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# The end of the world, or just 'goodbye to all that'? Contextualising the red deer heap from Links of Noltland, Westray, within late 3rd-millennium cal BC Orkney

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ABSTRACT

*As part of a major international research project,* The Times of Their Lives*, a programme of radiocarbon dating and Bayesian modelling was undertaken to refine the chronology of activities in one small but important part of the extensive Late Neolithic and Bronze Age settlement on Links of Noltland on the island of Westray, Orkney. The selected area (Trench D) is well known for having produced, next to a wall, the remains of a heap of at least 15 red deer carcasses, on top of which had been placed a large cod, a gannet's wing along with part of a greater black-backed gull, and a pair of large antlers. This remarkable deposit had been preceded by, and was followed by, periods of cultivation and the deposition of domestic refuse. Refined date estimates have been produced, based on 18 radiocarbon determinations obtained from 16 samples from Trench D (including nine newly obtained dates, three from individual deer in the heap). These clarify when, during this long sequence of activities, the deer were heaped up: probably in the 22nd century cal BC, around the same time as Beaker pottery was deposited elsewhere on the Links. This allows comparison between the dated activities in this part of the site with activity elsewhere on the Links and also with other episodes of deer deposition in 3rd-millennium cal BC Orkney. It encourages exploration of the possible reasons for what appears to be a remarkable act of structured deposition. The significance of an earlier, much larger scale deposit featuring cattle remains at Ness of Brodgar is discussed in exploring the nature of Orcadian society and practices during the second half of the 3rd millennium cal BC.*

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## INTRODUCTION

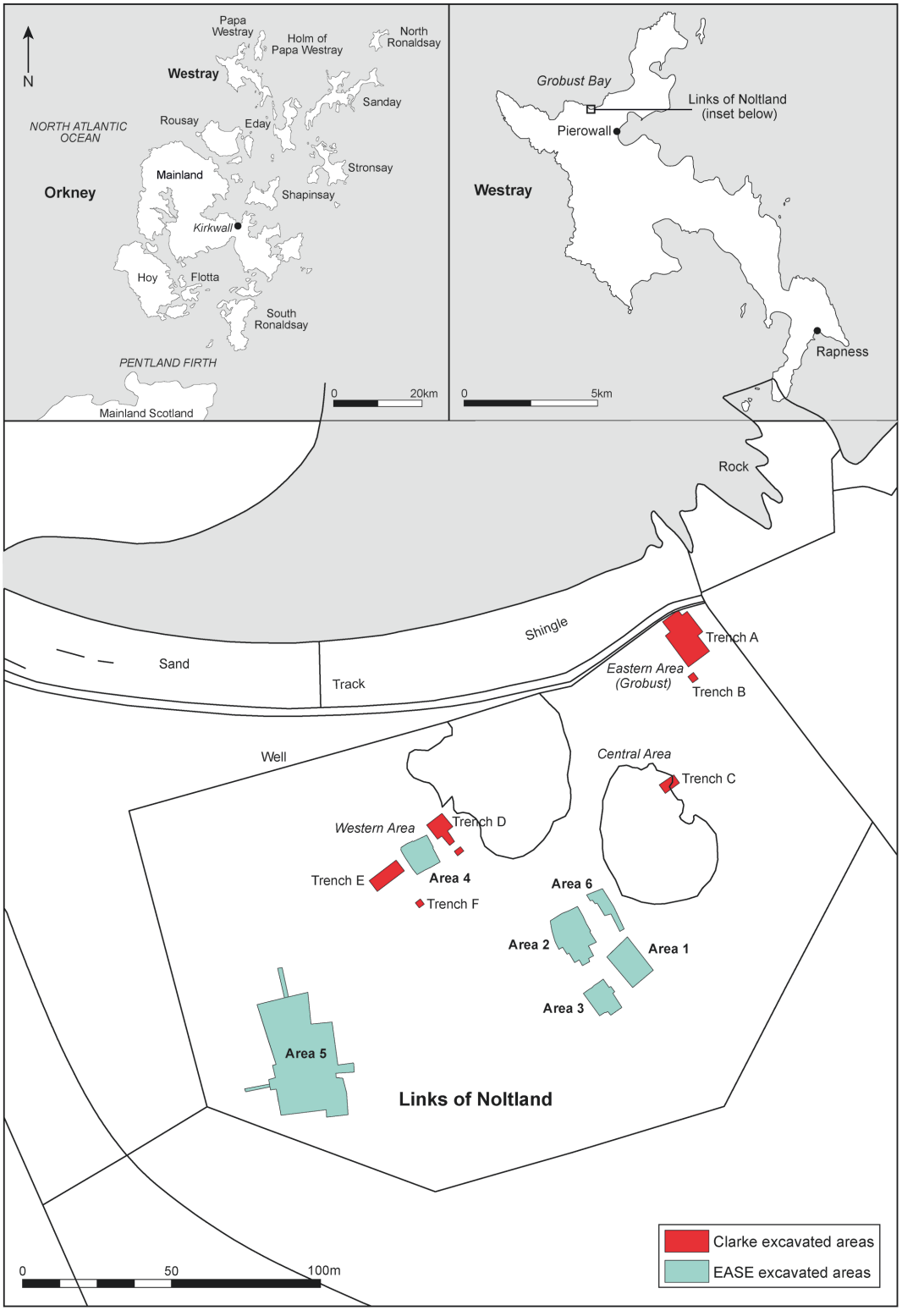
The complex of sand dunes and machair known as Links of Noltland on the north coast of Westray in the Orkney Islands (Illus 1; NGR: HY 428 493), just over 1km to the north-west of the Maeshowe-type passage tomb at Pierowall Quarry (Sharples 1984), is the site of extensive Late Neolithic (Grooved Ware-associated) settlement and Bronze Age activity (Canmore ID 2790; Clarke et al 1978; Clarke 1981; Clarke & Sharples 1985; Clarke 1991; Sheridan 1999; Sharples 2000; Moore & Wilson 2011a and see below for further references). This includes evidence for Beaker-associated activity dating to the last quarter of the 3rd millennium cal BC (Clarke & Sharples 1985; Clarke 1991; and see below); for funerary activity during the early 2nd millennium cal BC (Richard Strachan pers comm); and for funerary and domestic activities dating to between *c* 1700 and 1400 cal BC (Gooney 2011; Moore & Wilson 2011a; 2013).

This contribution focuses on one noteworthy discovery from the excavations undertaken between 1978 and 1981 by David Clarke, namely a heap of red deer that had been piled up beside a wall, in Clarke's Trench D, in what appears to be a deliberate act of structured deposition (Clarke & Sharples 1985; Sharples 2000). The heap comprised the articulated and partly disarticulated remains of at least 15 individuals. While it is presumed that the deer had been deliberately killed, there was no evidence for butchery or for gnawing or disturbance by scavenging animals. This deer heap and the remarkable condition of the remains have generated much discussion (eg Sharples 2000; Morris 2005; Richards et al 2015), and yet the deer themselves remained undated until 2015, when they became the subject of a radiocarbon dating programme undertaken as part of a much larger, European Research Council-funded research project, *The Times of Their Lives* (www.totl.eu). One of the constituent projects within this Europe-wide programme has focused on refining the chronology of developments in late 4th- and 3rd-millennium cal BC Orkney (MacSween et al 2015; Richards et al 2016; Card et al 2017; Bayliss et al 2017). Given the potential importance of the deer heap to our understanding of these developments, it was duly incorporated into the project. This contribution presents the results of this dating work, which was not limited to the deer heap but also encompassed the human activities and other site formation processes that preceded and followed its deposition in this part of Links of Noltland.

A detailed technical report on the dating and Bayesian-modelling work is presented elsewhere (Marshall et al 2016) and forms a companion piece to the current contribution. Here we focus on drawing out the significance of the results, not only as they relate to the broader picture of activities on Links of Noltland but also to other probable examples of structured deposition of deer and other creatures in 3rd-millennium cal BC Orkney. We attempt to locate these activities within our current understanding of Orcadian society and animal-related practices at that time. Doing so allows us to compare developments during the second half of that millennium – a period that has not hitherto received sufficient attention – with those of the first.

## A BRIEF HISTORY OF DISCOVERY AND EXCAVATIONS ON LINKS OF NOLTLAND

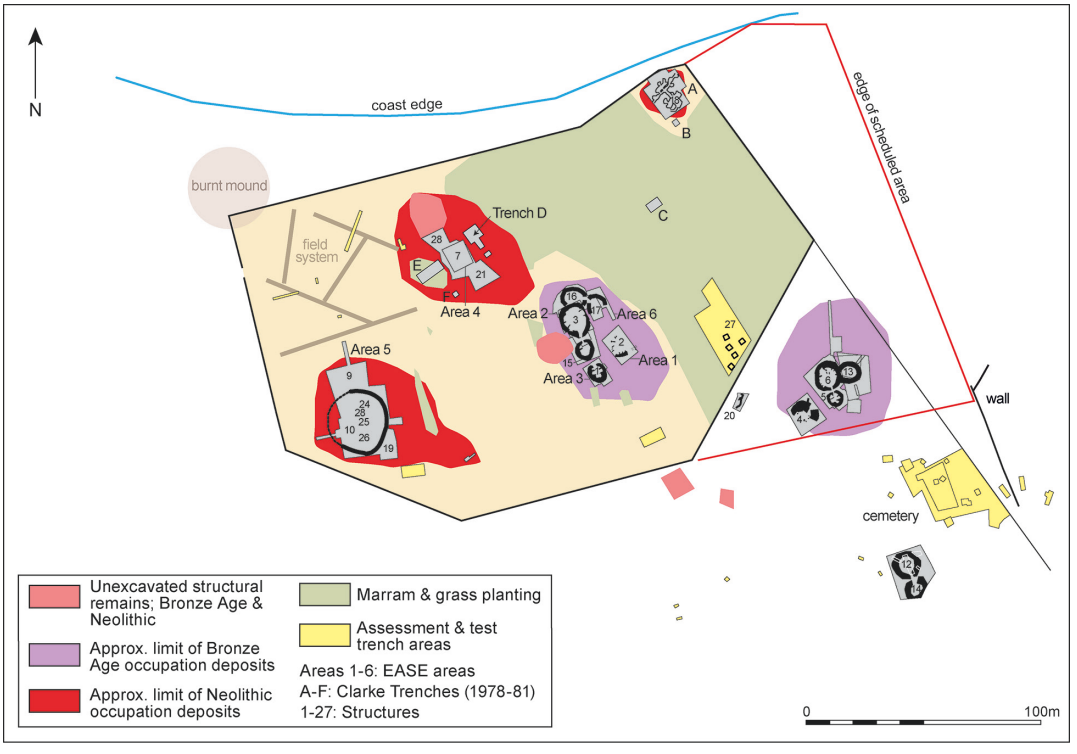
Archaeological remains on the Links were discovered in 1866 by the Orcadian antiquary George Petrie (Society of Antiquaries of Scotland MSS 554: 25–30; Clarke 1991), but over a century was to pass before these remains were explored further. Following his excavations at the Late Neolithic settlement at Skara Brae, David Clarke turned his attention to the Links in the late 1970s, with reconnaissance fieldwork by Rosemary Hope and Caroline Wickham-Jones in 1977 being followed by small-scale rescue excavation between 1978 and 1981. This work was funded by the Scottish Development Department (now Historic Environment Scotland, HES) and focused on those areas within the dune and machair system that




ILLUS 1 Location of Links of Noltland

appeared to be suffering the most from erosion caused by a combination of wind scouring, rabbit burrowing, marine storm-ingress and small-scale sand extraction. An area of 2.5ha was taken into State care in 1985 and measures were initiated to consolidate areas at risk of damage, but problems of erosion continued and, following assessment in 2001 (Moore et al 2002), it was decided that the best management strategy for this vulnerable area would be to undertake further fieldwork. Survey, palaeoenvironmental sampling and trial excavation in 2000–6 were followed by more substantial excavations (Illus 2), which have been undertaken by Hazel Moore and Graeme Wilson of EASE Archaeology – on behalf of HES – since 2007. (For details of this and other fieldwork and discoveries, and for an interim report on the finds from the 2007–9 excavations on the Links, see Moore & Wilson 2011a; 2011b; 2012; 2013; 2014. See also Brend 2010; Hamlet 2014; and various posts on the excavation's Facebook page, https://www.facebook.com/Links-of-Noltland-618982478135822/, accessed January 2017.)

