The Late Neolithic timescape of Orkney: islands of history

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SUPPLEMENTARY INFORMATION

This study forms part of *The Times of Their Lives* project, funded by the European Research Council (Advanced Investigator Grant 295412). This enabled new programmes of radiocarbon dating and chronological modelling to be undertaken on a series of Grooved Ware settlements on Orkney. We were able to provide new dating for fully published sites at Barnhouse, Mainland (Richards 2005; Richards *et al.* 2016a) and Pool, Sanday (Hunter 2007; MacSween *et al.* 2015), and to contribute to ongoing post-excavation analysis for Skara Brae, Mainland (Clarke & Shepherd forthcoming). At the Ness of Brodgar, Mainland, and the Links of Noltland, Westray, we were able to produce preliminary chronologies for sites where excavation is ongoing (Card *et al.* in press; Clarke *et al.* submitted).

This analysis attempts not only to compare these new site chronologies with each other, but also to set them within the wider framework of other dated sites in Neolithic Orkney. In doing this, we build on the review of Griffiths (2016) who provides a synthesis of the chronology of activity in the fourth millennium cal BC.

Our original intention was to confine ourselves to Late Neolithic activity associated with Grooved Ware, but it soon became apparent that round-based pottery[i] (as found at Isbister chambered tomb) and Grooved Ware (as found at Barnhouse) were almost certainly in contemporary use during the 31st century cal BC at the very least (Fig. S1 and Richards *et al.* 2016a, figs 6–8). We therefore consider all dating evidence associated with Grooved Ware sites and with sites of the later fourth millennium (Table 1; Fig. 1), although our analysis focuses on developments between *c.* 3300 and *c.* 2300 cal BC.

Details of all the scientific dates included in our review are provided in the tables referenced in Table 1, or in Table S1 (where we have gathered the relevant information from diverse sources). Details of Luminescence ages from the Ring of Brodgar are provided in Table S2, and details of radiocarbon dates on specimens of common vole (*Microtus arvalis*) from Orkney are provided in Table S3. Full details of the two radiocarbon results from the chambered cairn at Vestra Fiold, Mainland, which are published for the first time in this study, are provided in Table 2.

All the chronological modelling discussed in this review has been undertaken using the program OxCal v4.2 (Bronk Ramsey 2009a; 2009b; Bronk Ramsey & Lee 2013) and the atmospheric calibration curve for the northern hemisphere published by Reimer *et al.* (2013). The algorithms used are defined exactly by the brackets and OxCal CQL2 keywords on the left-hand side of the technical graphs which define each model (http://c14.arch.ox.ac.uk/). The posterior density estimates output by the model are shown in black, with the unconstrained calibrated radiocarbon dates shown in outline. The other distributions correspond to aspects of the model. For example, *start_isbister_primary* is the estimated date when burial in the chambered tomb at Isbister began (Fig. S1). In the text and tables, the Highest Posterior Density intervals of the posterior density estimates produced by the models are given *in italics*, followed by a reference to the relevant parameter name and the figures in which the model which produced it is defined. So, for example, we estimate that the settlement at Barnhouse, Mainland was established in *3160–3090 cal BC* (*86% probability*) or *3080–3045 cal BC* (*9% probability*; *start Barnhouse*; Richards *et al.* 2016a, figs 6–8), probably in *3135–3100 cal BC* (*68% probability*).

Key parameters for the chronology of Neolithic Orkney are listed in Tables S4 and S5, and illustrated in Figs 2 and S20–24. We begin our review by establishing our current understanding of the chronology of particular sites, considering them from south to north through the archipelago.

South Ronaldsay

Isbister

This stalled cairn, known as the Tomb of the Eagles, with features shared with Maeshowe passage graves, is located above 30m-high cliffs on the southernmost island of the Orkney archipelago, South Ronaldsay. Initial excavations took place in the 1950s (P. Ritchie 1961), with further more extensive investigations in the 1970s (Hedges 1983).

The central chamber is 8.2m long and is divided into five segments by transversely set orthostats. The two end compartments are structurally distinct from the central portion of the chamber, and there are three side cells. The western half of the cairn is encased by a rubble mound, 30m across, which was retained by a semi-circular horn. The central chamber contained 342 disarticulated bones, comprising the remains of 15 humans. A diverse faunal assemblage of terrestrial and marine species included the remains of at least six white-tailed sea eagles.

Thirty-two radiocarbon determinations have been produced on the human and animal bone assemblage (Renfrew *et al.* 1983; Sheridan 2005; Sheridan *et al.* 2012; Lawrence & Lee-Thorp 2012; Table S1). Given that all the human and animal remains were disarticulated and paired bones from the same individual were found in different positions of the monument it is not surprising that previous attempts to incorporate stratigraphic relationships between samples into chronological models (Schulting *et al.* 2010; Griffiths 2016) have produced poor agreement.

The chronological model shown in Fig. S1 excludes the two measurements (GU-1187 and OxA-25579; Table S1) that relate to Bronze Age activity and includes the dates on samples of human bone relating to primary use of the chamber as deriving from a single phase of activity. The single dated sample from the later hornwork (*109*) provides a constraint on the end of this primary phase of burial. The five samples that represent secondary re-use of the monument are also modelled as deriving from a single continuous phase of activity. The radiocarbon dates are in good agreement with this interpretation (Amodel: 89). As the dated sea eagle bone (UB-6552) from the foundation deposit (L 12 beneath the floor of ST 5) was intermixed with those from the tomb floor (Bramwell 1983: 159), it cannot securely be associated with the 'foundation deposit'. As both determinations on sea eagle bones are statistically consistent ($T'=2.4$; $T'(5\%)=3.6$; $\nu=1$; Ward & Wilson 1978), it seems more likely that their deposition is associated with secondary activity introducing material to the chamber (*contra* Griffiths 2016: 283).

The date estimates for the start and end of phases of burial and the hornwork at Isbister are given in Table S4.

Mainland

Barnhouse

The settlement at Barnhouse was excavated by Colin Richards in 1985–91, producing the remains of 13 buildings and a large assemblage of Grooved Ware (Richards 2005).

A chronological model for the development of the site is presented in Richards *et al.* (2016a, figs 6–8). Date estimates for key parameters from this model are given in Table S4.

Crossiecrown

Two Neolithic structures (The Red and Grey Houses) and an artefact-rich midden were excavated as part of the Cuween-Wideford Landscape Project (Card *et al.* 2016). The two structures had an almost identical internal layout, with many of the features of Orcadian Neolithic houses — recesses/beds, stone boxes, stone furniture and a small cell with a drain.

Seven radiocarbon dates were obtained on samples from the Red House, midden, and an isolated hearth (Table S1). The two radiocarbon measurements from floor deposit 012 in House 1 are statistically consistent ($T'=1.3$; $T'(5\%)=3.8$; $\nu=1$; Ward & Wilson 1978), as are those from the basal midden layer ($T'=3.3$; $T'(5\%)=3.8$; $\nu=1$), and the samples could therefore be of the same actual age. A model for dated activity at Crossiecrown shows good agreement between the radiocarbon dates and stratigraphic information (Amodel=103; Fig. S2). It excludes the later Bronze Age single naked barley grain (AA-51381) from the spread of ash associated with hearth [491] that appeared unrelated to any building (Card *et al.* 2016: 193).

