisted of little more than the removal of loose or slumped material to establish and allow the recording of the in situ sediment stratigraphy. Wave action on the cliff face allowed very good exposures of the stratigraphy. The decision was made not to destroy by excavation any more of the sediments than was naturally unstable. Archaeological features may remain within the sediments, not yet exposed. Small stratified samples of natural sediments were removed for particle size analyses, discussed in Tipping (2007). Four discrete, dense accumulations of charcoal (illus 2a: I–IV), and one, more diffuse concentration of wood charcoal (illus 2b: V), were recorded. Two of these were drawn to scale (illus 3). Large samples of charcoal and other materials were sampled from three charcoal accumulations (accumulation II is too eroded by footpath erosion to allow this) and wet- or dry-sieved through a 2.0mm sieve, and the residues retained. Fragments from the more diffuse concentration V were hand-picked from the section. Some wood charcoal fragments >2.0mm were identified to



Illus 3 (a) Measured section of charcoal accumulation III; (b) measured section of charcoal accumulation IV

the highest taxonomic levels from accumulation I and concentration V by Susan Lyons and Scott Tympany (pers comm). AMS radiocarbon (^{14}C) assays were obtained on (a) red deer (*Cervus elaphus*) antler (Location D), (b) a piece of *Corylus avellana* (hazel) charcoal in charcoal accumulation I and (c) a piece of *Betula* (birch) charcoal in charcoal concentration V, calibrated using the OxCal v.3.10 program (G Cook pers comm).

RESULTS AND INTERPRETATIONS

THE RELATION BETWEEN BEDROCK CLIFFS AND UNCONSOLIDATED SEDIMENTS

The relation between rock outcrops and unconsolidated sediments in the cliff (illus 2a) is complex. Immediately east of the section an in situ cliff in Carboniferous calciferous sandstone rises some 30m. At the base of this cliff, fissures and small caves occur, some of which are partly filled with unconsolidated sediments. One small cave, 95cm high, 50cm wide and 90cm deep is shown at 1m distance in illus 2b. The uppermost 5–6m of the cliff is a reddish-brown till, water-sorted near the surface. On top of the cliff is modern housing and the eroded site of the mid- to late Iron Age fort of Castle Dykes (Morrison 2003).

Viewed from the sea as in illus 2b, in situ bedrock also appears in patches behind the unconsolidated sediments to 8m distance and around 4m OD. Bedrock comprises a continuous wall against which unconsolidated sediments are stacked on the seaward side. On the upstream side, within Dunglass Burn, the continuity of this rock wall is seen. There is thus only a thin (*c* 0.5–1m) stack of unconsolidated sediments against this wall. From 11m distance, bedrock is eroded in a slope representing the side of a small valley to a disturbed but in situ rock surface at 2–2.5m OD. At the western end of the spine of bedrock (42m) a narrow channel is incised through this bedrock platform to 1.16m OD.

The base of the section in illus 2a, drawn schematically, is a series of large horizontal and tilted calciferous sandstone slabs. Some slabs are 5m wide but most are smaller. Tilted slabs lean north towards the sea at angles between 18° and 42°, exposing broad even surfaces. They have been tilted through undermining by wave action. Some have tilted after the deposition of overlying sediments because these sediments have also been moved, but others are infilled with unconsolidated sediment and so moved apart from each other before sediments were formed. West of around 11m distance the rock platform is in situ (illus 2a).

ANTHROPOGENIC ELEMENTS WITHIN THE SEDIMENT STRATIGRAPHY I: CHARCOAL ACCUMULATIONS

Some of the earliest features in the sediment stratigraphy are deposits of charcoal. There are four discrete accumulations, numbered accumulations I to IV (illus 2a). They are composed almost entirely of charcoal, with no sediment matrix between fragments in their cores (eg the cores of the accumulations are clast-supported and not matrix-supported). Towards the edges of the accumulations, charred fragments are mixed with overlying, later deposited coastal and fluvial sediments. The accumulations are all considered to be the sites of anthropogenic fires.

Accumulation I at 8.2m distance (illus 2b) lies directly on a single disturbed rock slab. The slab has tilted 30° seaward by waves undercutting the slab after the deposition of charcoal and later sediments. The surface of the tilted slab, at 2.8m OD, was probably more level when charcoal was deposited than it is now. The surface of the slab is blackened beneath the charcoal accumulation by charcoal smears and soot. Accumulation I is a pyramid of dense charcoal with almost no mineral matter in its core, 45cm wide and thinning symmetrically from a peak 17cm high to a constant 1–3cm drape away from the core, increasingly mixed with reddish-brown silt from overlying sediments. A sample of charcoal taken for sieving was from the thickest part of the accumulation, with a volume of *c* 1650cm^3 and dry weight 350g. All but 17g (5%) passed through a 2.0mm sieve. Almost no stones were retained in the sieve, around 14g (4%) by weight. No organic materials other than charcoal were retained. Sixty-four angular, unabraded fragments of wood charcoal were retained, weighing 2.5g (7%), the largest with an a-axis of 1.75cm. Eleven fragments were identified to species: four were of *Fraxinus excelsior* (ash), three were of *Alnus glutinosa* (alder), two were of *Prunus* cf *P. avium* (cherry, possibly wild cherry) and there was one fragment of *Corylus avellana* (hazel) and one fragment of *Hedera helix* (ivy). The fragment of *Corylus* charcoal was ^{14}C dated to 950 ± 40 ^{14}C BP (GU-13576), calibrated at 2σ confidence limits to 1010–1190 cal AD (Table 2).