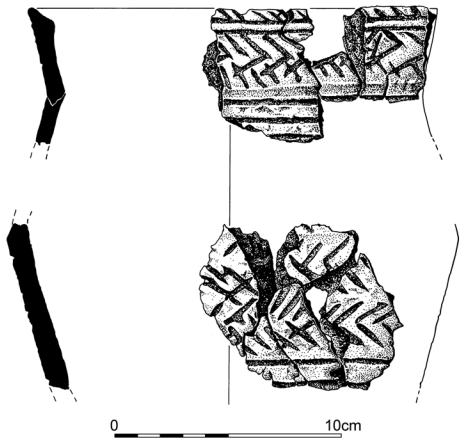
Clarke's excavations focused on three main areas of occupation deposits (originally named the 'East Midden', 'Central Midden' and 'West Midden': see note on the use of the term 'midden' below[1]) within a 150m stretch of the Links (Illus 2). In the Eastern Area, referred to by its local name as 'Grobust', Trench A explored the upper parts of a large (max 12m × 7.5m) Late Neolithic stone structure, consisting of a lobate main chamber linked by a passageway to an extension. A small and essentially unproductive trench (B) to its south was dug to check the spatial extent of activities in this part of the Links. In the Central Area, Trench C (6m × 4m) exposed part of a stone field wall running east/west. This wall, notched to take possible timber uprights, had what appeared to be a butchery area beside it to the south, plus traces of an insubstantial, stake-built




ILLUS 2 Plan showing the location of the areas investigated by David Clarke's team (Trenches A–F) and by EASE Archaeology. © Crown copyright

structure; overlying both this area and the wall was a thin deposit incorporating domestic waste, including sherds from two Beakers (Illus 3) and a sherd from an unusual vessel that conjoined another sherd found among remnant walling in the northern sector of the Grobust structure, over 40m away. A single human molar tooth was also found in this layer, quite possibly resulting from *in vivo* loss (cf Sheridan et al 2014). Overlying this was another occupation deposit with incised sherds of a possibly Early Bronze Age vessel. In the Western Area, three trenches (D, E and a small trial trench F) were excavated. The contents of Trench D – the only trench to be excavated down to the natural substrate – are dealt with below; Trench E (of which only 0.2m depth was excavated) produced traces of ard cultivation in the upper part of its occupation sediments, which covered structural traces including a small stretch of walling, a hearth and the remnants of a putative clay oven; Trench F produced just a small amount of anthropogenic material.

The EASE fieldwork (Illus 2) completed the excavation of the interior of the Grobust building (renamed Structure 18) and revealed many more Late Neolithic structures, as well as evidence for the Bronze Age settlement and funerary activity (Moore & Wilson 2011a: 24–8, 38; Gooney 2011). Late Neolithic discoveries include the remains of a substantial house (Structure 7) and a second house (Structure 21), both covered with occupation deposits, in Area 4 between Clarke's Trenches D and E in the Western Area; Structure 7 had been preceded by another house, also covered over with refuse-bearing deposits. (Details of Structure 7 and its predecessor can be found in Moore & Wilson 2011a: 22 and among the 2013 entries of the site's Facebook page.) To the west, a sizeable field system was uncovered, while in the south-west part of the Links (EASE Area 5) the excavators uncovered what they have described as 'a series of at least seven well-preserved dry stone buildings arranged in close proximity within a finely built stone-walled enclosure, linked by paved passageways and surrounded [and capped] by extensive and extremely rich midden deposits' (Moore & Wilson 2014); a Late Neolithic human skeleton was also found. One of the

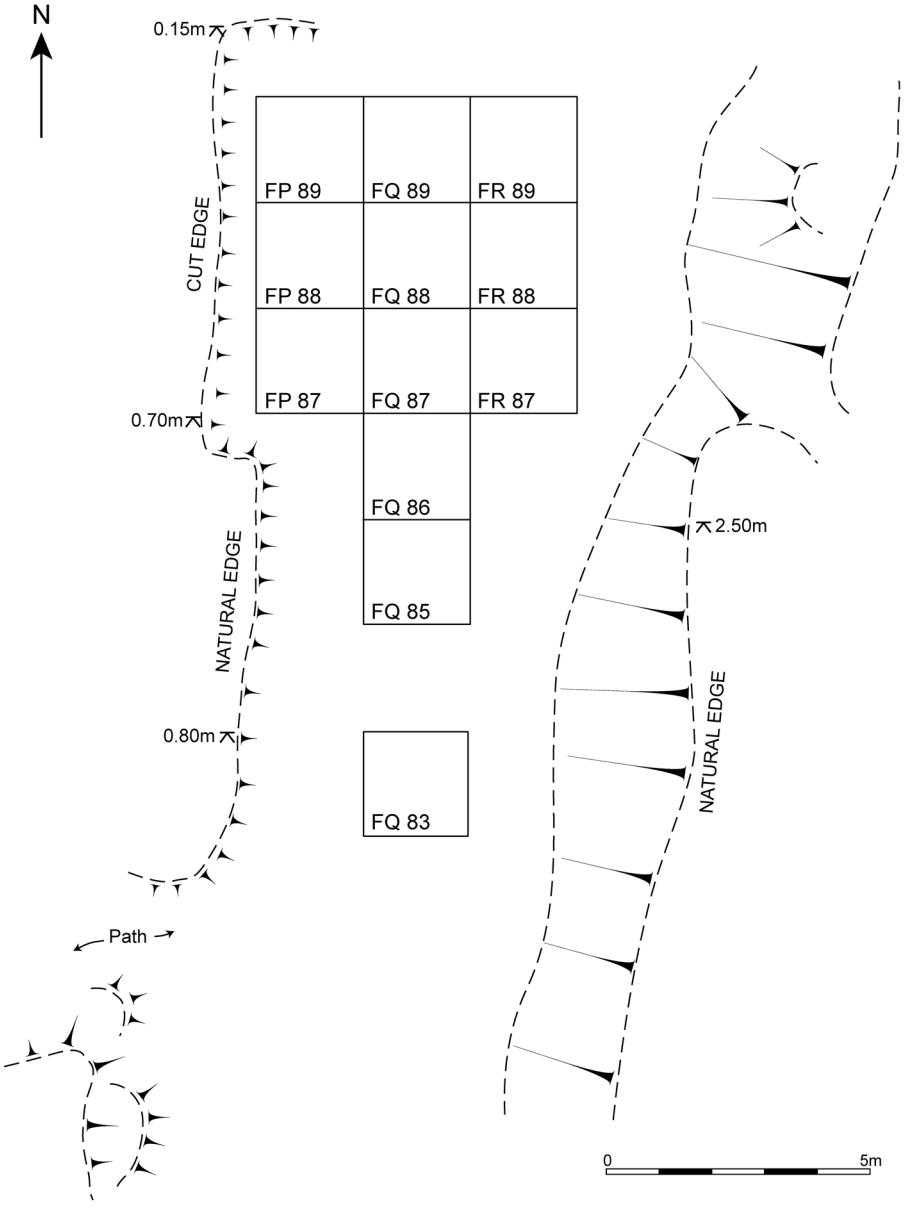



ILLUS 3 One of the Beakers found in Trench C. Illustration by Mary Kemp Clarke

Area 5 structures (Structure 8, subsequently renamed Structure 10), a massive building some 22m across in its maximum extent (Moore & Wilson 2010a), closely resembles Structure 8 at Barnhouse (Richards 2005; Richards et al 2016) and Structure 10 at Ness of Brodgar (Towers et al 2015; Card et al 2017) in its size, shape and quality of construction. It was among the wall-collapse rubble within this building that the first (and most famous) of the Links of Noltland figurines was found (ie the so-called 'Westray wifie' or 'Westray Venus' (Moore & Wilson 2011a: illus 43)). Also present in the rubble were a complete pot, smashed in situ, and a complete red deer skeleton. We shall return to the significance of that discovery below.

## TRENCH D AND ITS PLACE WITHIN THE LATE NEOLITHIC SETTLEMENT

Trench D was located to investigate the eastern edge of an extensive area of occupation deposits, at least 1,100 square metres in extent, its surface exposed through erosion (and elsewhere concealed by overlying sand dunes). The extent of the trench was constrained by the presence of a tall sand dune immediately to the east, and the eventual shape of the trench was a main, T-shaped area comprising 11 squares, with an




ILLUS 4 Plan of Trench D. Illustration by Mary Kemp Clarke and Kirsty Harding

additional 2m × 2m square (FQ 83) located 2m to the south of the main trench (Illus 4); the overall extent of the excavated area was 48 square metres. Excavation in two of the squares (FQ 85 and FQ 86) was halted at a relatively high level, while the other squares were excavated down to the natural glacial till.[2]

It is now clear, as a result of the EASE excavations, that Trench D lies less than 10m to the east of the adjacent substantial Late

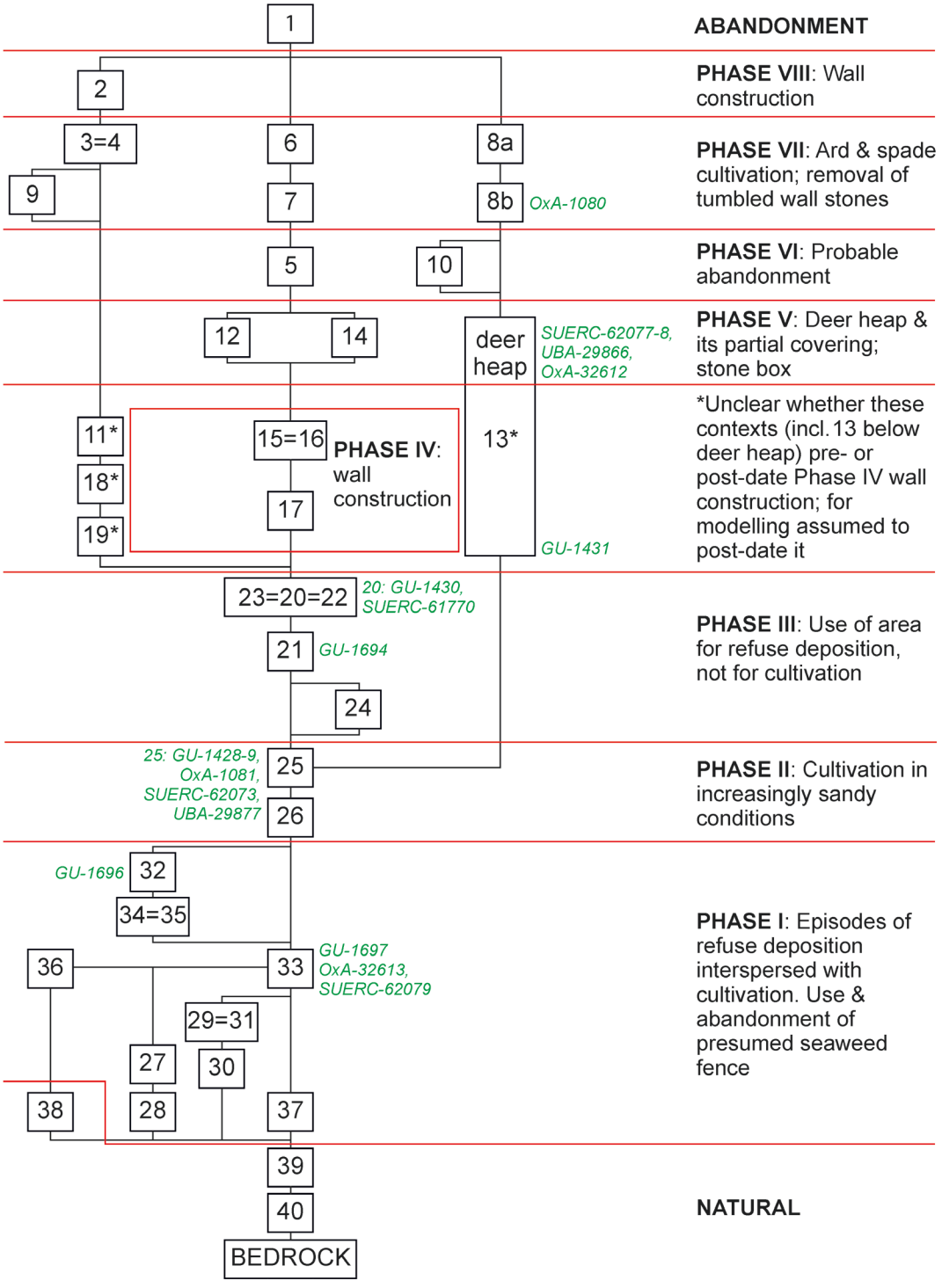
Neolithic house (Structure 7 (Moore & Wilson 2011a: 22)) and to the north-east of the farther house, Structure 21, in Area 4. It is therefore possible that some episodes of cultivation and refuse accumulation recorded in Trench D (and activities represented in Trench E) are associated with the occupation of one or both of these structures, or their predecessors.

## SITE FORMATION SEQUENCE IN TRENCH D

The excavations in Trench D uncovered a complex stratigraphic sequence, extending to a maximum depth of *c* 1.1m. Overall, some 40 stratigraphic units (ie layers and features) of varying spatial extent were identified, many present across all squares including FQ 83 off the southern end of the main trench. The task of defining, documenting and interpreting the stratigraphic sequence demonstrated the complexity of the site formation process, with natural processes of sand ingress, erosion, water-borne movement and decomposition being combined with human activities that had both added to and disturbed the stratigraphy (cf Barber 2003: 210–14). One aspect that proved especially difficult to gauge was the duration and timing of certain activities such as episodes of cultivation and of refuse deposition, although it was clear that in some cases there were very short-term events such as a single sandblow, or the dumping of marine shells, or indeed the piling up of the deer carcasses. The limited number of radiocarbon dates available during the 1980s (as discussed below) did not greatly help the interpretation of the site.