The midden material in Trench 3 accumulated in the first quarter of the third millennium cal BC (date estimates are given in Table S4) and is clearly not related to the later occupation of the Red House that was in use in *2445–2195 cal BC* (*94% probability*; *last_crossiecrown_red_house*; Fig. S2) or *2165–2150 cal BC* (*1% probability*), probably in *2390–2380 cal BC* (*1% probability*) or *2350–2205 cal BC* (*67% probability*).

The overall estimates for dated activity at Crossiecrown (Table S4) provide an indication of the currency of a Grooved Ware assemblage which utilises three main decorative techniques: incision, application, and impression (A.M. Jones *et al.* 2016).

Cuween

The Maeshowe passage grave at Cuween was excavated by M.M. Charleson in 1901 (Charleson & Turner 1902). The upper filling of the chamber contained numerous animal bones and the lower, together with the cells, both human and dog bones. The entrance passage which had been deliberately blocked contained a human skull and long bones.

Three dog bones from the fill of the chamber (SUERC-4847–9) were dated as part of the Cuween-Wideford project (Richards & R. Jones 2016; Ashmore 2005; Table S1). The three measurements are statistically consistent ($T'=1.2$, $T'(5\%)=6.0$, $\nu=2$) and could be of the same date. The human femur (UB-6422) from the entrance passage was dated as part of a project dating animal (and some human) remains from Scottish chamber tombs (Sheridan 2005).

Infilling of the chamber was taking place in the middle of the third millennium cal BC, while the human femur provides a *terminus post quem* (hereafter *TPQ*) for blocking of the entrance (Fig. S3).

Knowes of Trotty

The Knowes of Trotty is one of the finest examples of a linear Bronze Age barrow cemetery in the north of Britain (Downes *et al.* 2016, 41). Investigation in 2002 of magnetic anomalies thought to be associated with the cemetery unexpectedly revealed the remains of a Neolithic stone building. Further limited excavations in 2005–6 revealed some of the structural history of the building that appears to have been rebuilt/altered on two occasions.

Three samples were dated from the interior of the Phase 1 house; measurements on two fragments of birch charcoal (SUERC-18239 and SUERC-18241) from hearth [302] are statistically consistent (T'=0.8; T'(5%)=3.8; ν=1) and could be of the same actual age. SUERC-18235 from pit [282] under walling of the Phase 2 house provides a *TPQ* for its construction. Five samples (Table S1) derive from activities associated with the Phase 2 house; the model includes the direct stratigraphic relationship between the two dated hearth rake-out contexts, although as SUERC-18243 was unidentified charcoal it has been included as a *TPQ*. A model that includes SUERC-18233 from the Phase 3 hearth [082] as later than Phase 2 has poor overall agreement (Amodel=51; not shown) and it is therefore likely that this fragment of charcoal is residual. SUERC-18233 has therefore been included in the model shown in Fig. S4 as only providing a *TPQ* for Phase 3. This model has good overall agreement (Amodel=98) and suggests that the house at the Knowes of Trotty was in use in the late fourth millennium cal BC.

Maeshowe

Archaeological excavations at Maeshowe have been undertaken by Gordon Childe (1956) and Colin Renfrew (1979). Renfrew excavated two trenches through the ditch surrounding the monument in 1973 and 1974 in order to obtain samples for radiocarbon dating. Ten radiocarbon age determinations were made on samples from cuttings through the southern and northern parts of the ditch, beneath the platform and from the bank surrounding the ditch. All but one of the samples are described as 'silty peat' (Renfrew 1979: 71), the exception being a peat sample (SRR-791) from beneath the bank.

The radiocarbon dates conflict with the stratigraphic relationships between them, and the chronology of the monument is therefore uncertain. But a number of samples do provide constraints for its construction (Fig. S5); SRR-791 provides a *TPQ* for the digging of the ditch and formation of the bank; Sample D (68-70cm) provides a *terminus ante quem* (hereafter *TAQ*) for the digging of the ditch, and SRR-504 could provide a *TAQ* for the formation of the platform as it appears that it is an organic deposit that formed on its slope (Renfrew 1979: 25).

Ness of Brodgar

The settlement at Ness of Brodgar is the subject of ongoing excavations by a team led by Nick Card (Card 2012). The remains of at least 20 buildings have been recorded, associated with a substantial assemblage of Grooved Ware.

Two chronological models for the development of the site are presented in Card *et al.* (in press: figs 9–11). Date estimates for key parameters from Model 2 are given in Table S4.

Quanterness

This Maeshowe passage grave was excavated in 1972–4 (Renfrew 1979), producing a large assemblage of human bone and the remains of at least 34 Grooved Ware vessels. More recently this tomb has been the subject of a further programme of AMS radiocarbon dating (Schulting *et al.* 2010). Bayesian models for the chronology of the site are presented by both Schulting *et al.* (2010, illus 10) and Griffiths (2016: fig. 10.10). The model presented in Fig. S6 combines elements of both interpretations.

We follow Schulting *et al.* (2010: 11–13) in excluding the thermoluminescence ages (which were undertaken in the early days of the technique) from the model, and in regarding SUERC-24002 as being from a bone deposited during the main use of the tomb (rather than from the articulated skeleton in Pit A) and SUERC-24020–1 also being from that activity (rather than from the articulated skeleton in Pit C). We follow Griffiths (2016: 285) in using the original errors quoted on the measurements undertaken in the 1970s.

The dating of the articulated skeleton in Pit C is problematic. Renfrew *et al.* (1976) originally reported three statistically inconsistent measurements on bones attributed to this individual (Pta-1606 on a left radius, Q-1480 on a left tibia, and SRR-755 on a right femur), and a fourth (UBA-18424 on a left ilium) has been reported recently (Schulting *et al.* 2010: fn 4). This measurement is statistically consistent with Pta-1606 ($T'=0.1$; $T'(5\%)=3.8$; $\nu=1$), but inconsistent with the other two measurements reportedly from this skeleton ($T'=21.4$, $T'(5\%)=7.8$, $\nu=3$) which are themselves statistically consistent (T'=0.2; T'(5%)=3.8; ν=1). The model shown in Fig. S6 takes weighted means of both pairs of consistent measurements. Pta-1606 and UBA-18424 are interpreted as relating to the final use of the chambered tomb, and Q-1480 and SRR-755 are excluded from the modelling as these measurements either represent a later inserted burial or are aberrant.

The model shown in Fig. S6 has good overall agreement (Amodel: 102) and appears to accurately reflect a continuous period of burial in the tomb from *c.* 3400 cal BC to *c.* 2800 cal BC. Despite a plateau on the calibration curve at this time, the dated samples include individuals who probably died throughout this period (e.g. *SUERC-24012*, *SUERC-23993*, *SUERC-23997* and *SUERC-24007*).