Matrix-supported wood charcoal fragments >3442cm occur in adjacent sediments (Unit 1: Table 1) at the base of the tilted rock slab, lower in altitude than the charcoal accumulation (illus 2b). These can be traced around a metre to the east, declining in density away from charcoal accumulation I. These isolated charcoal fragments are assumed to have been derived by gravity and slopewash from charcoal accumulation I, although the eastern side of this charcoal accumulation is relatively undisturbed. The reworked charcoal may have derived from a more seaward part of charcoal accumulation I, now eroded. Charcoal has not been moved to the west of the accumulation because adjacent rock slabs are a few centimetres higher. Charcoal accumulation I is buried by the fluvial and colluvial sediments of Unit 2, considered below.

Accumulation II is between 13–14m distance (illus 2a), its base at 2.10m OD. It is the least understood because the current footpath to the shore crosses sediments overlying the accumulation and it is more heavily disturbed than other accumulations. This accumulation is 10–12cm above an uneven horizontal surface of in situ bedrock, lying on and within sediments ascribed to Unit 1a (Table 1), a colluvial slurry with abundant angular, locally derived calciferous sandstone clasts. The underlying sediment has no charcoal. Accumulation II is now around 75cm wide and 11cm thick at its apex, somewhat disturbed by later colluvial slurries. At its core the accumulation has abundant angular large (>0.5cm) wood charcoal fragments and

TABLE 2
Radiocarbon dates

				Calibrated dates (AD)	
Lab code	*Sample material*	*^{14}C age BP*	*δ^{13}C*	*1-sigma*	*2-sigma*
GU-13576	*Corylus* charcoal	950 ± 40	–26.1	1020–1060 (18%) 1070–1160 (50%)	1010–1190
GU-13577	*Cervus elaphus* antler	990 ± 35	–21.5	990–1050 (42%) 1090–1120 (20%) 1130–1150 (5%)	980–1160
GU-14374	*Betula* charcoal	955 ± 35	–27.0	1020–1050 (21%) 1080–1160 (47%)	1010–1160

powder mixed with reddish-brown silty clay and subangular calciferous sandstone clasts of Unit 1a, which seem to penetrate the deposit. Large wood charcoal fragments are found very rarely 78cm to the east of the accumulation, within sediment Unit 1, and more commonly closer to the core. The distribution pattern could not be examined to the west of the accumulation because of footpath erosion. A sample of *c* 300cm^3 (15 × 5 × 4cm) and 317g dry weight from the centre of the accumulation, roughly 10% of the area exposed, was dry-sieved through a 2.0mm sieve. Around 50g of material (16%) was retained, mostly small stones. Nineteen wood charcoal fragments were retained (2g or 0.6% of the total), none >0.5cm long. Three thin fragments of smashed limpet (*Patella vulgata*) shell were recovered, but no bone. Accumulation II is overlain and sealed by sediments of Unit 2.

Accumulation III is 5m to the west, 6cm above the same uneven, weathered in situ rock surface at 2 to 2.25m OD, within the earliest deposit of Unit 1a (illus 2a; illus 3a), a coarse colluvial slurry containing no charcoal. Directly beneath the charcoal accumulation at 60–110cm (illus 3a) is a red stoneless silt (Context IIa), contrasting in colour and lithology with Unit 1. This may have been purposefully placed as the base of the fire, its colour created through fire-reddening. Above this, the surviving patch of charcoal accumulation III (Context IIb) is 17cm wide and 10cm thick, a lens rather than a pyramid. The core of the accumulation comprises charcoal dust and wood charcoal fragments but also a high proportion of mineral matter, which may be invasive. A dry-sieved sample 17 × 9 × 3cm (459cm^3; dry weight 705g) included 165g (36% of total) of small stones. Twenty-nine fragments of wood charcoal were retained (5g or 1% of the total), the largest 1.5cm square. Six fragments (20%) were twigs: these were not noted in charcoal accumulations I and II. No other organic remains (bones, shells) were found.