A stratigraphic narrative is summarised in Illus 5 (and see also the section drawing, Illus 6). At the bottom of the sequence, resting on bedrock, is a natural layer of glacial till [40], upon which a turfed sand surface [39] had formed naturally, its humic top marked by a discontinuous layer of grey sand with iron-panning at its base [38]. Above this, across the main trench and south into FQ 83, was evidence for a period of cultivation of midden-enriched soil using ards, interspersed with episodes of refuse deposition (the latter including a dump of limpet shells, subsequently disturbed by ploughing [27]), with the ploughsoil becoming sandier over time – a sign of windblown sand ingress. In an initial attempt to define phases of activity (Sharples nd), the cultivation and refuse deposition episodes that occurred before the significant ingress of sand (Contexts [37] to [27] inclusive) were grouped as Phase I, while the sandier upper ploughsoil levels [25] and [26] were grouped as Phase II. A particularly interesting feature of the Phase I cultivation activity is the presence, in FQ 83, of a short stretch of ditch [30], running east/west, cut through the old land surface and into the underlying sand, with stones placed along its bottom and with a deposit of limpet shells [31] resting on one of the stones (Illus 7). The close similarity of this feature to one of Early Bronze Age date found at Rosinish, Benbecula, in association with ard marks similar to those seen at Links of Noltland (Shepherd & Tuckwell 1977: 112), prompted the suggestion that it might have been the base of a wall or fence/barrier made from seaweed, designed to keep animals away from a cultivation plot or field. Such fences, standing up to 2m high, are known from the recent past in coastal Denmark (Rasmussen 1974: 393–5); the function of the ditch and stones would have been to drain water from the seaweed, and such structures are known to have lasted for several generations. That cultivation persisted after the putative fence had decayed away and the ditch had silted up is clear from the presence of ard marks running across the top of the ditch fill [29]. Further ard marks were seen at a lower level ([37], Illus 8), cutting into the old land surface, and at various points higher in the trench.

A switch in the use of the area, involving the abandonment of cultivation, is marked by the deposition of more substantial amounts of refuse material (Phase III), represented by layers [20] and [22] and a massive concentration of seashells [23] in the main trench, and by layers [20], [21] and [23] and a pit [24] in FQ 83. (In that square, layer [20] constitutes the uppermost layer.) While these sediments, originally categorised simply as 'midden', varied in texture, composition and density of finds (particularly of shells), no clear-cut stratification could be distinguished within them. This is partly due to the decomposition of the original high organic content (which

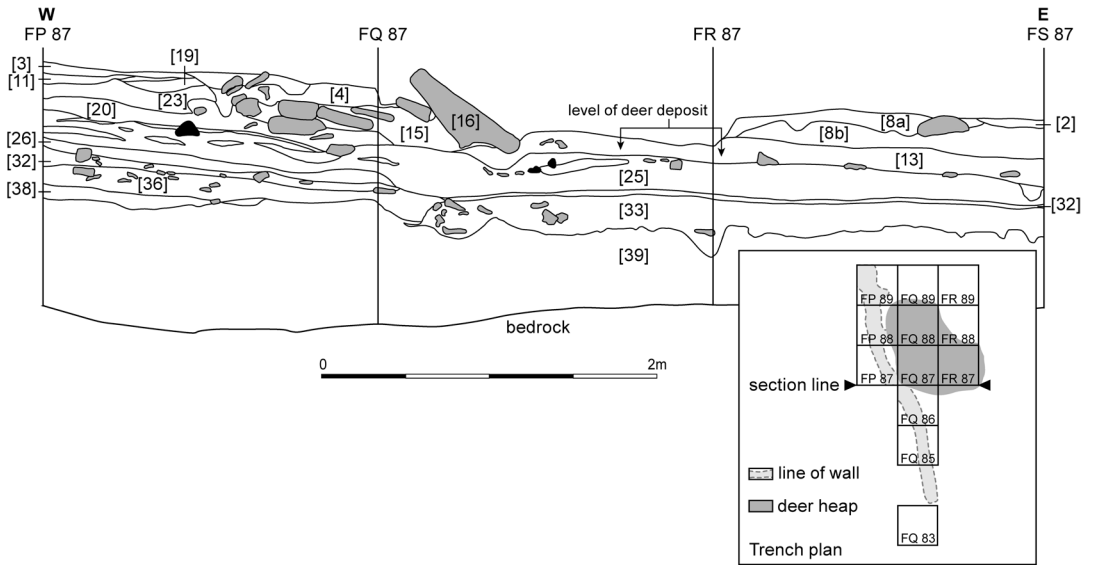

1
ABANDONMENT
2
PHASE VIII: Wall construction
3=4
6
8a
9
7
8b
OxA-1080
PHASE VII: Ard & spade cultivation; removal of tumbled wall stones
5
10
PHASE VI: Probable abandonment
12
14
deer heap
SUERC-62077-8, UBA-29866, OxA-32612
PHASE V: Deer heap & its partial covering; stone box
11*
15=16
PHASE IV: wall construction
13*
18*
17
19*
GU-1431
*Unclear whether these contexts (incl. 13 below deer heap) pre- or post-date Phase IV wall construction; for modelling assumed to post-date it
23=20=22
20: GU-1430, SUERC-61770
21
GU-1694
PHASE III: Use of area for refuse deposition, not for cultivation
24
25: GU-1428-9, OxA-1081, SUERC-62073, UBA-29877
25
26
PHASE II: Cultivation in increasingly sandy conditions
GU-1696
32
34=35
36
33
GU-1697 OxA-32613, SUERC-62079
29=31
27
30
PHASE I: Episodes of refuse deposition interspersed with cultivation. Use & abandonment of presumed seaweed fence
38
28
37
39
40
NATURAL
BEDROCK

contributed to their dark brown colour) and to the compaction and modification of the matrices over time. These sediments are believed to have been considerably thicker originally, and to have resulted from the long-term depositional and cultivation activities of the resident community; the presence of articulated animal and fish bone, and of large parts of individual pots, strongly suggest that we are dealing with primary dumps of refuse, rather than with midden material that had been composted elsewhere and subsequently moved. There is also evidence for in situ flint knapping in layer [21] in FQ 83. All this, together with the spatial extent and variable thickness of the deposits, confirms the impression that this was probably the edge of a much more extensive area of agricultural and related activity, including refuse dumping and accumulation, extending beyond the excavated area to the south and west, and probably relating to the houses found in EASE Area 4.

The next activity to leave its mark was the cutting of a linear foundation trench [17] into layer [20] for the erection of a stone wall [16], 0.75–1.1m wide, running north/south. The wall was constructed using a combination of orthostats and coursed slabs, its stones provided with some form of earth- or clay-based bonding [15] that incorporated refuse material including potsherds. From probing beyond the confines of Trench D, it was clear that the wall continued for some considerable distance to the north, way beyond the surviving edge of the occupation area; to the south it disappeared beneath a large dune. It appears to have been some kind of boundary marker rather than a structure specifically designed to constrain the spatial spread of refuse dumping. Its original height is hard to determine as there had been extensive robbing subsequent to its collapse (or deliberate destruction), but the volume of tumble suggests that it had been significantly higher than its maximum surviving height of 0.5m. The episode of wall construction has now been designated as Phase IV.

Due to subsequent disturbance and to the absence of dates for the layers in question (and especially for the construction of the wall), it is hard to be certain whether intentional refuse-rich deposits continued to accumulate after the wall's construction. There is a deposit of dark brown sandy clay [11], together with a lens-shaped deposit with a dark brown clayey matrix [19] and a concentration of seashells [18] to the west of the wall in the south-west part of the main trench, and to the east of the wall there is a much sandier deposit, clay-like in places

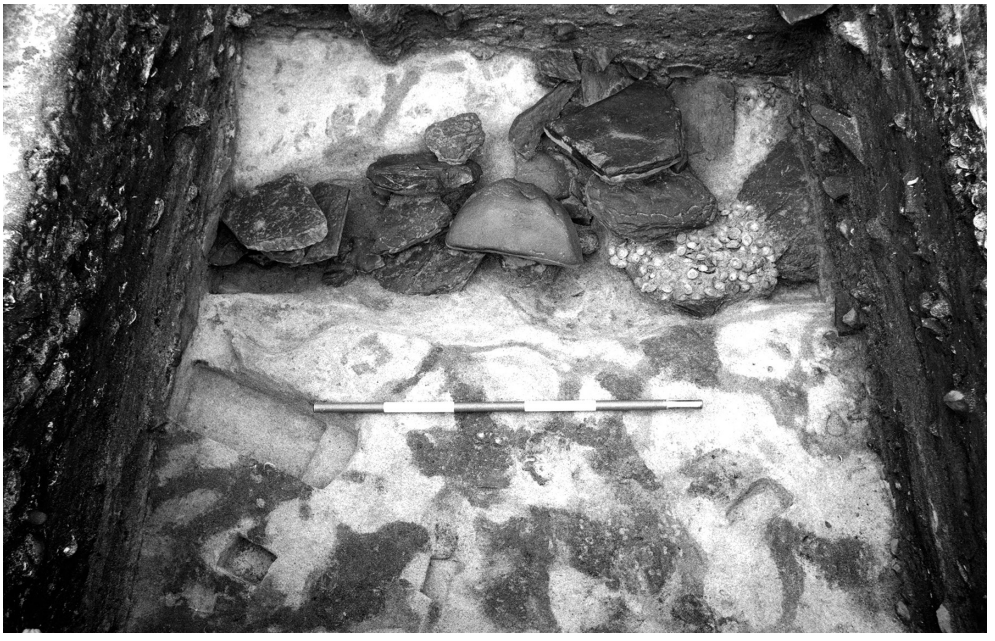
ILLUS 5 Summary of the stratigraphy in Trench D; for details of the radiocarbon dates, see Marshall et al 2016, table 1. Key to context/feature numbers, by Phase: *Abandonment Phase*: 1. Windblown sand; *Phase VIII*: 2. Slabs from a stone wall, plus clay-rich foundation material; *Phase VII*: 3 & 4. Remains of eroded ploughsoil; 6. Ploughsoil filling sockets left by removed stones; 7. Hollows left by stone-robbing; 8a. Ploughsoil with ard marks; 8b. Ard marks in underlying sand layer 10 beneath ploughsoil; 9. Ard marks in underlying deposit of refuse; *Phase VI*: 5. Soil percolated in between loose stones of collapsed wall during the accumulation of 10; 10. Windblown sand layer, disturbed by subsequent ploughing; *Phase V:* 12. Small stone 'box', possibly made using stones from wall collapse; 14. Collapse from wall 16; 13 (upper part). Deer heap just below top of layer of dark brown sand, clayey in places, with some refuse, east of wall 16; *Contexts either pre- or post-dating Phase IV*: 13 (lower part). As above, below deer heap; 11. Sandy clay layer in south-west of trench, its top disturbed by ploughing; 18. Deposit of shells in one area; 19. Lens of dark brown clay in same area as 18; *Phase IV*: Band of dark brown clay used to stabilise wall 16; 16. Stone wall; 17. Construction trench for wall 16; *Phase III*: 20. Large deposit of refuse, rich in clay, artefacts and food waste, extending beyond trench to south and west; 22. Continuation of refuse deposit 20 to east of where it had been truncated by wall 16; 23. Massive deposit of shells in one area; 21. Deposit of red-brown clay in FQ 83; 24. Pit cut into 25, filled with material identical to 21; *Phase II*: 25. Ploughsoil mixed with deposits of windblown sand; 26. As 25, restricted to west of trench; *Phase I*: 32. Dark brown clay-rich refuse deposit in west half of trench, washed across to the east; 34. Patch of windblown sand covered by 32; 35. Material derived from 32 in north-east corner of trench; 33. Ploughsoil; 36. Remnants of old land surface disturbed by ploughing; 27. Dump of limpets disturbed by ploughing; 28. Thin dark brown clay lens under 27; 29. Infill of ditch for possible seaweed fence; 31. Layer of limpet shells on stone in 29; 30. Ditch for possible seaweed fence; 37. Ard marks in 39; *Natural*: 38. Possibly undisturbed remains of original land surface; 39. Machair; 40. Glacial till




Illus 6 Section through part of Trench D. Drawing by Mary Kemp Clarke

[13], containing only a few artefacts and bones (other than the heap of deer near its top, as described below; this heap had definitely post-dated the wall). On the one hand, it appears that the wall had probably cut through the tail-end of a deposit of domestic waste that had lain at (and at the east end, possibly now beyond) the edge of the pre-existing area of cultivation and refuse accumulation. The distribution of finds to the east of the wall (at a level lower than the deer heap) in the sandy deposit [13], and in particular the fact that their density decreased with increasing distance from the wall, suggests that these finds could indeed be part of a pre-existing rubbish dump edge that had been cut by the wall – and thus that they should be designated as a continuation of Phase III activities. On the other hand, however, the sandier nature of the deposits in layer [13] to the east of the wall could be due to sand accumulating against the wall; thus, items found within this sandy deposit should post-date the wall. The area was too disturbed to offer any definitive indication of when, in the sequence of sediment accumulation, the wall was built.