Ring of Brodgar

The largest stone circle in Scotland, the Ring of Brodgar is located on rising ground on the isthmus that separates the Lochs of Stenness and Harray. The stones form a true circle and are surrounded by a rock-cut ditch with a diameter of 123m (Downes *et al.* 2013, 91).

In 1973 three sections were cut across the ditch of the Ring of Brogar, on behalf of the Department of the Environment, with the aim of obtaining samples for radiocarbon analysis (Renfrew 1979: 40). The two samples of organic mud dated from Trench A (SRR-502–3; Table S1) were from relatively high up the ditch fills as waterlogging made excavation of the underlying silt infill through this ditch impossible. These dates showed that the ditch had still been infilling into the Iron Age

In 2008 re-excavation of two trenches (A and C) previously examined by Colin Renfrew across the Ring of Brodgar ditch was undertaken to investigate the method and date of the ditch (Downes *et al.* 2013: 108). Trench A was never bottomed in 1973 due to problems of waterlogging. The 2008 excavations failed to find suitable material for radiocarbon dating in the basal ditch silts, but a series of OSL samples (Table S2) was obtained through the fills of the ditch in Trenches A and C.

A chronological model that incorporates the OSL dates and their stratigraphic relationship is shown in Fig. S7. SUTL-2285 has been excluded from the sequence in Trench C as the measurement is clearly too old for its stratigraphic position. The model has good overall agreement (Amodel=96) and by combining the two estimates for the digging of the ditch (*trench_A_dig* and *trench_C_dig*; Fig. S8) suggests a date for completion of the Ring of Brodgar of *2750–2210 BC* (*95% probability*; *Ring of Brodgar*; Fig. S8) probably of *2600–2330 BC* (*68% probability*). This estimate is significantly less precise than the 'reasonable estimate for the date of the digging of the ditch' of 2600–2400 BC (Downes *et al.* 2013: 113) but reinforces the interpretation that the Ring of Brodgar ditch was probably dug in the middle of the third millennium BC.

Skara Brae

The settlement at Skara Brae was excavated by Gordon Childe in 1927–30 (Childe 1931) and David Clarke in 1972–73 (Clarke & Shepherd forthcoming), producing the remains of more than ten buildings and a substantial assemblage of Grooved Ware.

A chronological model for the development of the site is presented in Clarke & Shepherd (forthcoming, illus 2.4.3/1–4). Date estimates for key parameters from this model are given in Table S4.

Smerquoy

The stone-built house structure, known as the Smerquoy Hoose was excavated in 2013–14 (Gee *et al.* 2016).

A chronological model for the development of the stone-built house is presented in Griffiths (2016, fig 10.4, table 10.1) and re-running of this model provides an estimate for primary construction of *3355–3260 cal BC* (*32% probability*; *build_smerquoy_hoose*; model not shown*)* or *3245–3100 cal* (*63% probability),* probably *3350–3320 cal BC* (*12% probability*) or *3275–3265 cal BC* (*2% probability*) or *3235–3170 cal BC* (*31% probability*) or *3165–3115 cal BC* (*23% probability*).

Stonehall

The Neolithic settlement complex of Stonehall comprises three elements: Stonehall Knoll, Stonehall Meadow, and Stonehall Farm, and lies on the low ground to the south of Cuween Hill (Richards *et al.* 2016b; 2016c).

Stonehall Knoll

Three determinations from the secondary floor [4041] of 'compartmentalised' House 3 are not statistically consistent (T'=78.2; T'(5%)=6.0; ν=2; Table S1) and the upper layers of the house clearly contains material of different ages. Given House 3 is the third building to be constructed on the knoll, following Structure 1 and House 2, the secondary floor most likely contains residual material from activity associated with earlier structures.

A date (AA-51385) obtained on *Salix* sp. charcoal from the fill of pit [471] that cut through the Neolithic deposits has been excluded from the model as it relates to Pictish activity on the knoll.

Stonehall Meadow

The partial remains of House 1 and almost the full extent of House 3 were excavated along with partial investigations of House 2 at Stonehall Meadow. Six radiocarbon dates were obtained from the interior of House 3 and the putative House 4 (Table S1).

House 3 was partitioned internally into two compartments of roughly equal size by opposed orthostats, with three samples dated from the front compartment and one from the rear. The measurements from in and around the hearth [018] of ?House 4 are statistically consistent (T'=0.8; T'5%=3.8; ν=1) and could be of the same actual age.

Stonehall Farm

The third and most substantial area of settlement, Stonehall Farm, as far as could be determined from the limited excavations, comprised a core of superimposed house structures within a mound of midden. The free-standing houses were concentrated towards the centre of the settlement mound with the periphery composed exclusively of midden deposits spreading away from the buildings (Richards *et al.* 2016b: 131).

Two samples were dated from features inside Structure 1 and relate to the later use of the building; *AA-51371* provides an indication of when the 'bowl' created on the floor surface next to the hearth was infilled, and *AA-51387* for the remodelled central hearth/cist. To the east of Structure 1 a series of three samples through the midden give an indication of the duration of refuse disposal. Samples from the last use of the hearth (*SUERC-5792*) and midden that accumulated (*SUERC-5791*) close to House 1 indicate when it was in use.

The model shown in Fig. S9 combines the few available stratigraphic sequences for the dated samples with the radiocarbon dates in a single continuous phase of activity (Buck *et al.* 1992). This model assumes that the three parts of the settlement at Stonehall formed a coherent complex and that the occupation of each part was linked. AA-51379 from the secondary floor has been excluded given this date is significantly younger than any other on Neolithic material from Stonehall.

The model has good overall agreement (Amodel=107) and key parameters from it are given in Table S4.

Stones of Stenness

The Stones of Stenness comprise five upright orthostats in a circle that, originally, probably held twelve stones. They stand within a henge monument that comprises an outer bank, inner ditch with a single causeway, and a central rectangular box-like structure which contained cremated bones, charcoal, and ceramics.

Four radiocarbon determinations (SRR-350–352 and SRR-592; Table S1) were obtained following excavations in 1973 (J.N.G. Ritchie 1976) on samples of unidentified animal bones from the basal organic ditch fill, from unidentified charcoal from the central feature and Pit C, and fragments of decomposed wood from the bedding trench of the putative rectangular timber structure. The five measurements made at Oxford in 2000–2001 (Ashmore 2000; 2001) were subsequently withdrawn (Sheridan and Higham 2006; 2007) because of a problem with the ultrafiltration protocol used in the laboratory in 2000–2002 (Bronk Ramsey *et al.* 2004). Excess gelatin from four of these samples (OxA-16482–5) was repurified and redated, and one was redated from a replicate sample of bone (OxA-17783). An additional sample of cremated bone was also dated.