Accumulation III is thought to have been deliberately covered by a cairn of large angular calciferous sandstone clasts (illus 3a). There is a concentration of platy clasts with a-axes 20 to 38cm, much more abundant and massive than elsewhere in the cliff, clustered or piled above and around the charcoal accumulation. Two stones above the charcoal accumulation appear fire-reddened, one strongly altered. These at least are assumed to have been added to the fire when still hot. Overlying charcoal accumulation II, perhaps invading it, and infilling spaces in the cairn and overlying this is fluvial sediment of Unit 2 (illus 3a). The stratification of this deposit is revealed by a series of prominent horizontal stringers of charcoal dust and fragments extending 130cm westward of charcoal accumulation II within sediments of Unit 2, stopping at a small cliff in bedrock. Water flowing down Dunglass Burn and to the west of the accumulation eroded it: no charcoal fragments were redeposited to the east of the accumulation.

Accumulation IV is at 24.5m distance. It is found on the same in situ bedrock surface as accumulations II and III but illus 2a, being schematic, does not depict all the irregularities of this surface or the changes in micro-topography. Accumulation IV is more isolated on the outcrop, projecting 2m further seaward on a small promontory. The charcoal accumulation lies on a sloping shelf of bedrock, directly above a 5cm-thick deposit of well sorted reddish-brown fine sand (Unit 1a), which may be a weathered surface of bedrock, and above a pebble beach gravel (Unit 1b). These units have no charcoal in them. The lowermost 2cm of the charcoal accumulation is a dense layer of charcoal dust and large wood charcoal fragments with no mineral matter, 70cm across. Above this, the deposit thickens and is generally coarser, still containing no mineral matter. It has accumulated against a low bedrock cliff at 70cm distance (illus 3b) and has risen over this to wedge out against a second cliff west of the section drawn. These cliffs may have served to limit successive fires, although there is no stratigraphy within the charcoal accumulation that would suggest more than one fire, and the cliffs may also have afforded protection from onshore breezes. The large stone west of 30cm distance (illus 3b) may form a side of a hearth but it does not appear fire-reddened. A sample including both layers of charcoal, of 1960cm^3 (20 × 7 × 14cm), had a dry weight of 548g, of which around 50g (10% of the total) was retained in a 2.0mm sieve, the bulk in the form of small stones (45g; 8%) and with 3g (0.5%) of wood charcoal fragments. Fourteen fragments were retained, the largest 2.5cm long, and three fragments (21%) were twigs. The sample also contained three complete shells of adult mussel (*Mytilus edulis*) around 4cm long and four halves of very small (<0.5cm) immature mussel shells.

The base of the fluvial silts and sands of Unit 2 contains reworked charcoal fragments. To the east and not depicted in illus 3b, charcoal fragments extend several centimetres in a series of probably redeposited lenses onto the surface of the lowest of several stratified colluvial deposits within Unit 1. Redeposition to the west, to seaward, is prevented by the bedrock cliff. The accumulation is capped by charcoal-free sediments of Unit 2.

STRATIGRAPHY OF BASAL NATURAL SEDIMENTS

Unconsolidated sediments in the cliff are very well stratified (Table 1). Unit 1 is found directly on bedrock slabs all along the coastal section (illus 2a), truncated to the west as the Dunglass Burn latterly incised through it. Unit 1 also underlies charcoal accumulations III and IV (above). It is a very poorly sorted sand-rich silty clay with abundant matrix-supported stones (clasts), 50cm thick at its most complete. Unit 1 varies vertically in the abundance and types of clasts and is divided on these characteristics into four sub-units. Unit 1a, closest to the bedrock surface, has abundant large boulders of local bedrock, most angular and clast-supported, in cracks between tilted rock slabs. On in situ surfaces rock fragments can be weathered. These are interpreted as in situ rubble accumulating on bedrock surfaces over a long period. They are surrounded by a finer-grained silty sand matrix interpreted as the product of successive clast-rich colluvial slurries. To the east of charcoal accumulation IV are individual 7–10cm thick bands interpreted as discrete slurries, each with smooth lower and upper boundaries, suggesting that individual flows were not erosive. Unit 1 on two occasions (Units 1b and 1d) received rounded pebbles which match in every way those on the beach at Dunglass today. Powerful waves periodically threw pebbles from a beach onto the silty clay surface of individual slurries. Shells are common but the only ones demonstrably in situ within Unit 1 are of limpet (*Patella vulgata*); rare, single though intact shells isolated within the gravel, unattached and not in life position. Within Unit 1b the abundance and proportions of beach pebbles increase, as more pebbles from the beach were thrown onto the surface of the aggrading slurries. Unit 1c is defined by a reduction in numbers of these pebbles, and Unit 1d by a marked increase in the abundance and size of beach pebbles (Table 1). These fluctuations probably reflect changes in wave energy as individual storms or clusters of storms made an impact on the coast. Wave action has sorted the deposit at lower altitudes by removing the muddy matrix, such as between 0 and 1m distance (illus 2b) where the undercut bedrock fissure has been filled to 2.3m OD with large clast-supported beach pebbles.