Just below the top of layer [13], and certainly post-dating the wall's construction, was found a remarkable collection of deer skeletons, comprising at least 15 individuals of various ages (detailed below) and topped by a large cod, one articulated gannet wing, part of a greater black-backed gull (represented by a humerus), and a pair of large, shed antlers (Illus 9). This heap, which would originally have been quite high, lay directly beside the wall on its east side – ie the side above the outermost edge of the earlier deposits. To the south and north of the deer heap, several horizontally laid slabs appeared to form some kind of paving, possibly associated with the heap. A thin spread of the sandy sediment [13] surrounded and just covered the heap, and this was much darker in the vicinity of the skeletons than below them, probably due to the rotting of the deer carcasses (and possibly also to the decomposition of turves that might have been brought in to cover the heap, as discussed below). The deposition of the heap and its partial covering with the sand mix [13] is referred to as Phase V. Subsequently – perhaps shortly after the heap was deposited – some stones from the wall [14] either tumbled, or were possibly pulled down, partly covering the heap; and beside the wall, and using some of its slabs, a small box-



ILLUS 7 Remains of the putative seaweed fence, running east/west across square FQ 83: ditch [30], cut through the old land surface and into the underlying sand [39], with stones along its bottom [29] and with a deposit of limpet shells [31] resting on one of the stones. Ard marks [37] visible in the foreground. Photo: Ian Shepherd

ILLUS 8 Ard marks [37] cut into sand surface [39] at bottom of Trench D. Photo: Ian Shepherd

like structure [12], around 30cm × 30cm in size, was created and a rounded boulder placed inside it; perhaps this had supported some kind of marker post. These activities are included within Phase V.

Overlying the area to the east of the wall, and abutting it, was a layer of windblown sand [10], perhaps indicating the temporary cessation of activity in the area. This sand was not found to the west of the wall, but if it had been present it may well have been disturbed by, or incorporated into, the traces of subsequent activities. This episode of sand accumulation, suggesting a possible hiatus of activity in the area, is referred to as Phase VI; also included within it is the percolation of sediment into the interstices of the dilapidated wall [5].

The area was subsequently taken back into cultivation, since the top of the sand layer [10] has clear traces of ard marks [8], with similar marks [9] scored into the top of the deposits to the west of the wall [11]. These cultivation traces on either side of the wall were not as distinct as those encountered lower down in Trench D, partly because they had been subjected to considerable wind erosion at various periods (including the recent past); but they were sufficiently clear to show that the ard or ards had been pulled along in two directions. It is clear that collapse from the wall must have caused an impediment, as there is evidence for the removal of tumbled wall slabs [7] and the filling of the resulting holes with light brown sand [6] identical to the base of the ploughsoil, [3] and [4]. Probable spade marks in one area suggest that spades were used to break up the soil where it was too difficult to run an ard through the ground. This phase of agricultural activity, encompassing stratigraphic units [3]–[4] and [6]–[9], is now designated as Phase VII.

The final episode of human activity in this trench (Phase VIII) involved the construction of a wall running north-west/south-east, its foundation trench cut into the ploughsoil [4] and its fill consisting of dark brown to black clay, with flat slabs set into it to create a level foundation [2]. The wall itself was virtually non-existent, either because it had never been completed or – arguably more probably – because it had subsequently been thoroughly robbed. A final layer of loose windblown sand [1] covered the area.

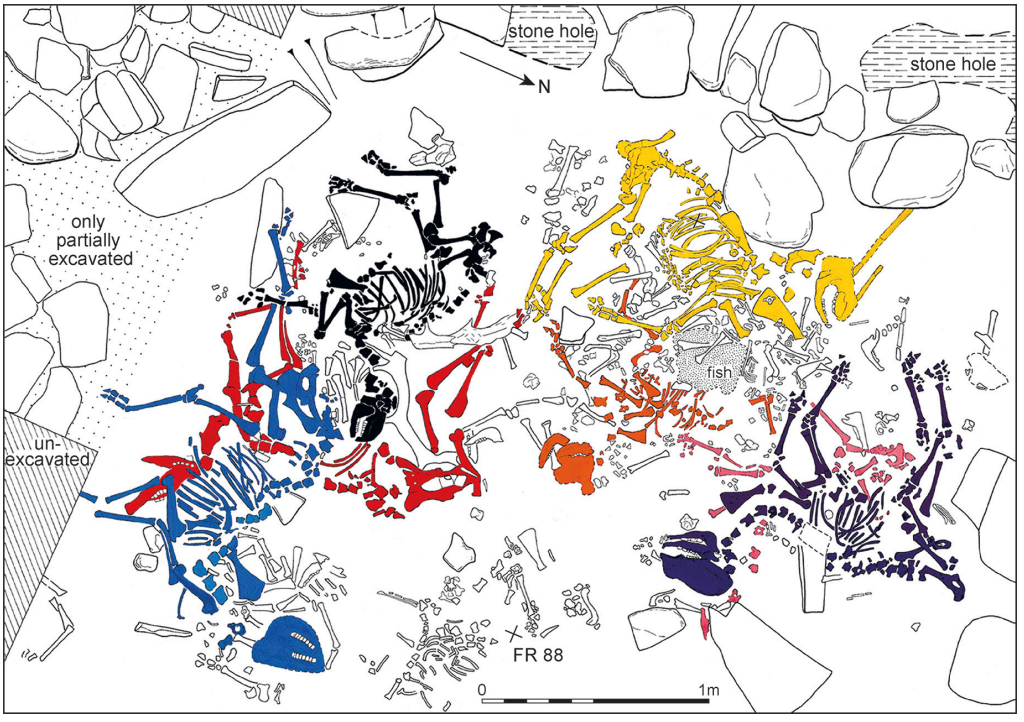
## THE POTTERY FROM TRENCH D

All the identifiable pottery belongs to the Grooved Ware tradition (Sheridan 1999). Most was found within the Phase III deposits, especially in square FQ 83; smaller amounts came from Phases II and I (and here the sherds were smaller and generally more abraded, consistent with their incorporation into ploughsoil), and from the contexts immediately overlying the Phase III layers. No pottery was associated with the deer heap and virtually nothing – just four small, undiagnostic sherds and some crumbs – was found from Phases VI to VIII.

The pots are all flat-based and virtually all tub- and bucket-shaped, varying greatly in size; a very few vessels have an undulating, 'pie-crust' rim. The decoration, where present, consists mostly of applied cordons, mostly occurring as single or multiple horizontal lines; three pots have more elaborate applied designs and ten vessels have incised decoration. Overall, the closest parallels to the Trench D assemblage (and to the Noltland assemblage as a whole) are to be found among the Pool Phase 3 (MacSween 2007) and the Skara Brae assemblages (Clarke & Shepherd forthcoming).

## THE DEER HEAP IN TRENCH D

The collection of deer skeletons found beside the wall consisted of the remains of at least 15 individuals, all (with the possible exception of one) lying on their left side (Sharples 2000). The skeletons in the upper part of the heap were articulated, while those farther down were partly disarticulated, perhaps due to the pressure from the super-incumbent carcasses. In order to differentiate between the closely spaced skeletons, a colour-coding system was established at an early stage in the post-excavation process (which we have retained for consistency with the archives) and the respective colours of the 'orange deer', 'purple deer' and so




ILLUS 9 Colour-coded plan of the deer heap in Trench D. Drawing by Mary Kemp Clarke

on are shown on the plan (Illus 9). Lying on top of the heap, between the 'yellow' and 'orange' deer, was the skeleton of what would have been a large cod, whose estimated length is *c* 99cm and estimated live weight *c* 7.94kg.[3] Also on top of the heap were found the articulated wing of a gannet, part of a greater black-backed gull, and a set of large, shed antlers. The bird remains – both from sizeable seabirds – lay on top of the 'purple' deer.

The deer fall into three age groups (as determined from the degree of wear on mandibular teeth (Armour-Chelu 1993: 142)): two (one male, one female) were around five years old; two (one male, one female) were two years old; and 11 were approximately nine months old. Beside the two-year-old male's head was a set of antlers that cannot have belonged to it originally, as the antlers are from a yearling. The deer are comparable in size to modern red deer; the mature individuals are marginally smaller than their counterparts in populations of Neolithic deer on mainland Britain. (The distal width of red deer humeri from Links of Noltland ranged between 48mm and 51mm (four specimens), whereas a range of between 50mm and 66mm (four specimens) was reported from the same measurement from Windmill Hill, Wiltshire (Grigson 1965).) The possible reasons for their slightly smaller stature are considered in the Discussion below.

That the juvenile deer could have all died at the same time is suggested by the pattern of mandibular wear. Hinds in the Scottish Highlands today calve between late May and late June, and if that was the case during the Neolithic on Westray, then the tooth wear data indicate that the juveniles could have died during the first quarter of the year, probably late February or March.

Despite thorough examination of the deer remains (as detailed in Armour-Chelu 1993), no trace of any injury, butchery marks or evidence for gnawing could be found, even though

elsewhere in Trench D there was plentiful evidence for dog-gnawed bones. Dogs, corvids and gulls would have been the main potential scavengers, there being no evidence for the Neolithic presence of foxes in Orkney; and yet none of the deer bones displayed the distinctive feathery, shredded tips that eagle-scavenging would have produced, nor – as noted above – did they have any dog-gnaw marks or other scavenging marks. Moreover, the fact that the skeletons in the upper part of the heap were found still articulated provides further evidence for a lack of scavenging; parts had clearly not been dragged away from the carcasses.

That the heap had resulted from the deliberate piling up of carcasses by humans is indicated by the facts that all, or virtually all, were laid on their left side and that natural group deaths do not result in the relatively neat stacking seen here. Furthermore, the presence of the cod, the bird remains and a pair of large antlers on the top of the heap, and the juxtaposition of antlers from a yearling beside the skull of a two-year-old, simply cannot be accounted for by natural processes: the cod would have to have been caught by humans, for example, and the yearling's antlers (from a 16th individual) must have been brought in and positioned manually. The presence of possible paving slabs in the vicinity, and perhaps also the pattern of wall collapse and the presence of the stone 'box' containing a rounded boulder that may have supported a marker post, all combine to create the impression that the heaping up of the carcasses had been a deliberate and formalised human act.

The possible causes of death will be discussed further below; suffice it to note here that killing the deer by slitting their throats with a Skaill knife (a stone flake from a sandstone cobble) would leave no trace on the skeleton. We cannot entirely exclude the possibility that the deer died from natural causes and that their carcasses were subsequently heaped up, but it can be stated with confidence that the placement of the carcasses does not relate to a natural, unaltered accumulation occasioned by a group death (for example, through being caught in a catastrophic sandstorm or a snowdrift: see Rebanks 2015: 190).

This was not the only area on Links of Noltland where articulated remains of red deer have been found. The evidence is reviewed below in the Discussion.

## RADIOCARBON DATING

For reasons of space, full details of the radiocarbon dating and Bayesian modelling programme undertaken as part of *The Times of Their Lives* project are presented elsewhere (Marshall et al 2016), and so only a summary is presented here.

### AIMS OF THE PROJECT

Refining the chronology of the sequence from Trench D at Links of Noltland aimed to:

- provide formal estimates of the date and duration of activity in this part of the site;
- provide a precise date for the deposition of the red deer heap;
- situate the activities in Trench D within a broader chronology of 3rd-millennium cal BC activity on the Links; and
- understand better the Marine Reservoir Effect for late 3rd-millennium cal BC Orkney, utilising the 'perfect pairs' provided by the articulated cod found on the deer heap.

A further aim was to determine the date of the pottery from Trench D, enabling its place within the broader typo-chronology of Grooved Ware within Orkney to be established more precisely; the results of that part of the study will be discussed elsewhere (Sheridan et al in preparation).

Nine new radiocarbon dates were obtained, from seven samples (six unburnt mammal bones and one fish bone, with two of the mammal bones being dated by two different laboratories). These include three dates for three of the deer, plus one date for the cod from the top of the deer heap. These joined the nine radiocarbon determinations, all on unburnt mammal bone, that had been obtained for material from Trench D during the 1980s (Marshall et al 2016: table 1).

## CHRONOLOGICAL MODELLING

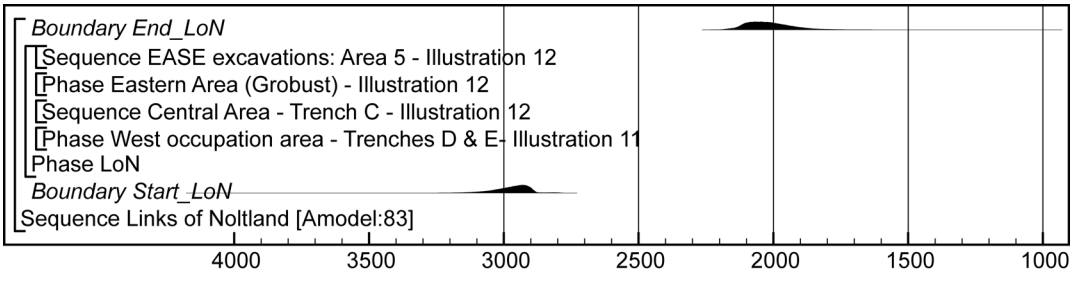
The 18 dates from Trench D were considered alongside the eight dates obtained during the 1980s for material from Clarke's other trenches, and alongside the seven publicly accessible dates obtained from the EASE fieldwork. (A further 38 dates from the latter have been obtained but are not yet in the public domain; while analysis of these would help refine the sequence, they do not appear to change substantively the modelled results presented below (Richard Strachan pers comm).) After careful quality assessment of the dated material, and exclusion of five of the 33 publicly available dates for reasons presented elsewhere (Marshall et al 2016: 9–10), chronological modelling was undertaken using OxCal 4.2 (Bronk Ramsey 1995; 2009), and the internationally agreed calibration curve for the northern hemisphere (IntCal13: Reimer et al 2013). The models are defined by the OxCal CQL2 keywords and by the brackets on the left-hand side of Illus 10–12. In the diagrams, calibrated radiocarbon dates are shown in outline and the posterior density estimates produced by the chronological modelling are shown in solid black. The Highest Posterior Density intervals which describe the posterior distributions are given in italics.