The model shown in Fig. S10 assumes that the dated samples all derive from a single phase of activity and has good overall agreement (Amodel=124). Assuming that construction preceded the first dated material by only a very short amount, the construction of the monument occurred in *3030–2895 cal BC* (*95% probability*; *build_stenness*; Fig. S10), probably in *2995–2990 cal BC* (*1% probability*) or *2975–2905 cal BC* (*67% probability*).

Wideford Hill

Excavations at Wideford Hill in 2003 revealed the remains of a series of timber and stone structures or houses (Richards & A.M. Jones 2016). At least two sub-circular structures (Timber structures 1 and 2) were identified along with a possible third ('Timber structure 3') to the east. Stonehouse 1 was subsequently constructed directly over Timber structure 2. Stonehouse 1 and its contemporary Stone structure 2 were separated by a covered drain although any trace of internal architectural features in Stone structure 2 had been destroyed by ploughing and modern drainage infrastructure. To the north of (Timber structure 3) a sequence of deposits sealed beneath a rammed-stone surface [002] could possibly be associated with earlier occupation and Stone structure 2. The rammed-stone surface [002] entirely covered the area previously taken by Stone structure 2 and represented an open area where a number of tasks were undertaken.

The model shown in Fig. S11 does not include the stratigraphic relationship between timber and stone structures defined in Griffiths (2016: fig. 10.3), as the only recorded direct stratigraphic relationship is between Timber structure 2 (undated) and Stonehouse 1 (one dated sample). The model, that simply treats the dated samples from Wideford Hill as deriving from a single phase of activity (Buck *et al.* 1992), has good overall agreement (Amodel=92) and suggests that timber and stone structures/houses were in use at Wideford Hill in the later part of the fourth millennium cal BC.

Wyre

Ha'Breck

Fieldwork between 2006 and 2013 revealed the remains of five buildings and associated middens and work areas, and a domestic stone quarry on the island of Wyre at Ha'Breck (Thomas & Lee 2012). Houses 1 and 4 are timber structures, while Houses 2, 3, and 5 are stone-built.
Our model follows the model defined in Griffiths (2016, fig. 10.5; Table S1) although we have excluded the measurement on material from the midden (SUERC-37960), given it is *c.* 700 years later than the use of the structures, and have also calculated date estimates for the construction and decommissioning of House 3.

The model (Fig. S12) has good overall agreement (Amodel=93) with occupation of the houses taking place in the later part of the fourth millennium cal BC.

Rousay

Knowe of Ramsay

The Knowe of Ramsay is a stalled long cairn divided into 14 cells by a series of pairs of transverse orthostats. It was excavated in 1935, when a small assemblage of human bone (representing perhaps three individuals) and a much larger assemblage of animal bone was recovered (Callander & Grant 1936). No diagnostic pottery was found.

Three bulk samples of animal bone have been dated from this site (Q-1222–4; Renfrew *et al.* 1976, table A). These may relate to the use of the cairn.

Knowe of Rowiegar

The Knowe of Rowiegar is a stalled long cairn, probably originally divided into at least 11, probably 12, compartments by pairs of transverse orthostats (RCAHMS 1946; Davidson and Henshall 1989: 136–8). It was excavated in 1937 by W.G. Grant, but remains unpublished. Parts of the archive, including the assemblage of human bones recovered from the tomb, survive. Fragments of Unstan Ware were recovered (Henshall 1963: 214).

Twenty-six radiocarbon measurements are available from the tomb (Table S1), all but three on human bones. The samples derive from at least 16 individuals (16 skulls were dated), although the seven measurements on right humeri could, potentially, derive from some of these individuals. The other two samples were of bulk animal bone. All appear to relate to the use of the tomb (*contra* Griffiths 2016: fig 10.9), although Q-1227 is a slight statistical outlier.

A model incorporating this interpretation has good overall agreement (Amodel: 77), suggesting that the cairn was used for burial between *3515–3360 cal BC* (*95% probability*; *start_rowiegar*; Fig. S13), probably *3430–3365 cal BC* (*68% probability*), and *2875–2750 cal BC* (*95% probability*; *end_rowiegar*; Fig. S13), probably *2855–2800 cal BC* (*68% probability*).

Knowe of Lairo

The Knowe of Lairo began as a stalled long cairn divided into three parts by transverse pairs of orthostats. It was subsequently altered into a horned cairn with a Maeshowe passage grave chamber. It was excavated in 1936, when a polished axehead and two sherds from a rounded vessel were recovered (Grant & Wilson 1943). A single radiocarbon measurement has been obtained on an adult male skull recovered from the tomb (SUERC-45833; Table S1).

Know of Yarso

The Knowe of Yarso is a stalled long cairn divided into three parts by transverse pairs of orthostats. It was excavated in 1934, when a large quantity of disarticulated human bone representing at least 29 individuals was recovered (Callander & Grant 1935). The only pottery was part of a Food Vessel that was apparently a later insertion into the tomb.

Two radiocarbon measurements have been obtained from this site, one on an adult male skull and one on a bulked sample of animal bone (SUERC-45838 and Q-1225; Table S1). Both samples probably relate to the use of the cairn.

Midhowe

Midhowe is an Orkney-Cromarty stalled long cairn divided into 12 cells by a series of flat orthostats projecting from the lateral walls. It was excavated between 1932 and 1934, when the remains of at least 25 primary human burials were recovered (Callander & Grant 1934). Sherds from seven vessels, including three Unstan bowls, were found.

Two radiocarbon measurements have been obtained on human skulls that probably derive from the primary use of the monument (SUERC-46400–1; Table S1).

Rinyo

The settlement at the Braes of Rinyo was excavated in 1938 and 1946 (Childe & Grant 1939; Childe & Grant 1947). The remains of seven stone buildings were recovered, incorporating classic features of Neolithic Orkney — recessed dressers and beds, square central hearths and interior drains. Some of the walls were embedded in midden. The associated assemblage of Grooved Ware included both incised and applied decoration.

A single radiocarbon measurement has been obtained on cattle bone from the settlement (Q-1226; Renfrew *et al.* 1976, table A).

Eday

Green

Excavations of the settlement at Green between 2007 and 2013 revealed three stone Neolithic buildings with associated midden, and recovered assemblages of finds which included Grooved Ware (Coles & Miles 2013).

Post-excavation analysis continues, but currently four radiocarbon dates (Table S1) have been produced on short-lived charred plant material from a sequence of deposits through structure 1 and from a post-hole that may be associated with a timber building (Griffiths 2016: 281). It is not clear how the Grooved Ware is associated with these dates.

The model for the chronology of Neolithic activity at Green is shown in Fig. S14; Highest Posterior Density intervals for key parameters are given in Table S4.

Sanday

Pool

The settlement at Pool was excavated by John Hunter between 1984 and 1989. The remains of 14 Neolithic buildings were revealed, along with an assemblage of 10,000 pottery sherds. Small numbers of round-based bowls were identified from phase 1, but the vast majority of material was Grooved Ware, with significant differences between the fabrics and decoration found in phases 2 and 3 (Hunter 2007).