ANTHROPOGENIC ELEMENTS WITHIN THE SEDIMENT STRATIGRAPHY II: THE BONE ASSEMBLAGE

Within and at the top of Unit 1, a faunal assemblage was recovered as winter storms exposed recognizable bones. Illus 2b shows the positions of the 11 locations from which individual or small collections of bone were retrieved by limited excavation. Bones may still lie within unexcavated sediments, and it should be recalled that without sieving, very small bones, though searched for, may have been missed. Descriptions and identifications by

Table 3
Details of the bone assemblage

Location	*Distance (Fig 4)*	*Altitude OD*	*Size (cm)*	*Weight (g)*	*Identification*	*Brief comment*
A	0.75m	2.25m	10 × 8	420	*Equus caballus* (horse)	single almost complete atlas, slightly water-worn
B	0.75m	2.00m	32 × 4	450	*Cervus elaphus* (red deer)	single antler
C	3.68m	2.65m	14 × 5	53	*Bos taurus* (cow)	part of the coronoid process from a right mandible
D	3.82m	2.70m	19 × 11	560	*C. elaphus* (red deer)	single left antler and frontal fragment of an animal > 7–8 years old
E	7.48m	2.82m	22 × 5	230	*Equus caballus* (horse)	right third metacarpal
F	7.78m	2.79m	n/a	n/a	(a) *Ovis* (sheep)	(a) two bones from one fragment of left frontal bone
					(b) *Cervus elaphus* (red deer) or *Bos taurus* (cow)	(b) three bones from one fragment of scapula
G	7.86m	2.70m	n/a	n/a	*Ovis* (sheep)	10 small bones from one fragment of a single skull
H	7.92m	2.80m	7 × 7	150	*Cervus elaphus* (red deer) or *Bos taurus* (cow)	single lumbar vertebra fragment
I	8.07m	2.75m	16 × 14	292	*Cervus elaphus* (red deer)	part of skull of a male
J	8.15m	2.77m	11 × 2	54	? *Capreolus capreolus* (roe deer)	part of left femur
K	8.20m	2.77m	7 × 2	9	*Bos taurus* (cow)	a single thoracic vertebral spinous process

n/a = not applicable

David Henderson are presented below: this first part of the section describes the taphonomy of the assemblage. Table 3 summarizes the data.

The locations of most bones are to the east, and within a metre, of charcoal accumulation I. No bones have been found on the rock slab supporting that charcoal accumulation, but the bone at Location K lies in a crevice against this slab and those at Locations E–J lie in sediment immediately above the adjacent rock slab. Bones at Locations C and D are 3–4m east of these, within Unit 1. The distribution of bones may originally have been more continuous because Unit 1 is absent across rock slabs between Locations E–K and C–D, perhaps eroded before deposition of Unit 2.

Bones have been recovered from Units 1a to 1d. The bone at Location K was found at the base of Unit 1a, and bones at Locations H, C and D are from Unit 1b. Most bones, including abraded bones (Table 3), are found among the beach pebbles in Unit 1c. There need be no significance to this distribution because all sub-units of Unit 1 may have accumulated rapidly, and some bones were probably moved and redeposited by wave action. In the fissure at 1m distance where Unit 1 is thickest but where sub-units 1a to 1d cannot be recognized (probably because wave energies were consistently higher), bones at Locations A and B were deposited towards the end of deposition of Unit 1. These bones are slightly water-worn, likely to have occurred as they were pushed by waves into the back of the small fissure they were found in. The bone at Location D was slightly worn, though not sufficiently to obliterate anthropogenic cut-marks (below). The bone at Location I, part of the skull of a male red deer (*Cervus elaphus*) (Table 3), had been abraded after the antler had been removed by people cutting it, probably as it was rolled by the waves that deposited the beach pebbles in Unit 1. These bones are probably allochthonous. In addition, the single antler fragment of *Cervus elaphus* (Location B) is of a diameter at its proximal end to allow the suggestion that it was originally joined to the skull of the animal represented by the bone at Location D, ie they are from the same animal. The third bone of *Cervus elaphus* (Location I) is not of that animal, and at least two individual red deer are present (below). The bone at Location J is also heavily water-worn. Other bones in the assemblage are not demonstrably worn and are assumed to have been recovered from where they originally lay.

Individual large and small fragments of wood charcoal lie close to many bone fragments, particularly around Locations E–K and also near Locations A and B, but the bones themselves show no evidence of having been charred: no bone fragments were recovered from sieved samples of the charcoal accumulations (above). No bones have been recovered from the overlying Unit 2. The bone at Location E at the boundary between Units 1 and 2 had undergone subaerial weathering for some indeterminate time before being incorporated into the deposit, and this is taken to suggest a depositional hiatus between Units 1 and 2 when Bone E was exposed.