The overall form of the chronological model for activity on Links of Noltland is shown in Illus 10, with the component relating to the western area (Trenches D and E) being shown in Illus 11 and that relating to the central and eastern areas (Trenches C, Grobust, and EASE Area 5) being shown in Illus 12. It includes 28 radiocarbon determinations on 26 samples; four samples of bulked animal bone from different species and an articulated otter skeleton whose reservoir age cannot be estimated provide *termini post quos* for their contexts. In assessing the reliability of this model, we must consider the number of dated samples available from different parts of the site. The Eastern Area (Grobust) and EASE Area 5 have four dated samples each, the Central Area (Trench C) only three, and the Western Area (Trenches D and E), 16. We clearly have too few dated samples to provide more than a provisional indication of the overall span of Neolithic activity on the site as a whole, although for Trench D there are sufficient samples to provide a broad indication of the date of activity in this area of the site. Dated contexts from Trench D are indicated on Illus 5.

## A CHRONOLOGICAL NARRATIVE

The model has good overall agreement (Amodel: 83; Illus 10–12) between the radiocarbon dates and the archaeological information included in the model.

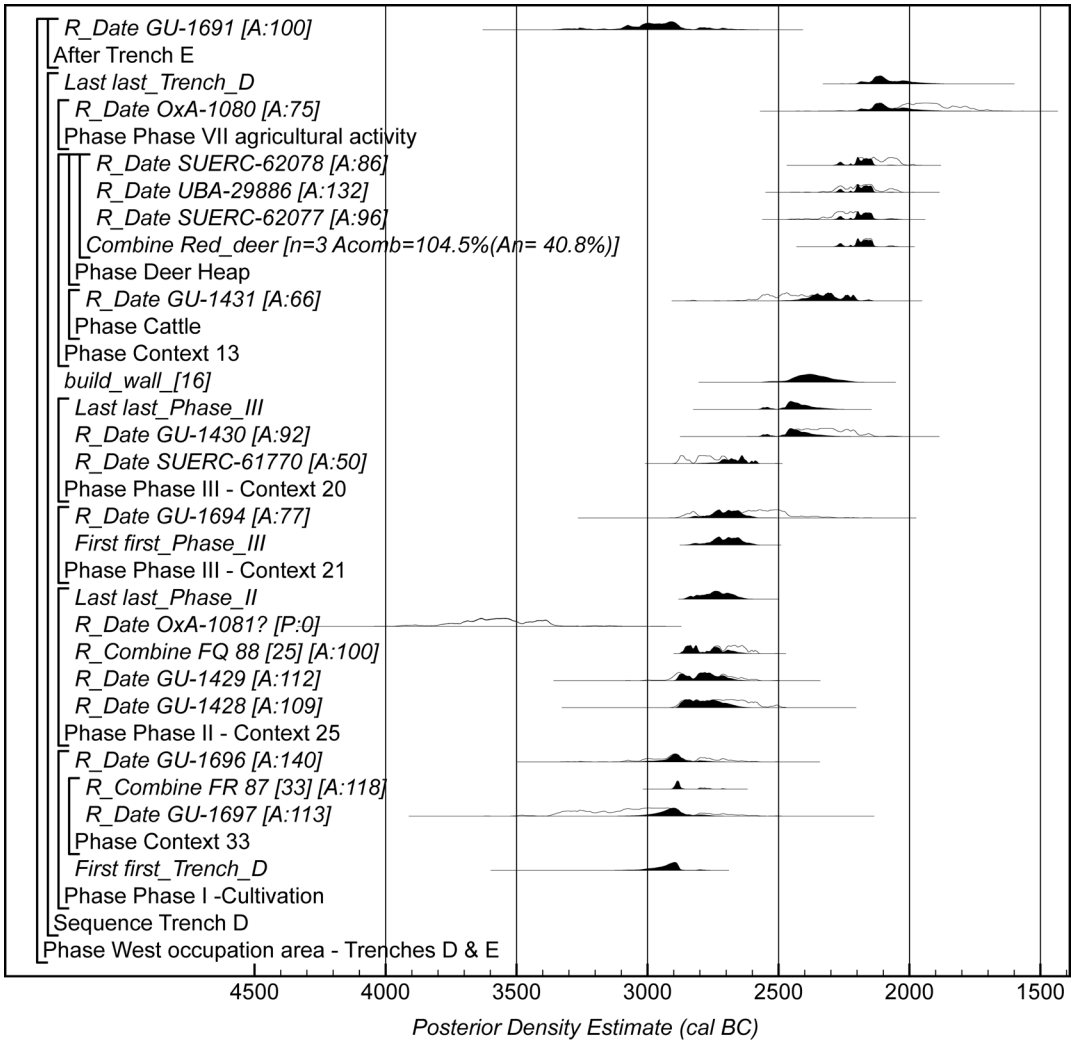
It estimates that the dated activity at Links of Noltland began in *3160–2870 cal BC* (*95% probability*; *start_LoN*; Illus 10). The earliest dated activity is from Trench D and it provides a *terminus ante quem* for the initial cultivation in this part of the site at the beginning of Phase I and for the construction of the putative seaweed fence/barrier [30] of *3060–2865 cal BC* (*93%*




ILLUS 10 Overall structure for the chronology of 3rd-millennium cal BC activity at Links of Noltland. The component sections of this model are shown in detail in Illus 11 and 12. The large square brackets down the left-hand side along with the OxCal keywords in Illus 10–12 define the model exactly

*probability*; *first_Trench_D*; Illus 11), or *2810–2780 cal BC* (*2% probability*). This first phase of cultivation in the Western Area, Trench D, and its continuation during one or more periods of sand ingress (Phases I and II), took place for a minimum of *55–330 years* (*95% probability*; distribution not shown), ending in *2850–2640 cal BC* (*95% probability*; *last_Phase_II*; Illus 11).

Deposition of considerable quantities of refuse (Phase III) began immediately after the end of cultivation in Phase II in *2830–2805 cal BC* (*3% probability*; *first_Phase_III*; Illus 11), or *2795–2600 cal BC* (*92% probability*) and continued until *2570–2520 cal BC* (*9% probability*; *last_Phase_III*; Illus 11) or *2500–2300 cal BC* (*86% probability*). To judge from




Illus 11 Probability distributions of dates from the Western Area, Trenches D and E. Each distribution represents the relative probability that an event occurs at a particular time. For each radiocarbon date, two distributions have been plotted: one in outline which is the result of simple radiocarbon calibration, and a solid one based on the chronological model used. The other distributions correspond to aspects of the model. For example, the distribution '*last_Phase_II*' is the estimate for when the primary cultivation in Trench D ended

the date from a deposit of *Bos* bones in Context [13] (*GU-1431*), the practice of depositing household waste – albeit not with the same intensity, given the smaller amounts of material found and the high sand content of Context [13] – seems to have continued at least until the construction of the wall [16] in *2500–2225 cal BC* (*95% probability*; *build_wall_[16]*; Illus 11). This estimated date for the wall's construction is based on the assumption that all the material from Context [13] post-dates construction of the wall.

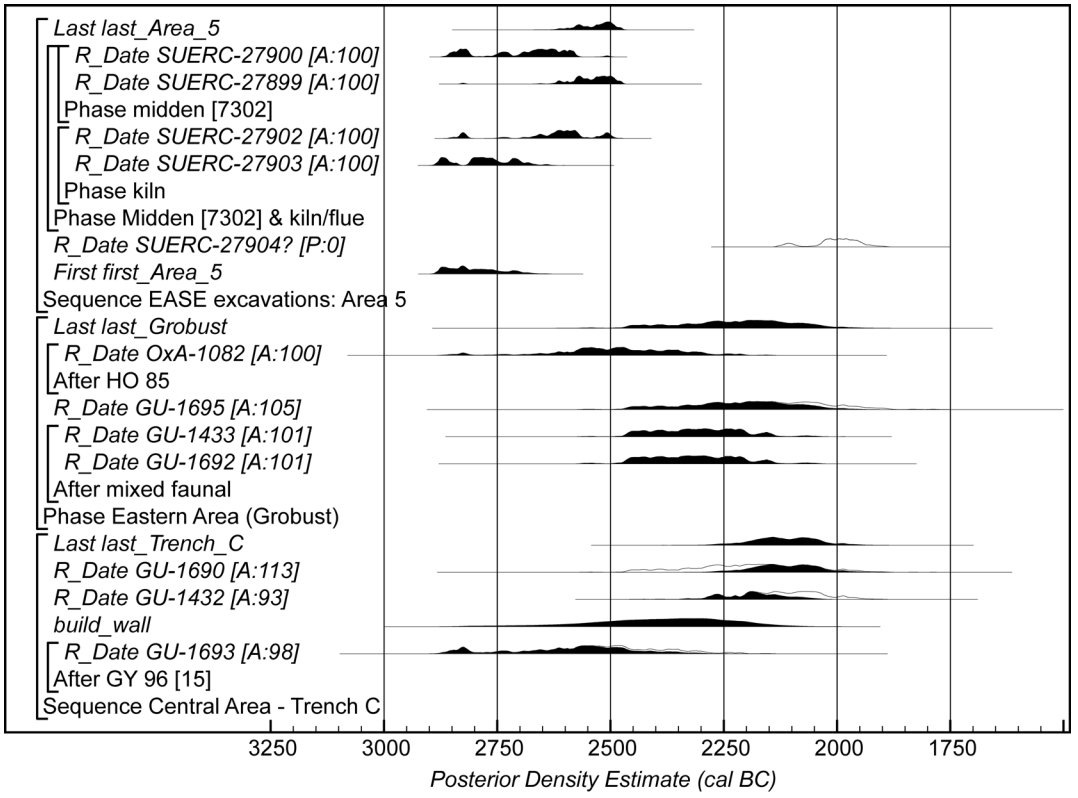
Whether the low-level deposition of household waste persisted until the heap of deer carcasses was deposited beside the wall [16] in *2280–2245 cal BC* (*12% probability; Red_deer*; Illus 11), or *2230–2130 cal BC* (*83% probability*) (Phase V) remains unclear. Renewed agricultural activity at the top of Trench D (Phase VII) is attested at the end of the 3rd millennium cal BC; the latest dated material (ie vole remains) for this trench is estimated to have been incorporated into the ploughsoil in *2200–1930 cal BC* (*95% probability*; *last_Trench_D*; Illus 11). As noted above, this was not the last activity in this area: a later wall (Phase VIII) was subsequently erected, but that activity is not dated.

## OTHER ACTIVITY ACROSS LINKS OF NOLTLAND

The end of the primary cultivation activity and the start of extensive refuse deposition in Trench D (Phase III) occurs slightly later than the start of the infilling of the abandoned massive Structure 8 (10) in Area 5 (Illus 13). Dating indicates that the accumulation of occupation deposits in Area 5 had probably finished by the 26th or the first half of the 25th century cal BC (Illus 12), with the Phase III refuse accumulation in Trench D continuing for a little longer (Illus 11).

Activity in the Central Area (Trench C) is only dated by three samples (Marshall et al 2016: table 3), with the earliest relating to the development of sediments incorporating domestic waste prior to the building of a wall; the second relating to the deposition of animal remains (predominantly of deer) in a 'butchery area' beside the wall; and the third deriving from deer bone within a thin, clay-rich layer overlying the collapsed remains of the wall. A later period of refuse-bearing sediment accumulation, which included an incised sherd with possible affinities to the Food Vessel tradition, was not dated, although if the ceramic attribution is correct, a date early in the 2nd millennium cal BC (or around the turn of the millennium) might be assumed. According to the model (Illus 12), all three of the radiocarbon-dated phases of activity – not just the 'butchery area' activity – could be broadly contemporary with Phase V (the deposition of the red deer heap) in Trench D (Illus 11), although a somewhat longer overall sequence cannot be ruled out. The wall in Trench C was probably constructed at some point between the 25th and the 23rd centuries cal BC (*build_wall*; Illus 12) – that is, around the same time as the Trench D Phase IV wall was probably being built – and the butchered animals were deposited beside it during the last quarter of the 3rd millennium cal BC (Illus 12), around the same time as the Trench D deer heap was being deposited. The latest date for Trench C (*GU-1690*) comes from deer bones found in the deposits overlying the collapsed wall and is virtually indistinguishable from the date for the 'butchery area' deer (*GU-1432*). If the bones in question are not residual from a midden deposit – and the fact that they were probably both from articulated bone groups suggests that they were not – then this date may also apply to the two Beaker pots whose sherds were found in that context [2]. (Note that this post-wall accumulation also contained a sherd from a hard-to-categorise pot, possibly within the Grooved Ware tradition, that conjoined with a sherd from the Grobust structure over 40m away. The latter was found among collapsed walling that ran across the northern chamber and belongs to a late stage in the life of this structure.)