A chronological model for the development of the site is presented in MacSween *et al.* (2015: fig. 9), although unfortunately only the later Neolithic phases (2.2–3.2) could be included. Date estimates for key parameters from this model are given in Table S4.

Quoyness

Quoyness is a Maeshowe passage grave which was largely cleared out in 1867. The remaining stratigraphy was excavated by Gordon Childe in 1951–2 in advance of consolidation works. He recovered a fragmentary collection of human remains, including elements of at least ten adults and three to five children (Childe 1952).

Three radiocarbon dates on human bone are available for the tomb, which probably relate to the period of its use (MacSween *et al.* 2015: table 2).

Tofts Ness

The settlement at Tofts Ness was excavated by Stephen Dockrill between 1984 and 1988. The remains of one Neolithic stone building with associated ash tips and midden deposits, and an overlying period of ash tips and middening, were recovered (Dockrill 2007: chapter 2). The associated pottery was mostly untempered, flat-based vessels with slightly angled walls. None of the pottery was decorated.

Eleven radiocarbon dates on animal bone are available for the Neolithic deposits, although it is not clear whether these were made on samples consisting of more than one bone (although GU-2105 may have been) and whether the bones were disarticulated and so have the potential for being reworked. The chronological modelling of these results is discussed by MacSween *et al.* (2015: 21–3), and key parameters from the resultant model (MacSween *et al.* 2015: fig. 13) are provided in Table S4.

Westray

Links of Noltland

The settlement at the Links of Noltland was initially excavated by David Clarke between 1978 and 1981 (Clarke & Sharples 1985). Further ongoing excavations have been undertaken by EASE Archaeology since 2007 (Moore & Wilson 2011). A chronological model for the development of the site is presented in Clarke *et al.* (submitted: illus 10–12). Date estimates for key parameters from this model are given in Table S4.

Pierowall Quarry

Rescue excavations at Pierowall Quarry by Niall Sharples in 1981, following the discovery of a large decorated stone, revealed a large circular chambered tomb, *c.* 18m in diameter. Although nothing of the presumed chamber was visible, due in part to the subsequent later alterations, the size of the cairn would suggest that it was a Maeshowe passage grave.

Following demolition of the cairn it was levelled and paved over with a small platform on which a structure was built. Large quantities of flint knapping debris were found on the floor of this secondary structure together with a small assemblage of Grooved Ware (Sharples 1984).

Nine radiocarbon dates from the site were obtained immediately following the excavation from cattle and ovicaprid bones, and a single measurement on a pine marten bone was subsequently obtained as part of research into faunal introductions into Orkney (Table S1).

The model shown in Fig. S15 incorporates the stratigraphic relationship between deposits from the cairn revetment collapse and secondary occupation, but excludes the two Iron Age dates

(GU-1580–1). The pine marten bone (OxA-1049) appears to be too old for its stratigraphic position and has therefore only been included as a *TPQ*. The ovicaprid bone GU-1585 is only included as part of the phase of activity at Pierowall Quarry given uncertainty as to its context.

The model has good overall agreement (Amodel=79) and provides a *TAQ* for the construction of the cairn of *3040–2605 cal BC* (*95% probability*; *start_pierowall_quarry*; Fig. S15), probably *2910–2685 cal BC* (*68% probability*). The deliberate destruction of the cairn is estimated to have taken place in *2860–2600 cal BC* (*95% probability*; *cairn_levelled*; Fig. S15), probably in *2770–2625 cal BC* (*68% probability*).

Point of Cott

The megalithic tomb at the Point of Cott was excavated in 1984 and 1985 (Barber 1997). It began as a stalled cairn, with a chamber divided into four compartments. Subsequently, the cairn was enlarged and hornworks added.

Fifteen radiocarbon age determinations have been obtained on samples of human, animal, and bird bone (Table S1). The sample of animal and bird bone (GU-2945) has been included in the model (Fig. S16) as a *TPQ* for the end of the use of the tomb since the dated sea eagle would have had some marine component in its diet. The diet of the otter (UtC-1665) was almost certainly 100% marine and its radiocarbon age has been calibrated using the Marine13 calibration data set (Reimer *et al.* 2013) and a ΔR value of -47 ± 52 BP (Russell *et al.* 2015).

The model treats all the dates on human remains within the chamber as relating to the primary use of the stalled cairn for burial, and all the samples from the infilling of the passage and collapse of the chamber roof as a separate period of activity. Although this must have happened after the end of primary use of the tomb, not all the dated material need be later as it was disarticulated and so could be reworked. The model has good agreement (Amodel=104) and suggests that the site was used for the disposal of the dead for a period of about 500 years.

Papa Westray

Knap of Howar

This Neolithic settlement was excavated by Anna Ritchie in 1973 and 1975 (A. Ritchie 1983). Eleven radiocarbon age determinations (Table S1) were obtained on bulk samples of 'mixed animal bone' (Renfrew and Buteux 1985: 264).[1] Since the first set of measurements were perforce on mixed material, a further eight determinations were obtained on samples of single bones in 2001 (Bronk Ramsey *et al.* 2002). These measurements were subsequently withdrawn due to a problem with ultrafiltration at Oxford during the period they were measured (Bronk Ramsey *et al.* 2004) and redated (Table S1; Sheridan & Higham 2006; 2007).

The stratigraphic record suggests two main phases of activity: a primary phase represented by a midden deposit some 0.4m thick and a second when two structures were built into and on top of the primary midden (A. Ritchie 1983: 44). Although better known for its Unstan Ware assemblage (A. Ritchie 1983), the site also contains a small assemblage of Grooved Ware vessels (Schulting *et al.* 2010: 33)[2]. As none of these bones were found in articulation or found to articulate, all the dated samples could potentially be residual.

The model shown in Fig. S17 excludes the two measurements from the original series from the primary midden [9] in the wall core of House 1 as they are both markedly different from OxA-16475 from the same context, and significantly earlier (SRR-347) and later (SRR-352) than any other dated sample from the site. The model treats the remaining 17 radiocarbon dates as deriving from a single phase of activity, since there is clearly residual material identifiable in a model that incorporates the stratigraphic relationships between samples.

This model has good overall agreement (Amodel=76) and suggests that the occupation of the site occurred in the second half of the fourth millennium cal BC. OxA-16476 provides a *TPQ* for the construction of House 1 of *3345–3020 cal BC* (*95% probability*; *OxA-16476*; Fig. S17), probably of *3335–3215 cal BC* (*59% probability*) or *3175–3160 ca BC* (*4% probability*) or *3110–3085 cal BC* (*5% probability*).

Holm of Papa Westray

Holm of Papa Westray North

Excavation of the Holm of Papa Westray North in 1982–3 (A. Ritchie 2009) revealed a structural sequence within an Orkney-Cromarty stalled long cairn.

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1 The measurement (Birm-817) from Test Pit 16 at Holland some 0.5km east of the site is excluded. The test pit contains no archaeology as was dug to explore differences in stratigraphy in the area (Whittington 1983: 116).