The faunal assemblage contains wild and domesticated animals (below). All are large mammals, and although smaller animals may be under-represented because of retrieval processes, it is thought that only large mammals were originally present. Most bones show no evidence for anthropogenic modification but some do. At Location B is a single broken antler of red deer (*Cervus elaphus*), snapped at its proximal end on recovery, but an earlier break at this end may have been purposeful. A break at the distal end is original and may also have been purposeful. No butchery marks are seen. The left antler and frontal fragment of a male red deer (*Cervus elaphus*) at Location D, perhaps the animal represented at Location B, had the base of the antler still attached to the frontal bone but the remainder had been sawn from the rest of the skull. Three cuts are visible on the antler base though subsequent abrasion has meant that the tool used cannot be defined. A right third metacarpal of horse (*Equus caballus*) at Location E also had its distal end sawn off. A different modification is suggested from the wear and shape of the left femur of a deer at Location J, possibly roe deer (*Capreolus capreolus*), which although in a very water-worn state with all detail eroded has the appearance of an artefact, possibly a knife handle. Collagen from Bone D, the shed antler of a male red deer (*Cervus elaphus*) is radiocarbon dated to 990 ± 35 ^{14}C BP (GU-13577), calibrated to 980–1160 cal AD (2σ) (Table 2).

FAUNAL REMAINS

D Henderson

Eleven collections of animal bone, either single or small assemblages, were recovered from the site (illus 2b: locations A–K), representing four, possibly five species. These were, at Location F, a fragment of skull of a sheep (*Ovis aries*) with a small section of the base of the horn-core, together with a fragment of scapula of either red deer (*Cervus elaphus*) or domestic cow (*Bos taurus*). A collection of ten small bones at Location G relates to a smashed fragment of a single skull bone of sheep (*Ovis*).

A lumbar vertebra fragment from a red deer or domestic cow was recovered from Location H. Two further cattle bone fragments were recovered, a thoracic vertebral spinous process (Location K) and part of the coronoid process from the right mandible (Location C). No butchery marks were observed, and the fragments appeared to be unweathered, suggesting primary deposition in situ. The single bone at Location I is part of the skull of a male red deer (*Cervus elaphus*). A large part of the back of the skull of a male red deer was recovered at Location D. The fragment comprised most of the occipital bone, the parietal and the frontals. The antlers of the stag have been removed by human action, suggesting that it had died between September and January, before the antlers are cast. The right antler had been removed by cutting through the pedicle (the permanent 'stump' of the antler) from three directions, leaving a triangular scar on the bone. The left antler had been removed by a large single cut through the bone of the skull, below the level of the antler. After butchery, the skull was water-worn, removing any tell-tale marks of the instrument used to remove the antlers, but the directions of the cuts indicate a saw was used, rather than a knife or a chopping instrument. The skull had spent some time after butchery (most probably a matter of a few months, certainly not years) being worked on by the tides before inclusion in the deposit. Similarly, another left antler and frontal fragment of red deer was recovered (Location B), which had been treated in a similar manner; the base of the antler was still attached to the frontal bone, which had been sawn off the rest of the skull. This specimen came from a different individual to the above specimen, the antler being much more massive (circumference on the 'burr' was 229mm). Although the antler was broken above the brow tine, the size suggests an animal of over seven or eight years old.

The left femur of a (?)roe deer (*Capreolus capreolus*) (Location J) was recovered in a very water-worn state, with all detail eroded. The wear and shape of the fragment is suggestive of an artefact, possibly a knife handle, but the state of preservation is too poor to establish this beyond a possibility. The fifth species was horse (*Equus caballus*); represented by a right third metacarpal (Location E), with the distal end sawn off, and an almost complete atlas (Location A). The atlas was slightly water-worn, while the metacarpal had undergone subaerial weathering for some indeterminate time, before being incorporated into the deposit.

This is an unusual assemblage of species and skeletal elements to find in a medieval context. Although small, the collection does not suggest a normal domestic assemblage, and is more likely to represent the waste from craft working. In particular, the removal of both red deer antlers by sawing through the skull is unusual; it would appear to be easier to saw through the antler itself. If the (?)roe deer femur was, indeed, intended as a tool handle, it may have been discarded during manufacture, as a crack had developed along its length. Cattle mandibles were frequently used to provide disks of bone for decorative purposes or as gaming pieces (McGregor 1985, 61).

FLUVIAL AND COLLUVIAL SEDIMENTS SEALING THE ARCHAEOLOGICAL FEATURES

The boundary between Units 1d and 2 occurs at an altitude of 3m OD, 1.5m higher than the present storm beach crest, above the tilted bedrock slabs east of 11m distance (illus 2b). It is not so clearly defined in mid-valley where matrix-supported stones are more common, but is at 1.9m OD in the channel at 42m distance. At the boundary between these units, Bone E (above and Table 3) was weathered by subaerial exposure, probably after coming to rest, since it contrasts in this with bones found within Unit 1 which are not weathered. This suggests that sediment deposition was not continuous between Units 1 and 2. Unit 2 is a 40cm-thick, poorly sorted and structureless clay-rich silt with rare to common clasts, most of calciferous sandstone. Beach pebbles are still found, probably thrown up by large waves, but are far less common. Unit 2 is interpreted as partly colluvial and partly fluvial, its colour suggesting derivation from till and, perhaps, from reworked sediments of Unit 1 (Tipping 2007).