Placing the construction and use of the Grobust structure into this preliminary chronology of activity at Links of Noltland on the basis of four radiocarbon dates (Marshall et al 2016: table 4) is difficult, and new dates from the EASE excavations will certainly clarify matters. The two samples derived from sediments infilling the northern section of the structure at




Illus 12 Probability distributions of dates from the Central Area, Eastern Area (Grobust) and EASE excavations: Area 5. The date followed by a question mark has been calibrated (Stuiver & Reimer 1993), but not included in the chronological model for the reason outlined in the text. The format is identical to that shown in Illus 11

the end of its use are included in the model as only providing potential *termini post quos* (*GU-1433* and *GU-1692*); and the otter bone from the fill of the southern cell (*OxA-1082*) could simply be intrusive, as well as undoubtedly having an unknown reservoir effect. Therefore, given the available data, the last-dated material from the infill could conceivably provide a *terminus ante quem* for the use of the structure; the model provides an estimate for the infilling of parts of the structure in the second half of the 3rd millennium cal BC (Illus 12).

## MEASUREMENT OF THE MARINE RESERVOIR EFFECT

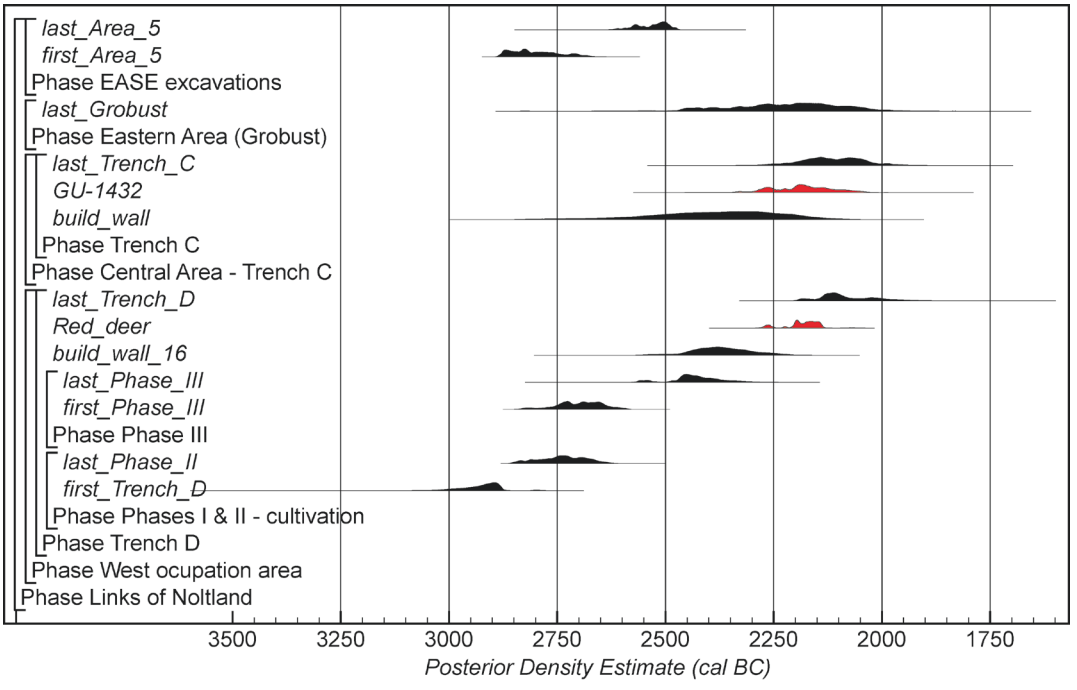
As detailed elsewhere (Marshall et al 2016), the 'perfect pairs' of dates for the cod on the top of the deer heap and for the three dated deer below it allowed the Marine Reservoir Effect for late 3rd-millennium cal BC Orkney to be calculated, since deposition of the cod can safely be assumed to have taken place at the same time as, or very shortly after, the deposition of the deer. The resulting offset was found to be of the order of three to four centuries (Marshall et al 2016: 12–13, fig 4, table 6). While this information was not germane to the chronological modelling of activities at Links of Noltland – the cod date and another date showing a marine offset (from otter bone) were not used in the modelling described above – nevertheless it provided valuable additional data on the Marine Reservoir Effect, a phenomenon that varies spatially and temporally.

## DISCUSSION

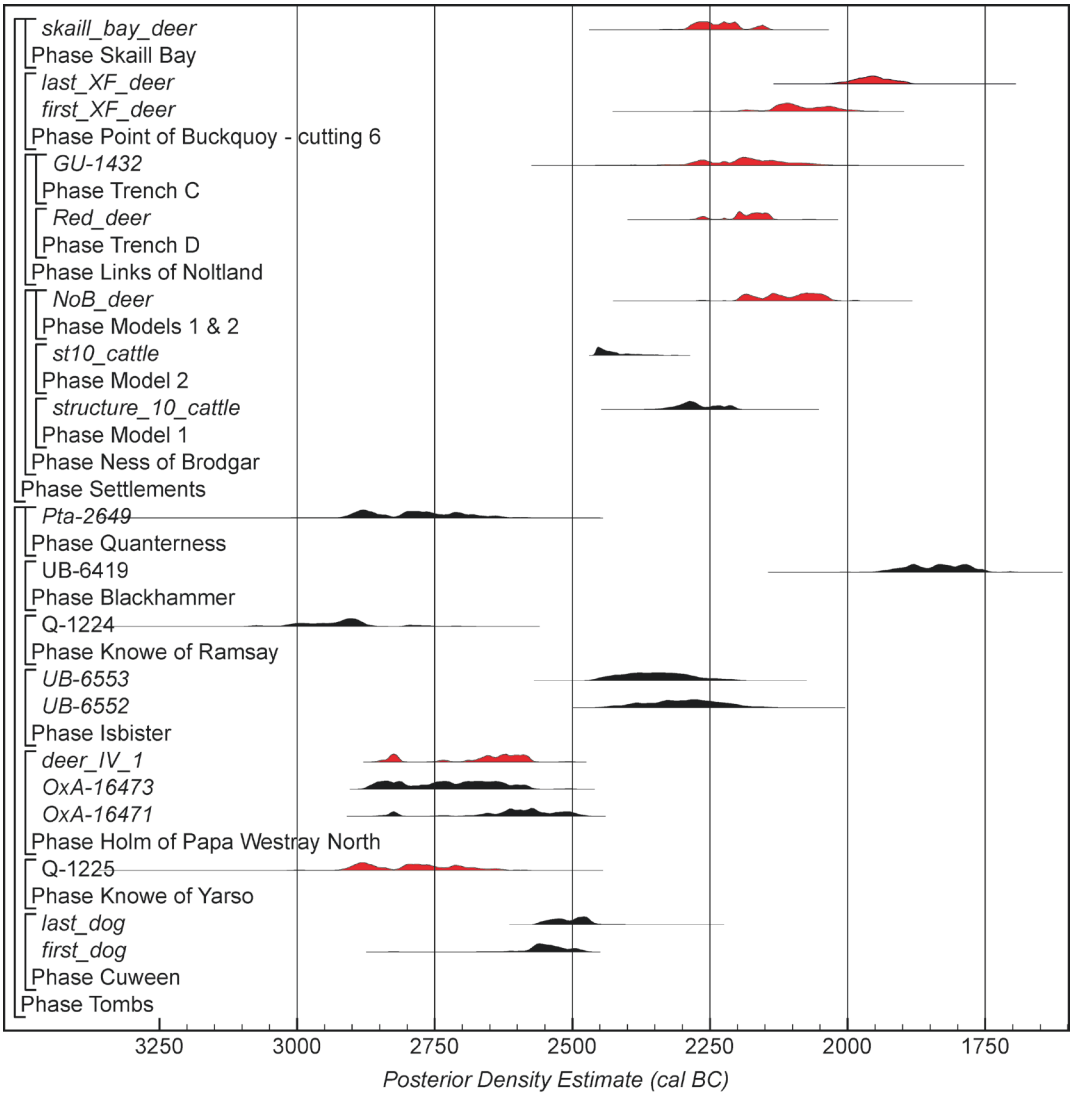
### CONTEXTUALISING ACTIVITIES IN TRENCH D

The area investigated in Trench D lay at the periphery of one of the settlement locales on the Links, Area 4, and it was used alternately and intermittently over several centuries for growing crops and for the deposition of household waste, some of it likely to have been accumulated as middening for soil enrichment. The periodic abandonment of the Trench D area is indicated by heavy sand ingress, a phenomenon attested elsewhere in 3rd-millennium cal BC Orkney, for example at Skara Brae where one massive sand accumulation marks a gap in occupation of up to 50 years' duration (Shepherd 2016: fig 5). This changing use of a relatively small area in Trench D is echoed in the nearby Area 4, where a sequence of house construction, use, abandonment and covering with occupation debris was repeated at least twice (as reported in the 2013 entries on the excavation's Facebook page). The relationships between the various phases of activity in Area 4 and in Trench D will become clearer once full post-excavation analysis and dating of the EASE excavations in Area 4 have been undertaken.

As noted above, the red deer heap beside the long wall in Trench D was deposited in *2280–2245 cal BC* (*12% probability*; Illus 13), probably in *2230–2130 cal BC* (*83% probability*). This finding is important for our understanding of late 3rd-millennium developments in Orkney for several reasons. First, it enables comparison with other broadly contemporary and earlier practices relating to red deer, not just on the Links but elsewhere in Orkney, and focuses attention on the intriguing role or roles that deer seem to have played in the life and belief system of the inhabitants of the archipelago. Second, it invites comparison with other instances of structured deposition of animal remains in 3rd-millennium cal BC Orkney, particularly those connected with assumed 'foundation' and 'closure' events (Illus




ILLUS 13 Probability distributions for key parameters for 3rd-millennium cal BC activity at Links of Noltland derived from the model defined in Illus 10–12. (The distributions in red are for the red deer deposits)




Illus 14 Probability distributions of key archaeological events associated with the deposition of animal remains in mid- to-late 3rd-millennium cal BC Orkney (red deer in red); the distributions are derived from: Links of Noltland, the model defined in Illus 10–12; Ness of Brodgar (Card et al 2017: figs 7 and 9); Cuween (Bayliss et al 2017: fig S3); Holm of Papa Westray North (Bayliss et al 2017: fig S18); Isbister (Bayliss et al 2017: fig S1); Point of Buckquoy, cutting 6 (Marshall et al 2016: fig 5); Skaill Bay (Marshall et al 2016: fig 6); and simple calibration of the determinations from Knowe of Ramsay and the Knowe of Yarso (Renfrew et al 1976; Stuiver & Reimer 1993)

14). Here, the creation of the deer heap at Links of Noltland can be compared and contrasted with a much larger scale and somewhat earlier event at Ness of Brodgar on Mainland, featuring the deposition of thousands of cattle bones (Mainland et al 2014). Third, it appears that by the time the deer heap was deposited, the major period of Grooved Ware-associated construction (both on the Links and elsewhere in Orkney) was over and Beaker pottery was present in the archipelago. Together with the Ness of Brodgar cattle evidence, the Noltland deer heap raises

the question of what was happening within late 3rd-millennium cal BC Orcadian society that prompted these two extraordinary acts of deposition. If times were changing, what might have been the cause? And was the appearance of Beaker pottery involved in those changes – and if so, how?

## PRACTICES RELATING TO RED DEER IN 4TH- AND 3RD-MILLENNIUM CAL BC ORKNEY

The role and significance of red deer to the early farming communities of Orkney have long been a matter for debate and speculation, since on the one hand these animals appear to have been introduced deliberately by the earliest farming communities, transported by boat across the treacherous Pentland Firth (Stanton et al 2016), while on the other hand they do not appear to have been exploited as a food resource in the same quantities as cattle or sheep/goat (and, to a lesser extent, pig); their bones almost invariably comprise less than 5–10% of faunal assemblages (as, for example, at Knap of Howar (Noddle 1983: 92–100; see also Mulville 2010 for an assessment of their exploitation in Orkney over the longer term, and see below for three late 3rd-millennium findspots where red deer are the dominant species)). It has been suggested, à propos a deer-bone-dominated deposit at the Point of Buckquoy, Mainland (Area 5/6) (Rackham 1989; Morris 1989: 101–2, 105, 299), that deer could have been used as a supplementary food resource, particularly during lean winter months, and this is indeed a possibility. It is also clear, from artefactual evidence, that antler was both used as a tool and worked into objects such as pins; and it seems likely that deerskin was also used for clothing and other everyday purposes, along with other animal skins. However, as many others have previously noted (eg Jones 1998; Sharples 2000; Morris 2005; Richards et al 2015), the way in which deer were deposited at several sites in later 3rd-millennium cal BC Orkney suggests that they had a significance over and above the utilitarian.