2 The model for the Knap of Howar shown in Schulting *et al.* (2010, illus 21), based on radiocarbon dates from animal bone samples, contains two dates from the Holm of Papa Westray (GU-2067–8), whilst SRR-347, SRR-352, SRR-345, Birm-813, SRR-349 and Birm-816 are omitted.

Fourteen radiocarbon dates have been obtained on samples of human and animal bone, which are modelled as deriving from a single phase of activity at the site. The period of primary use of the tomb for human burial is modelled as a separate, discrete phase of activity. Later occupation in the area of the tomb is also modelled as a separate phase of activity. The neonatal sheep bone (OxA-16472) with highly elevated $\delta^{13}C$ and $\delta^{15}N$ values has been included as a *TPQ* for the end of activity associated with the cairn, since the dated animal had some marine component in its diet. The diet of the otter (OxA-17780) was almost certainly 100% marine and its radiocarbon age has been calibrated using the Marine13 calibration data set (Reimer *et al.* 2013) and a ΔR value of −47±52 BP (Russell *et al.* 2015). The marine component of the diet of the dated humans is likely to have been minimal, and so these measurements have simply been calibrated with the terrestrial calibration data (Reimer *et al.* 2013).

The model (Fig. S18) has good overall agreement (Amodel=106) and suggests that the primary use of the cairn occurred in the third quarter of the fourth millennium cal BC, although there was later activity on the site and within the tomb itself.

Synthetic models

We also present a number of synthetic models which employ posterior density estimates from the site-based models just described as likelihoods.

So, for example, in the model for the currency of Orkney-Cromarty stalled cairns on Orkney (Fig. 2, lower) the Tomb of the Eagles, Isbister, South Ronaldsay, is represented by the posterior density estimates for the start and end of the primary use of the cairn calculated by the model shown in Fig. S1 (*start_isbister_primary* and *end_isbister_primary*). This approach ensures that sites which have large numbers of radiocarbon dates are not disproportionately weighted in the synthetic model: Isbister (with 32 measurements) is similarly weighted to Midhowe (with just two measurements). Each is represented in model for stalled cairns by two parameters, although those from Isbister, deriving from many more data, are more precise.

A similar approach has been taken for the model for the currency of different forms of Neolithic architecture on Orkney defined in Figs S19–20. In this model, the posterior distributions input into the model are either calculated parameters, such as '*build_house_3*' from Ha'Breck, Wyre (Fig.

S12), or are radiocarbon dates that have previously been constrained by the archaeological prior information included in the Ha'Breck model, such as '*SUERC-34504*'.

A further level of synthesis is provided in Fig. 5. Here, the probability that a site, or class of sites, is in use in a particular 25-year period is plotted by shading. This is the probability that a site has been established by the relevant calendar date, minus the probability that it has gone out of use by then. For the appearance of the Orkney vole and the construction of the Stones of Stenness and the Ring of Brodgar only the probability that they had arrived or been constructed is considered as, once they had appeared, they endured.

Figure 7 represents a further level of synthesis, by combining our estimates of when the different houses in our dated sample were in use (e.g. Richards *et al.* 2016a: fig. 14).

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Figure S1. Probability distributions of dates from Isbister, South Ronaldsay. Each distribution represents the relative probability that an event occurs at a particular time. For each of the dates 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. Distributions other than those relating to particular samples correspond to aspects of the model. For example, the distribution *start_isbister_primary* is the estimated date when burial in the chambered tomb began. Measurements followed by a question mark and shown in outline have been excluded from the model for reasons explained in the text, and are simple calibrated dates (Stuiver & Reimer 1993). The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

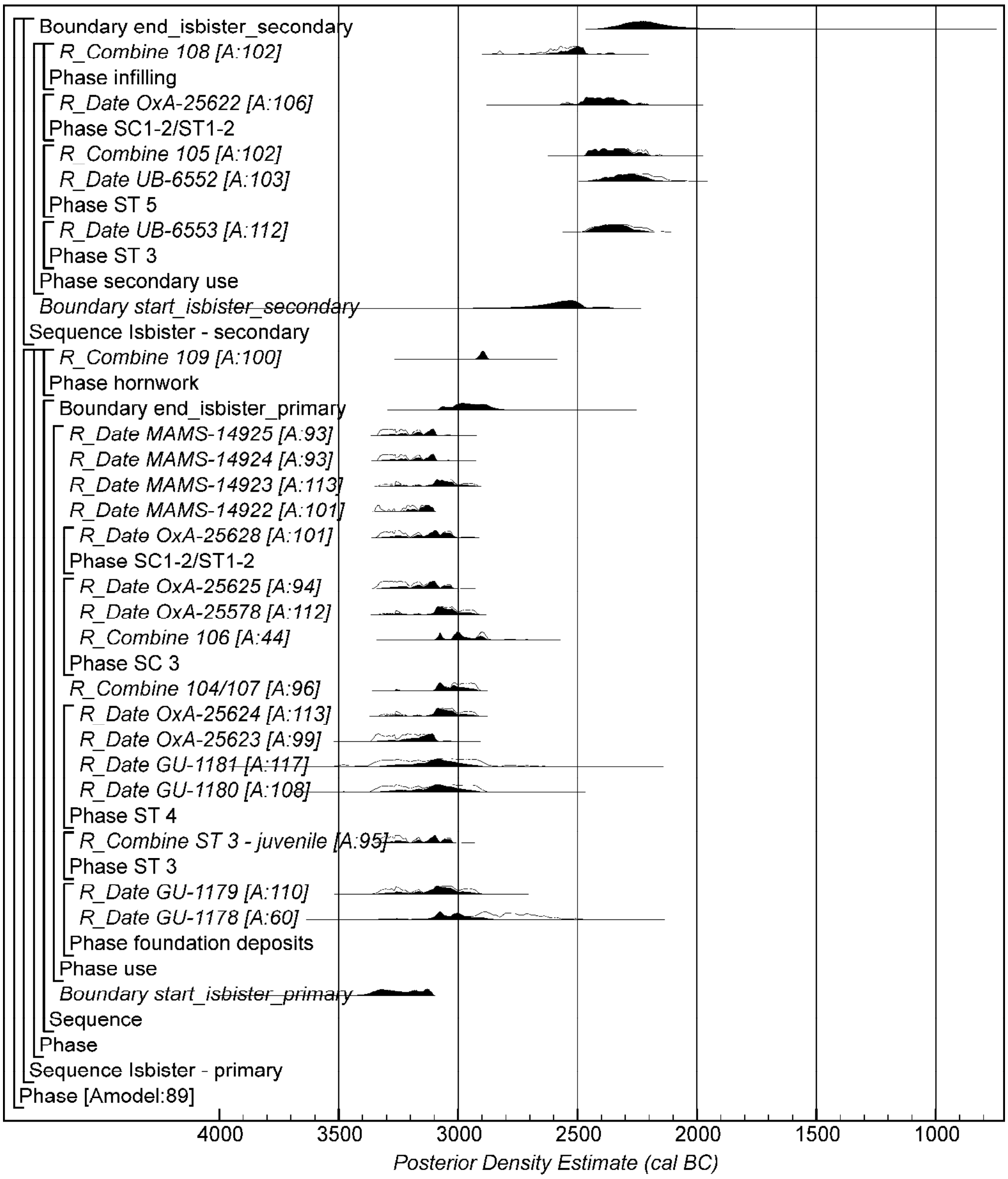

Figure S2. Probability distributions of dates from Crossiecrown, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