Unit 4 is comparable in all characteristics to Unit 2 and is a fluvial deposit rising to a terrace surface (T2) at 5m OD (illus 1b; illus 2b). Between these, Unit 3 at 3.8m OD is a 15cm-thick bed of clast-supported gravel, entirely of beach pebbles, interpreted as a storm beach (illus 2b). It represents a phase, probably of very short duration, of exceptionally energetic wave action, with gravel deposited up to 2.5m higher than at present. Being a storm event, this deposit need not imply higher relative sea level. At the base of the overlying Unit 4, within matrix-supported beach pebbles at 7.2m distance (illus 2b), is a deposit of charcoal comprising individual unabraded and slightly abraded fragments of wood charcoal, each fragment surrounded by the sandy silt matrix of Unit 4. The layer is around 12cm long, a maximal 2.5cm thick, and lies around 1cm above a bedrock ledge. This deposit need not be in situ. The sandy silt either invaded an in situ charcoal accumulation or the two were transported together, but the concentration of charcoal fragments suggests only limited movement. Eleven charcoal fragments were picked out, but two fragments only could be identified, of *Quercus* sp (oak) and *Betula* sp (birch). A radiocarbon assay was obtained on a fragment of *Betula* charcoal, selected because a tree of this genus is likely to have grown for a shorter time, giving a calibrated age of 955 ± 35 BP (1010–1160 cal AD at 2σ (GU-14374)) (Table 2).

CURRENT RATES OF EROSION

The unconsolidated sediments in the cliff are exposed by winter storms almost continuously along this 150m-long spine. Nevertheless, very little loss of fine sediment occurred by wind erosion or direct wave impact between October 2005 and November 2006: the locations of small samples taken in winter 2005 continued to be visible. However, undermining by wave action of bedrock slabs that support the unconsolidated sediments was at points pronounced, and this process is resulting in large-scale cliff collapse. It is hard to estimate how long the sediment stratigraphy will be preserved because major losses are irregular, probably almost random, but the slender stack of unconsolidated sediments seaward of the rock cliff may be lost in the next few years.

SYNTHESIS AND DISCUSSION

In the early medieval period, before *c* 1100 cal AD, the Dunglass Burn reached the sea over a broad rock platform of carboniferous calciferous sandstone at 2 to 2.25m OD. The channel at 42m distance, incised in bedrock to 1.16m OD (illus 2b), probably represents the main stream course. This is little different to the altitude and location of the present stream course (illus 1b), but this observation disguises the recognition that in the last 1,000 years the valley floor at the coast has risen to almost 5m OD by the rapid accumulation of a fluvial and colluvial valley fill, before cutting down through these (Tipping 2007).

The rock platform appears to have been clean of soils and sediments. Some rock fragments lying on the platform appear slightly weathered, and basal unconsolidated sediments may in part be weathered from the underlying sandstone (eg Unit 1a), but no soil profile has been preserved. The interpretation is, however, that the rock platform was at *c* 1100 cal AD a stable surface and had been for some time.

Three closely contemporary events happened at around 1100 cal AD. These are: (a) the beginning of a phase of apparently increased storminess which rapidly led to the construction of a gravel beach up to 2.3m OD (Units 1b to 1d); the construction by human beings of four fires on the rock platform, now charcoal accumulations I–IV and (c) the use and deposition of a collection in Unit 1 of large mammal bones of both wild and domestic species. The calibrated radiocarbon assay on a fragment of *Corylus* (hazel) in charcoal accumulation I (1010–1190 cal AD) is statistically indistinguishable from that on the red deer antler at Location D, 4m to the east, of 980–1160 cal AD: they are contemporaneous. Their separation into a series of relative events is done on sediment-stratigraphic grounds.

One charcoal accumulation only was ^{14}C dated because their position on the same rock platform, their closely comparable relations to surrounding sediment bodies, their proximity to each other and the indistinguishable ^{14}C assay on the stratigraphically later antler (below) all strongly suggest that they were contemporary. At accumulation IV, on a comparatively low altitude part of the rock platform, at least one storm event led to the deposition of Unit 1b pebble gravel prior to the construction of the fire or fires there (illus 3b), but the other fires were built directly on rock and these are not affected by the deposition of beach gravel. Most of the fires recorded in the cliff may have been constructed before beach gravels were generated by storms. Large charcoal fragments, probably derived from fires, are found in the earliest deposits (Unit 1a) adjacent to charcoal accumulation I.