The deposition of complete, or near-complete, carcasses of red deer is attested not only in Noltland Trench D but elsewhere on Links of Noltland; the complete skeleton found beside a Grooved Ware pot among the rubble of the deliberately infilled Structure 8 (10) may have marked the decommissioning of that structure, while a similar role may have been played by the articulated remains of deer (some lacking their heads), along with the articulated remains of sheep and cattle, that were deposited among the material 'capping' the Area 5 structures (Moore & Wilson 2010b; see also the entry for 22 August 2013 on the excavation's Facebook page). In both cases these deposits were made during the first half of the 3rd millennium cal BC (Illus 13). Several complete red deer skeletons have also been found at Ness of Brodgar, deposited individually, with one lying on top of the major spread of cattle bone in Structure 10. That individual could well be contemporary with the Noltland deer heap during the last quarter of the 3rd millennium cal BC (Illus 14), depending on the model chosen for the interpretation of the chronology of Ness of Brodgar (see below). It is tempting to interpret such deposits as sacrificial offerings, deployed to mark significant points in the life of a community; we shall return to the significance of the Noltland deer heap below.

Large numbers of deer bones are also recorded as having been found in the chamber tombs of stalled cairn type at the Knowes of Ramsay and Yarso on Rousay (Davidson & Henshall 1989: 136), with at least 14 individuals represented at the former and at least 36 at the latter; the radiocarbon dates indicate deposition during the first half of the 3rd millennium cal BC (Illus 14. Note that the dated samples each consisted of more than one deer bone). While due caution must be exercised in interpreting animal remains from chamber tombs (Barber 1997; Schulting et al 2011), nevertheless the large number of deer represented in these two monuments is noteworthy. Whether or not one accepts the arguments for animals having been used in a totemic manner in 3rd millennium cal BC Orkney (Hedges 1984), or more generally as a way of expressing community identity (Jones 1998), the deposition of these deer in chamber tombs that would already have been old suggests that they had a particular significance to the people who placed them with the ancestors.

From the second half of the 3rd millennium cal BC there is evidence for the exploitation of deer for food (and presumably also other uses), and yet there are several instances where the butchery has been incomplete, with large carcass parts being left untouched. Around the same time as the Trench D deer heap was being deposited, elsewhere on the Links, in Trench C, several individuals, including a pregnant hind, were incompletely dismembered, and their partial carcasses were left to rot beside a wall; interestingly, the evidence suggests slaughter during the spring, as had been the case with the Trench D deer heap (Illus 13, *GU-14*32; Sharples 2000: 112). Also found within this 'butchery area' was the skull of a seal and bones from domesticated mammals. The depositing of deer parts continued after the collapse of the wall. Elsewhere in Orkney, at the Bay of Skaill, near Skara Brae on Mainland (Sharples 2000: 110–11; Richards et al 2015), another butchery site was found; on one side of a wall disarticulated red deer bones were found, along with the Skaill knives that had probably been used to dismember the carcasses, while on the other side partially articulated red deer remains were found. Overall, four, possibly five, red deer were represented here, along with cattle bones from one individual and sheep/goat bones from six individuals. The age of the deer suggested that they had probably been slaughtered during the autumn or winter (Richards et al 2015: 108–9). Two dates on antler (Illus 14) are broadly contemporary with the Noltland deer remains from Trenches C and D. A slightly later deposit of partially articulated and disarticulated deer remains, featuring old and young individuals (and possibly including a foetus, suggesting the presence of a pregnant hind), is known from the aforementioned deer-bone-dominated deposit of refuse at the Point of Buckquoy, Mainland (area 5/6) (Rackham 1989; Morris 1989: 101–2, 105, 299), with this activity occurring around 2000 cal BC (Illus 14). In all these cases where partial carcasses have been left, this implies that the animals were not being fully exploited for their edible (or otherwise usable) parts – although the reason why such large amounts of the carcasses were being left is hard to determine. Were deer so abundant in late 3rd-millennium cal BC Orkney that people could afford to leave large parts unused? Or was it that, because the fat reserves of deer become depleted during the winter months, the meat of individuals killed during the winter or early spring would not have been very nutritious in any case? In this regard, Speth's comments on bison hunters' behaviour may be pertinent: 'in the nutritional literature [there are] important insights into reasons why hunters might have abandoned lean or fat-depleted carcasses, even when they themselves were short of food' (Speth 1983: 153).

Finally, at Skara Brae Gordon Childe found 'the skull of a red deer with antlers complete' among post-abandonment deposits in his Hut 7 (Childe 1931: 62), and 'a relatively large number of stags' antlers were found in sand' overlying the western part of the settlement, once again in a post-abandonment context (Childe 1931: 59–60).

This brief review of the various ways in which deer remains were deposited in 4th- and 3rd-millennium cal BC Orkney provides a comparative background against which the Noltland Trench D deer heap can be assessed. As noted above, these deer were clearly not destined to be eaten. A significant number of animals seem to have been killed; their carcasses were piled up, laid (mostly) on their left side, and other items were carefully placed on them: antlers, a whole cod, and two birds (or parts thereof). A pair of antlers from one deer not otherwise represented in the heap was positioned beside another deer's head. The absence of any evidence for scavenging of the carcasses by dogs or birds, despite the fact that both had clearly been present on the Links during the 3rd millennium cal BC (with dogs leaving plentiful coprolites), suggests that the heap may have been covered or protected in some way. It may be that turves and sandy sediment were placed over the heap (with the latter becoming stained dark, as noted above), and that some of the wall stones were dragged across as additional cover; if the enigmatic stone in a box had indeed supported a marker post, then this strengthens the argument that the heap had been covered over. It is also possible that the area was abandoned, with people moving elsewhere and taking their dogs away with them. The creation of the heap could

thus have been an act marking this abandonment – however temporary – of the Links. The available dating evidence suggests that by the time the deer heap was created, regular occupation of the Late Neolithic, Grooved Ware-associated settlement had already effectively ceased and that activities on the Links were sporadic.

## ANIMALS IN ACTS OF STRUCTURED DEPOSITION IN 3RD-MILLENNIUM CAL BC ORKNEY

It was not just deer that were the subject of acts of structured deposition in 3rd-millennium cal BC Orkney. From Links of Noltland and Ness of Brodgar come several examples where the remains of other species also appear to have been deployed in a significant manner, particularly to mark the start or the end of activities in a given location (Illus 14). At Links of Noltland, for example, the deposition of 30 upturned cattle skulls, their horns interlocking, within the wall core of the Structure 9 house, constitutes a foundation deposit, probably relating to a feast, at the start of that house's life (Moore & Wilson 2011a: 22–3; 2013), while in the Grobust structure, excavations by Clarke found carefully placed deposits within the inner chamber including two cattle skulls, a complete eagle, antler, a large piece of pumice and oyster shells, all lying above a 2m-long whale rib (Clarke 1991: 48). These deposits have been interpreted as marking the end of that structure's main period of use.

Elsewhere in Orkney, the practice of preferentially depositing the carcasses (or parts) of specific species within chamber tombs, as noted above regarding the deer at the Knowes of Ramsay and Yarso on Rousay, is also attested at Isbister where the remains of several white-tailed sea eagles were found (Hedges 1984; Sheridan 2005), and at Cuween where the skulls of 24 dogs were found on the floor of the main chamber (Davidson & Henshall 1989: 113). In both cases the available dating evidence – sparse though it is (Illus 14) – indicates that these acts of deposition occurred centuries after the monuments in question had been constructed (Schulting et al 2010; Bayliss et al 2017), and the chronological span represented by these and by the deposits of deer in the Rousay monuments indicates that this kind of depositional act occurred at various points during the 3rd millennium cal BC.

The most spectacular instance of the structured deposition of animal remains in 3rd-millennium cal BC Orkney is attested at Structure 10 at Ness of Brodgar on Mainland. Here, on a pathway leading around the building, people had piled up thousands of bones – mostly cattle tibiae, split to extract the marrow, but also including a few non-cattle bones (Mainland et al 2014; Towers et al 2015; Card et al 2017). By the time of their deposition, that structure was already centuries old and possibly abandoned. Detailed examination of the parts of this deposit that were excavated up to 2012 revealed that the bones represented at least 87 individual cattle (Mainland et al 2014: 875), with a further 30–5 individuals being identified following excavation in 2015 (Ingrid Mainland pers comm) and the overall total has been estimated at over 400, on the grounds that only 20% of the deposit had been excavated by 2012. By any reckoning, a substantial number of animals had been slaughtered, which raises the intriguing questions of what proportion of the overall Orcadian cattle population at the time this represented and whether their slaughter had long-term effects on resource availability. (In this regard, one might wonder whether the dominance of deer remains in the late 3rd-millennium cal BC butchery and refuse deposits described above may be due to the comparative shortage of cattle at the time – although given the small number of late 3rd-millennium cal BC Orcadian faunal assemblages it would be premature to make any such claim.) In contrast to the deer that ended on the heap in Noltland Trench D, the Ness of Brodgar cattle were butchered and their meat and marrow consumed; the Structure 10 deposit 'represents a vast amount of meat, perhaps indicative of communal events, such as feasting and of a gathering together of large numbers of people' (Mainland et al 2014: 876). The freshness of the fracture surfaces relating to marrow extraction supports the idea of immediate consumption, as in a feast (cf Serjeantson 2011 on similar-looking bone fractures at Runnymede, Surrey).

If we are indeed dealing with either a single feast or a series of feasts held over a short period of time, as the excavators have argued (Mainland et al 2014: 875, 877 and Ingrid Mainland pers comm), then the cattle could have fed a huge gathering of people, possibly coming not just from across the archipelago but also from farther afield. To give some impression of the amount of meat involved, one could cite a comparable study of cattle remains that had been found at an Early Bronze Age barrow at Irthlingborough, Northamptonshire (Davis 2011: 686), which concluded that the 185 animals represented there could have yielded some 40 tons of beef. If the estimated figure of 400 head for Ness of Brodgar is correct, then over 80 tons of beef are possible.

Deposition of the cattle remains at the Ness of Brodgar appears to be one of the latest activities at the by-then old, and arguably dilapidated, ceremonial centre; indeed, according to one of the Bayesian models (Model 2) for its chronology, it may have occurred as part of the definitive decommissioning of Structure 10, through its infilling with rubble and domestic debris (Card et al 2017). (According to the second model for its chronology, the structure would have been abandoned some two centuries before the feast took place, as noted below.)

This act pre-dated the creation of the Noltland deer heap, but by how long depends on which of the two chronological models for the Ness of Brodgar – created as part of *The Times of Their Lives* Orkney dating project – is preferred. One (Model 2) places this hypothetical giant feast around *2565–2360 cal BC* (*95% probability*; *structure_10_cattle*) (Card et al 2017: fig 7), while the other (Model 1) has it somewhat later, around *2340–2200 cal BC* (*95% probability; st10_cattle*) (Card et al 2017: fig 9) (Illus 14). Model 2 places it at, or closer to, the time when the structure (and Ness of Brodgar overall) was abandoned, or certainly ceased to be enlarged or inhabited, while Model 1 places it possibly two centuries after that and paints a very different scenario. Thus, it would have pre-dated the Noltland deer heap (and the Trench C deer) by at least two generations (Model 1), and possibly several more (Model 2); the intervals estimated by the alternative models are *35–190 years* (*95% probability*: distribution not shown; Model 1), or *140–320 years* (*95% probability*: distribution not shown; Model 2). Similarly, it will have pre-dated the deposition of the individual deer carcass found on top of the cattle bone spread at the Ness of Brodgar by a comparable interval (Illus 14) (Card et al 2017).

## A BEAKER CONNECTION?

While no pottery was associated with the Noltland Trench D deer heap, the presence of sherds from two Beakers in Trench C in a context dated (from deer bone) to *2265–1975 cal BC* (*95% probability*; *GU-1690*, Illus 12), and of a single Beaker sherd underneath the cattle bone deposit in Ness of Brodgar Structure 10 (and believed to be related to that deposit (Roy Towers pers comm)), suggests that this ceramic tradition had appeared in Orkney by the time the deer heap was created. The absence of Grooved Ware from these three deposits, and from the late 3rd-millennium findspots of deer remains on Orkney mentioned above – with the sole possible exception of the hard-to-classify pair of conjoining sherds from Noltland Trench C and remnant walling in the northern sector of the Grobust structure – is striking. It raises the questions of whether the Grooved Ware ceramic tradition was all but defunct by this time, and whether the appearance of the Beaker ceramic tradition in Orkney was in any way connected with events that led to the heaping up of the deer at Links of Noltland and, before that, to the major cattle slaughter and feast at Ness of Brodgar.

## THE END OF THE WORLD, AND BEYOND?

As noted above, the Noltland deer heap could represent an act marking the abandonment, if only temporary, of the Links. Likewise, some generations previously, an enormous number of cattle at Ness of Brodgar had been killed and eaten. Was there some kind of environmental or social crisis (or crises) during the late 3rd millennium that triggered the mass consumption

or destruction of valuable resources and the abandonment of the Links? And might the appearance of Beaker pottery in Orkney be implicated in any social crisis that may have occurred?