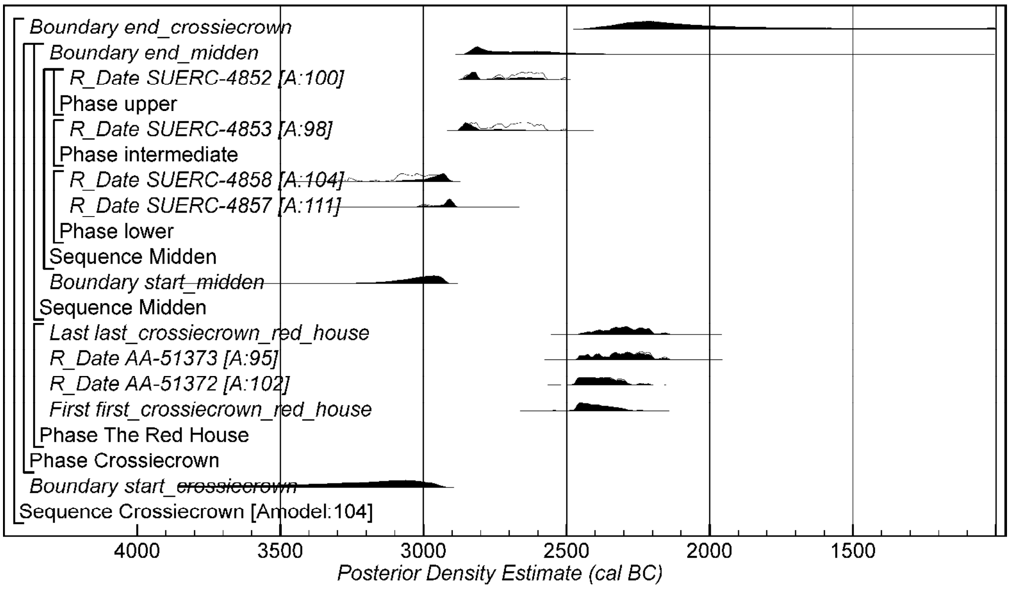

Figure S3. Probability distributions of dates from Cuween, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

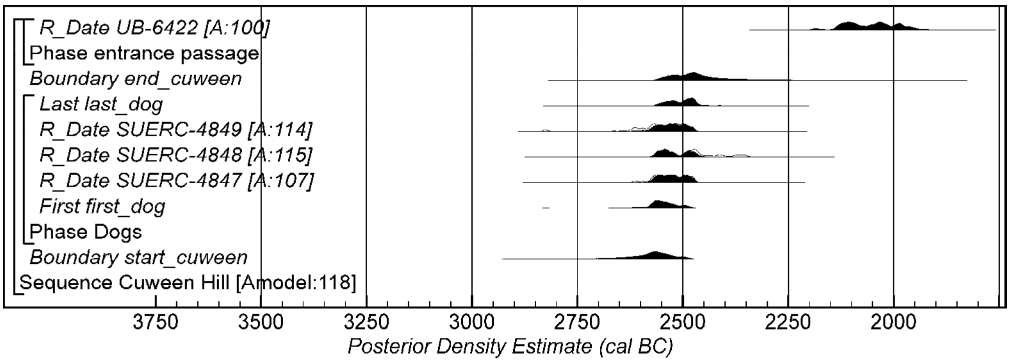

Figure S4. Probability distributions of dates from Knowes of Trotty, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

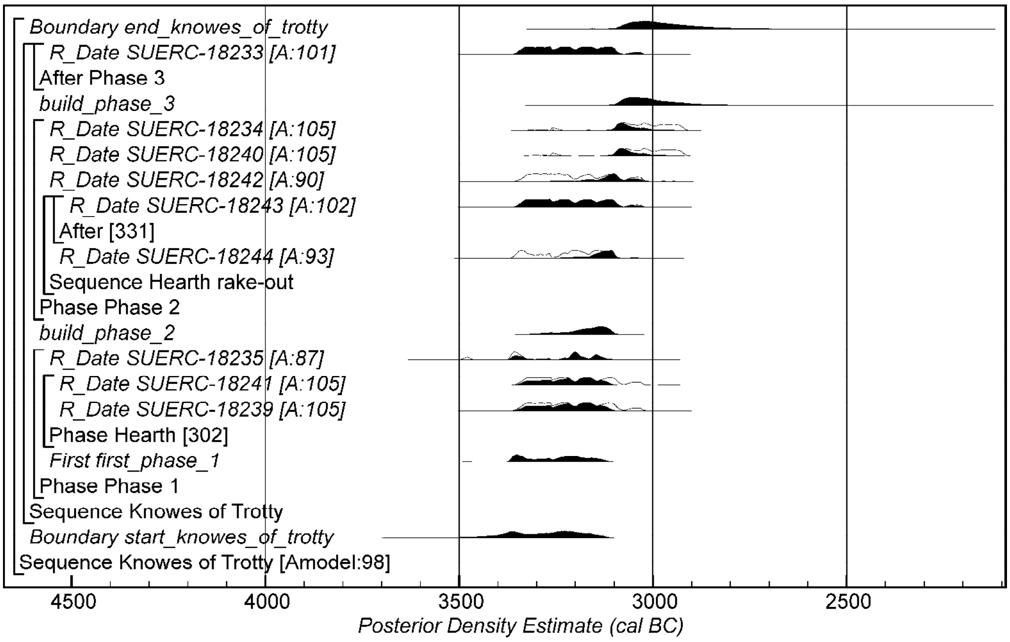

Figure S5. Probability distributions of dates from Maeshowe, Mainland, calibrated using the probability method (Stuiver & Reimer 1993).