There is no strong evidence from which to deduce the purpose of these fires. Large sieved samples produced nothing other than charcoal and occasional stones in most charcoal accumulations: small bones should have been identified with the 2.0mm sieve size used. A few adult and immature mussel (*Mytilus*) shells were recovered from charcoal accumulation IV, and although these were used for baiting lines in white fishing (Aitcheson 2006, 4), prodigious numbers of shells are needed for this. The few shells recovered from charcoal accumulation IV do not suggest this use. The shells were intact and had not been prised apart to extract the meat. These shells are thought to represent shells in life position, naturally colonizing the charcoal accumulation after its use when it was an intertidal surface. The smashed limpet (*Patella*) shells in charcoal accumulation II are thought to have been thrown up in storm waves as they are common in Unit 1 deposits. The charcoal accumulations vary in proportions of fine (<2.0mm) and coarse (>2.0mm) fractions. Stones >2.0mm vary from 3% by weight in accumulation I to 36% in accumulation III but many of these are thought to be invasive when later fluvial sediments impacted at particular localities: accumulation I is sheltered from the Dunglass Burn by a rock wall. There are many more large charcoal fragments at accumulation I (7% fragments >2.0mm compared to 0.5–1% at other accumulations), the principal reason for charcoal only from this accumulation being submitted for species identifications, and this may imply that different fuels were used for different fires, but this does not help in defining their purpose. Although many of the animal bones collected are close to charcoal accumulation I, and reworked charcoal fragments are frequently found close to bone, the bones have not been heated, and there is no causal relation established to link the fires to the bone. They are contemporary, and almost certainly whoever constructed the fires knew about the animals or their bones but there is no evidence in the faunal assemblage from which to suggest the fires were built to treat meat or bones.

The locations of the charcoal accumulations provide the best clues as to their function. They are thought to be too ephemeral to be the products of salt-panning. It is suggested that the fires were built as beacons to guide small fishing boats into land on this treacherous and rocky coast (illus 1b). Graham (1968, 244) identified from the documentary record the narrow gap between the rocky foreshore called Gutcher's Hole as a landing place in the early 17th century AD, and noted how inhospitable the site was. He also noted the absence of archaeological evidence for this. Dent & McDonald (2001, 42) linked the use of such difficult landing sites like Gutcher's Hole to the loss of Berwick to England in the late 15th century AD. These fires may be evidence that the landing place was also used in the medieval period. If correct, the fires were probably sequential rather than strictly contemporary, though this is impossible to establish. There were probably more than the four fires preserved. Charcoal accumulation I is a well-preserved pyramid, suffering little erosion, and so the abundance of reworked charcoal fragments adjacent to it may have come from fires more seaward and being eroded by wave action. Charcoal accumulation I had been sealed by a metre of fluvial sediments (Unit 2) when charcoal in concentration V was deposited, and yet this concentration has the same age, of 1010–1160 cal AD. This charcoal is likely to have been reworked from other charcoal accumulations. The fires are not on cliff tops, but are visible only when close in-shore, but are positioned to lead boats through Gutcher's Hole. If the broad contemporaneity of the four recorded fires is accepted, together with the evidence for geomorphic stability of the rock platform on which they were constructed, then a reason for the single period of use should be sought. Speculatively, this singular phase of interest in Gutcher's Hole may be related to the rapid expansion in fish consumption at *c* 1000 AD (Barrett, Locker & Roberts 2004). The absence of fish bone in the cliff sediments is taken to imply the absence of processing on the shore: larger animal bones are well preserved. Three of the fires are sealed by later fluvial sediments (below) but charcoal accumulation III has a low cairn of angular boulders placed on it, two fire-reddened, and this is interpreted as a concealment of the fire, suggesting perhaps that some fishing was not condoned. Nevertheless, it would be wrong to picture this cove as hidden: Graham (1963, 327) suggests the Berwick–Edinburgh road passed along the shore before Dunglass Old Bridge was built in the early 17th century AD.

It is likely that these activities were, however, coincident with increased storminess, seen in the construction of the colluvial and beach gravels of Unit 1. The occurrence of beach gravels in Unit 1 indicates that the shore was very close, probably in the same location as today: the fires were on the shore. The small life assemblage of mussel shells in charcoal accumulation IV is likely to represent the colonization of intertidal surfaces at 2m OD. Some bedrock slabs in the east of the section were being undermined by wave action and the new fissures filled with beach gravel. Frequent storm tides threw pebbles up to 2.3m OD onto colluvial sediment surfaces where waves were pushed against bedrock cliffs. The same storms in mid-valley lifted similar pebbles to <2.1m OD. The four charcoal accumulations were affected to different extents by wave action. Accumulation IV is the only deposit to incorporate pebble gravel. Accumulation I at 2.8m OD seems to have been undisturbed. At present the most frequent storms build gravel beach ridges to 1.5m OD, suggesting either that medieval storms were larger than those in the last few years or relative sea level was higher by around a metre. Other data on historic period relative sea levels from this coast are very few, but the estimate of a slightly higher medieval sea level would not be at variance to current reconstructions (Shennan et al 2000; Shennan & Horton 2002). The transformation of the coast from bedrock to pebble beach may have been through increased storminess after *c* 1100 AD (Brown 2001, 201–6; de Kraker 2002; Tipping et al 2004). This may be one reason why beacons ceased to be built, if the rocky Gutcher's Hole became too risky a landing place. However, subsequent geomorphic changes may also have made use of the shore difficult (below).