*An environmental crisis? Climate change, pressure on resources, disease?*

As far as any hypothetical natural catastrophe is concerned, there does not appear to have been any significant climatic downturn in Orkney during the period 2500–2000 cal BC, to judge from the most comprehensive review of the evidence currently available (Farrell 2009; 2015; Farrell et al 2014). Conflicting claims about climatic conditions during this half millennium have been made, with Charman et al (2006) arguing that northern Britain was substantially wetter than average at this time, while others have pointed to a period of climate change around 2200 BC – manifested in northern Europe as a cold, dry spell – and have claimed that this had a major impact on many parts of the world (Meller et al 2015). This *c* 2200 BC 'event' is marked in Scotland by a modest peak in the amount of ice-rafted sand grains, suggesting a cooling of the North Atlantic, but not on a sufficient scale to have had a major impact on the Gulf Stream (Oppo et al 2003). While no detailed palaeoclimatic or palaeoenvironmental record exists for 3rd-millennium cal BC Westray, the archaeological and palaeoenvironmental evidence for Orkney more generally makes it clear that the inhabitants of Orkney were raising large numbers of cattle at this time; any increased precipitation that may have occurred is thus unlikely to have affected grassland growth adversely.

Irrespective of any climate change that may have occurred, there appears to be no evidence for exceptional stress on resources at this time (for example through overgrazing by excessive numbers of animals); in her review of palaeoenvironmental evidence from Orkney, Farrell identified some local intensification of grazing around Blows Moss during the late 3rd millennium cal BC, but elsewhere this intensification does not seem to have occurred until *c* 2000 cal BC (Farrell 2009: 352, 366). Once again, there is a need to obtain the relevant evidence for Westray. There may well have been a chronic shortage of winter fodder for domesticated animals, such as might have required the killing of deer to tide communities over these lean months, as suggested for the Point of Buckquoy (Morris 1989: 106), but this had probably been a perennial challenge to the prehistoric farming communities of Orkney – as is clear from the abundant evidence for malnutrition (including 48 cases of cribra orbitalia and 22 cases of cranial periostitis) among the late 4th-millennium cal BC human remains from the chamber tomb of Isbister (Lawrence 2006; and see also Hamlet 2014 on strategies used at Links of Noltland to optimise agricultural fertility). Moreover, the evidence suggests that the juvenile deer within the Noltland heap died during the spring, indicating that they had survived any possible pre-winter slaughter. The X-raying of the red deer mandibles from the Trench D deer heap that was carried out as part of Miranda Armour-Chelu's doctoral research (Armour-Chelu 1993) revealed no evidence for malnutrition; the slight loss of trabecular structure apparent on two juvenile specimens could be accounted for by the poor quality of the grass available during the animals' season of death. (See also Jones and Mulville 2016 for a study of animal nutrition in 3rd-millennium cal BC Orkney.)

The small size of the red deer on Orkney in comparison to their mainland counterparts has previously been interpreted as a possible response to resource stress (as cited in Clutton-Brock 1979), but a recent aDNA study has concluded that the red deer which were deliberately brought to Orkney by Neolithic farmers were already of a naturally smaller strain than those found on mainland Britain when they arrived (Stanton et al 2016: 7). While the deer may not have been treated as domestic stock, nevertheless the inhabitants of Orkney were probably capable of managing their numbers (through periodic selective culling) to avoid the 'boom and bust' demographic pattern seen with unmanaged deer herds (cf Sykes et al 2016). At present there appears no proof of any exceptional resource crisis during the late 3rd millennium cal BC.

Might there, finally, have been an epidemic, such as foot and mouth disease, that affected red deer or cattle, killing them – or else necessitating their culling? Further research would need to be undertaken to establish whether there are any genetically detectable traces of disease in the bones; but for now this seems an unlikely scenario, since the cattle at Ness of Brodgar were clearly eaten, and since the absence of scavenging of the Noltland deer bone can be accounted for without having to invoke disease as a reason. Moreover, the other instances of deer deposition in late 3rd-millennium cal BC Orkney as discussed above suggest that some deer were indeed being eaten.

*A social crisis?*

With the possible and significant exception of the construction of the Ring of Brodgar, whose dating is still far from secure (Downes et al 2013; Bayliss et al 2017), large-scale building projects in Orkney had probably ceased by the second half of the 3rd millennium cal BC, in contrast with their proliferation during the first half of the millennium (and in the final centuries of the fourth). The period at which the hypothetical Ness of Brodgar feast occurred post-dates, by possibly up to half a millennium (depending on which dating model is preferred), the main period of use of Structure 10 and the other substantial piered buildings at this walled ceremonial centre (Card et al 2017: fig 11). There had been some re-use of the central hearth in Structure 10 around *2500 cal BC*, but this has been described as 'perhaps the only activity in an otherwise abandoned site' (Card et al 2017). Similarly, at Links of Noltland, the deer heap in Trench D and the deer butchery area (plus subsequent evidence for deer exploitation) in Trench C post-date by several centuries the period of sustained and extensive occupation-related activities on the Links during the earlier part of the 3rd millennium cal BC; the massive Structure 8 (10) in Area 5 will have been long since abandoned and infilled by the time these deer were deposited. Likewise, at Bay of Skaill, the deer butchery appeared to take place around a quarter of a millennium after the main period of occupation ended at nearby Skara Brae (Richards et al 2015; Shepherd 2016).

It has been argued elsewhere (eg Schulting et al 2010: 39–40) that the principal driver behind the flurry of late 4th-/early 3rd-millennium cal BC construction in Orkney had been the creation of a new, and hierarchical, social order by ambitious groups within Orkney, with these people indulging in what Mary Helms (1998) has termed 'cosmological acquisition', bringing back esoteric knowledge and ideas (such as on passage tomb design) from long-distance journeys to the Boyne Valley. They were also innovative, creating a new style of pottery (Grooved Ware), new symbols of distinction (in various forms of carved stone artefact), a new type of monument (the stone circle within a bank and ditch at Stones of Stenness) and new ceremonial practices, including – so it would seem – the deployment of animal remains in acts of structured deposition (as seen for example in the cattle skull foundation deposit in the Noltland Structure 9 house). They seem to have engaged in acts of conspicuous consumption, not only in the construction of monumental structures – with the creation and subsequent enhancement of the ceremonial centre at Ness of Brodgar requiring the input of labour on a supra-local basis – but also in the ceremonial breakage of potent symbols (stone maceheads). Maintaining such a social system, particularly if it involved competition between groups, probably required an investment of effort that was ultimately unsustainable (cf Bayliss et al 2017). Thus it may be that the cessation of major building activities, the decommissioning of individual buildings (such as the large Structure 8 (10) at Noltland and Structure 10 at Ness of Brodgar) and the abandonment of some settlements (including Skara Brae) reflect a breakdown in this social order. Within such a scenario, the building of the Ring of Brodgar may represent the final major construction activity on the archipelago for many centuries; and it could be that the cattle slaughter and concomitant massive feast or feasts at Ness of Brodgar constitute final, and literal, acts of communal conspicuous consumption. Whether there had been an element of millenarianism in those acts (cf Hall 2013), we can only speculate.

The breakdown of hierarchical social order could have destabilised society in such a way that occupation of any given area became

more ephemeral. Within such a scenario, the abandonment of the Links in or around the 22nd century cal BC – an event marked by the creation of the deer heap – is a plausible outcome. It will not have been the first time the Links were abandoned; the decommissioning and sealing of the early 3rd-millennium cal BC structures (with the dating for this activity in Area 5 suggesting that this took place during the 26th or 25th century cal BC, as noted above) may well mark an earlier relocation. Nor was the abandonment permanent, as is clear from the subsequent agricultural activity in Trench D outlined above, and by the Bronze Age settlement and cemetery on the Links.

*How (if at all) was the appearance of Beaker pottery linked with these events?*

The discovery of a small amount of Beaker pottery at both Noltland Trench C and Ness of Brodgar is noteworthy, but assessing its significance in terms of broader late 3rd-millennium cal BC developments in Orkney needs to be undertaken cautiously. Orkney, unlike many areas of Mainland Britain, does not seem to have featured in the appearance of Continental-style Beaker pottery and associated exotic novelties such as metalwork and fancy archery equipment during the 25th century cal BC (Needham 2012; Sheridan 2012; Parker Pearson et al 2016).[4] To judge from the shape and decoration of such scant Beaker pottery as is found in Orkney, this ceramic tradition seems to have arrived relatively late here, in comparison with other parts of Britain. Contact with the north Scottish mainland (where, for example, a Beaker settlement is known from Freswick Links in Caithness (Gibson 1982: 157–8, 408)) may be responsible for its appearance in Orkney.

It is therefore unsurprising that we do not find the same impact, and the same reactions, as were associated with the appearance of the Beaker phenomenon farther south (Needham 2012). There is nothing about the Ness of Brodgar feast or the creation of the Noltland deer heap that echoes Beaker-associated practices on mainland Britain. The aforementioned deposit of the remains of an estimated 185 cattle at Irthlingborough, Northamptonshire (Davis 2011), and a second example of mass cattle bone deposition at Gayhurst, Buckinghamshire (Chapman 2007) – both believed to relate to funerary feasts – are wholly exceptional within Beaker practice for mainland Britain (see Marshall et al 2016, appendix 2, for further discussion of the chronological relationship of these deposits to those from the Ness of Brodgar and Noltland). Rather, these examples of structured deposition involving animal remains at Ness of Brodgar and Links of Noltland can be related to Orcadian practices stretching back to at least the early 3rd millennium cal BC, as documented above.

It may be, however, that the appearance elsewhere in Britain of Continental-style material culture and practices during the 25th century cal BC – introduced, so it seems, by actual immigrants (Parker Pearson et al 2016) – *indirectly* contributed to developments in Orkney by disrupting patterns of long-distance external contacts. It has been argued that contacts between Orkney and Wessex had existed around the 26th and 25th centuries cal BC (and indeed earlier), with similarities claimed between the design of houses at Durrington Walls and Skara Brae (Parker Pearson 2012: 99), and the Ring of Brodgar possibly inspired by visiting Avebury henge (Sheridan 2004). If Orkney – and specifically the Ness of Brodgar area – ceased to be a place to which people came from far and wide during the third quarter of the 3rd millennium cal BC, it is easy to see how this could have contributed to the decline of the society that had previously flourished there. The creation of the Noltland deer heap and the huge Ness of Brodgar feast may therefore be acts carried out after the demise of the earlier social order.

## CONCLUSIONS

The new radiocarbon dates relating to Trench D at Links of Noltland, together with the other dates for Orcadian material obtained as part of *The Times of Their Lives* project, have allowed us to situate the creation of the remarkable heap of red deer at Noltland not only within the chronological sequence of activities on the Links, but also within the evolving narrative of developments during

the second half of the 3rd millennium cal BC in Orkney as a whole. Many questions still remain to be answered, particularly concerning the nature of social organisation and modes of occupation and subsistence at this time; the ideological and symbolic importance of animals to the inhabitants of the Orkney Islands; and just what form of impact is represented by the appearance of Beaker material on Orcadian Neolithic sites, very limited in scale compared with farther south in Britain. The task ahead is to refine and fill out this picture of late 3rd-millennium cal BC Orkney.

## NOTES

1 During the late 1970s/early 1980s, the context categorisation for Links of Noltland followed the usage at Skara Brae where the default label of 'midden' was given to all deposits incorporating artefactual and/or ecofactual debris, whatever their level of incorporation. In the later stages of post-excavation analysis, attempts have been made to differentiate the varied forms of settlement sediment that this blanket term has covered and to represent more accurately the site formation processes and activities that produced those sediments: agricultural soil development (cf Hamlet 2014), domestic refuse accumulation, specific occupation surfaces and aeolian sand incorporation. The labels for Links of Noltland deposits have here been adjusted accordingly. See also Barber 2011, 45–51; Shepherd 2016 on the use of the term 'midden', and the need for care in its definition; and Hamlet 2014 on anthropogenic deposits at Links of Noltland.

2 With the aim of examining and defining the process by which the deposits accumulated, initially not just artefactual material but every piece of bone and stone over 10mm long was treated as a 'find' and recorded in three dimensions, and the angle of inclination of its deposition noted; additionally, the top of every layer was contour-surveyed. It became clear, however, that given the time-consuming nature of the exercise, the consequent large number of finds, the comparatively small team available, and the adverse conditions of the excavation (with continuous wind and concomitant sand-blows), this had to be scaled back so that only artefactual finds were 3D-recorded and only some contexts were contour-surveyed. This laborious recording was undertaken long before the advent of digital recording systems. It continued to be used in Trench E, hence the very restricted depth of excavation achieved in that area over four seasons. The sediment from every layer that had been formed through human activity was, however, collected and wet-sieved on-site through a 3mm mesh, the residues being taken with the other finds to the then-named National Museum of Antiquities of Scotland for specialist investigation.

3 Despite the large size of the cod, this was not necessarily a deep-water catch (Clarke 1976: 243–4).

4 Barbed-and-tanged arrowheads are indeed known from Orkney, with examples being found in the stalled cairns of Knowe of Yarso and Unstan (Davidson & Henshall 1989: 79), but these are likely to post-date the earliest appearance of this Beaker type of projectile point in Britain by several centuries.

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