The faunal assemblage, though contemporary, appears to be unrelated to the charcoal accumulations. Its preservation is due to the base-rich rocks and sediments as well as to the rapidity of burial within Unit 1 sediments and beneath those of Unit 2. The assemblage may not be complete because sieving was not used on the natural sediments of Unit 1 which contain the bones, but small bones were looked for and not identified. The assemblage has also in part been moved following its discard by the waves that built up the storm beach (above) so that the proximity to each other of different animals or bones cannot aid interpretation. The assemblage was present on the beach, rather than on the rock platform with the charcoal accumulations, because the rock platform was little disturbed by waves. The evidence for the anthropogenic working of bone of both wild and domestic species is taken to indicate that the animals or their bones were deliberately introduced to the beach: these are not thought to be casualties of cliff-falls. Henderson (above) suggests that this is not a domestic assemblage. One red deer antler was shed naturally, in the autumn, and it may have been collected rather than the animal killed. Some form of craft-working is suggested for parts of the assemblage though it is unclear what: the water-worn state of worked bones precludes description of the tools used, for instance.

The weathered bone at Location E, at the boundary between Units 1 and 2, suggests an hiatus between the pebble-rich, storm-affected colluvium of Unit 1 and the better sorted colluvium and alluvium of Unit 2. Exposure may only have been for decades, however. The structural coherence of most of the four charcoal accumulations indicates that they were quickly buried by fine sediment, so that the beginning of the major sediment aggradation from the Dunglass Burn beneath terrace T2 is thought to be very close to the age of the charcoal accumulations, between 1010–1190 cal AD. Both colluvial processes on and near the valley side and fluvial processes in the valley centre contributed to the aggradation of 2.5m of sediment that filled the 50m wide valley and elevated base level in this lowermost reach of the burn from around 2.5m OD to just over 5m OD. This is an exceptional thickness of deposit to have accumulated, even if partly explained by the confinement of the valley, and is discussed in detail elsewhere (Tipping 2007). The effect of this greatly accelerated sediment supply on the shore was to bury and preserve the archaeological features, but their impact at the time may have been to make very difficult the continued use of the coast at Dunglass. Riverine floods are a second likely reason for the absence of archaeological remains after the high medieval period. Tipping (2007) argues that the coast was buried by the seaward extension of a large alluvial fan until its erosion before Gutcher's Hole was mentioned in the early 17th century AD (Graham 1968, 244).

In conclusion, the work has identified some novel archaeological and anthropogenic features of this coastal landscape, established the ages of these and been able to evaluate the geomorphological changes impacting on these features and use of the coast. The work has not succeeded in defining the function of the charcoal accumulations, and their use as beacons remains speculative. The faunal assemblage remains unexplained. It needs to be evaluated, finally, whether these weaknesses are due to the approach taken, of recording and salvage rather than detailed excavation (Toolis 2005; Turner 2005). Without the work undertaken the set of archaeological features would not have been recorded. This must be the key argument in justifying this low-key approach, particularly when inventories of sites and site types are still needed (Ashmore

2003, 207). It is not assumed that the recorded features at Dunglass are at all significant: this is, after all, only a series of fires and some bones of medieval age. The geomorphological changes are more significant although their causes remain unclear (Tipping 2007). Full excavation would have resulted in the more complete recording of the charcoal accumulations. Contexts within the accumulations but not visible in the tapestry excavations here might have been found that are critical in defining function. More post-excavation analyses, particularly of charcoal fragments from those accumulations not analysed, might have defined differences in fuels, but even at charcoal accumulation I, only a small minority of fragments was able to be identified, so it is not known whether the assemblage described above is characteristic of the fuels used. It is doubtful whether full excavation of the bone-bearing sediments (illus 2b) would have yielded more data: the vast majority of the collection was visible at the first visit.

What has been retrieved at Dunglass has not been unprofessional. The recording and survey are to appropriate standards because of the training of the author. Access to specialists has been facilitated by familiarity with the archaeological discipline, but these can in future be more formal. A key consideration, if voluntary recording and monitoring of threatened sites is to be encouraged (Turner 2005), must be the establishment of closer working links between volunteer and specialist. The site will continue to be monitored, but given how little of the unconsolidated sediments remains to be eroded, few further surprises are expected. But if not recorded now, by techniques that are simple, there would be no site to record.

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