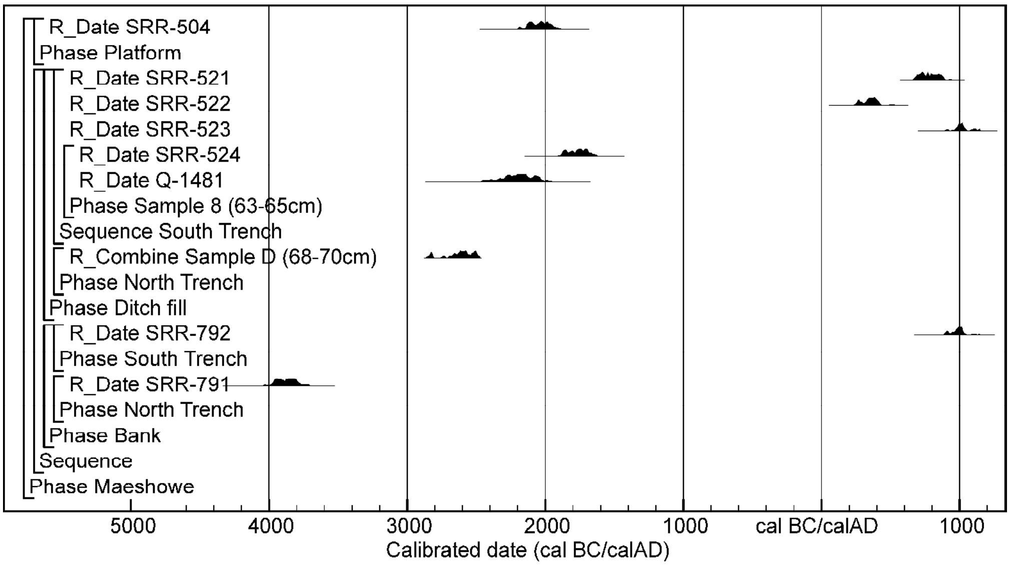

Figure S6. Probability distributions of dates from Quanterness, Mainland. The format is identical to that of Fig. S1. Measurements followed by a question mark and shown in outline have been excluded from the model for reasons explained in the text, and are simple calibrated dates (Stuiver & Reimer 1993). The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

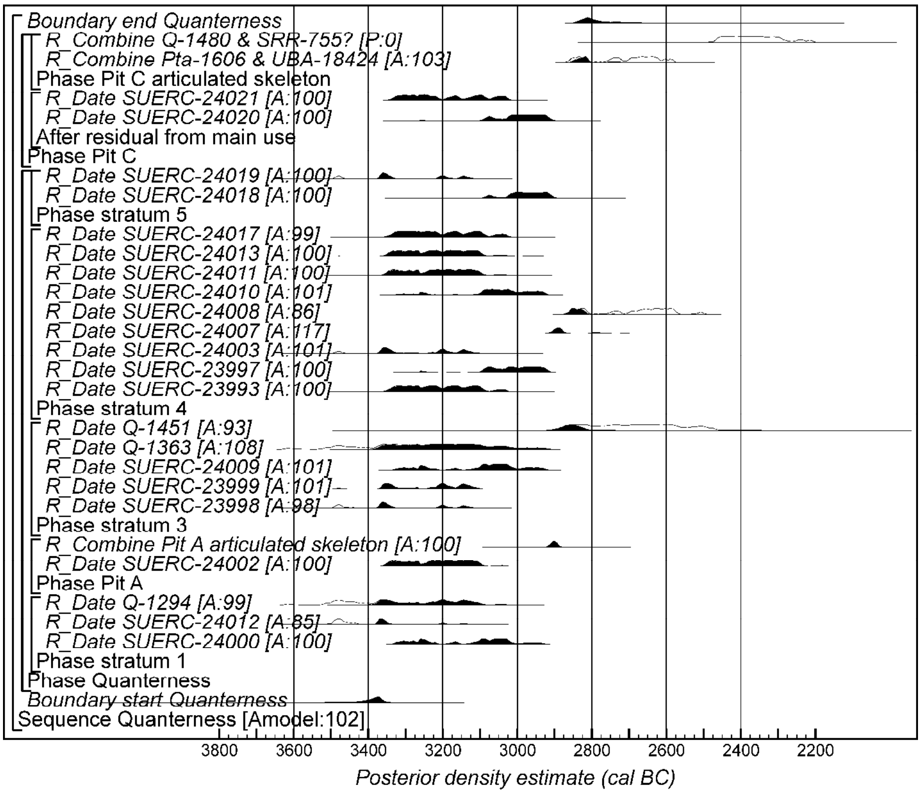

Figure S7. Probability distributions of dates from the Ring of Brodgar, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

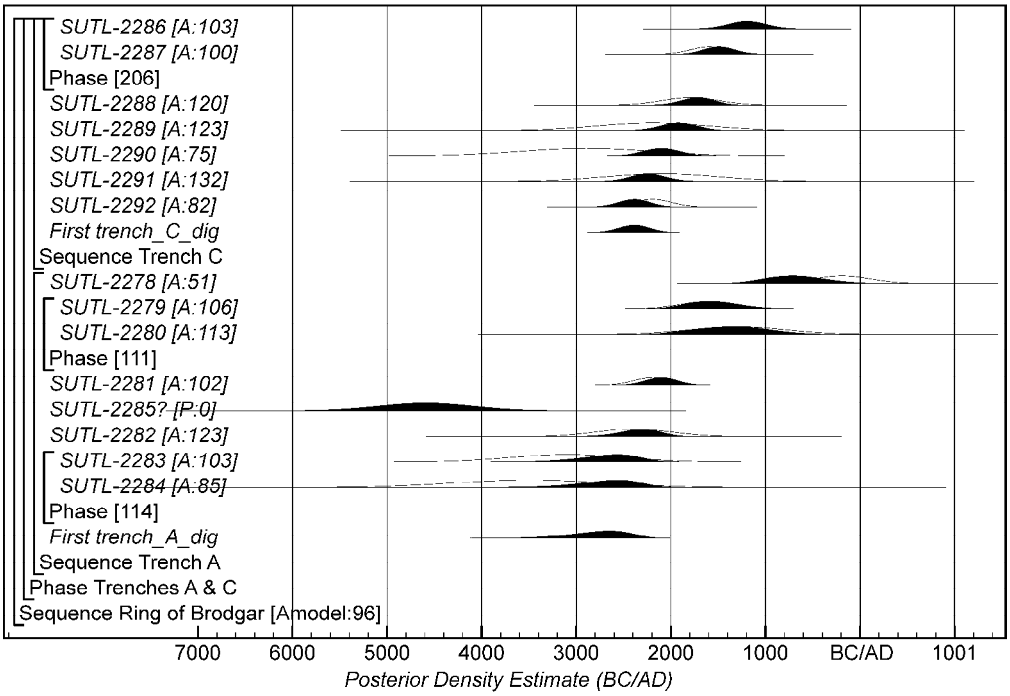

Figure S8: Combined probability distribution estimating the construction date of the ditch at the Ring of Brodgar, if it is interpreted as representing a single planned construction.

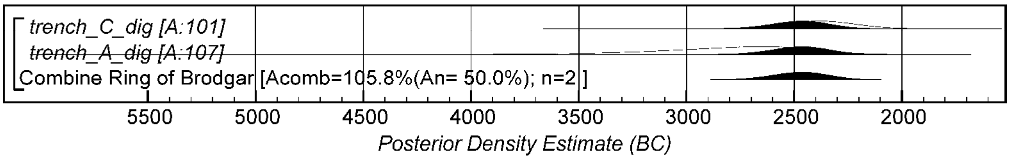

Figure S9. Probability distributions of dates from Stonehall, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

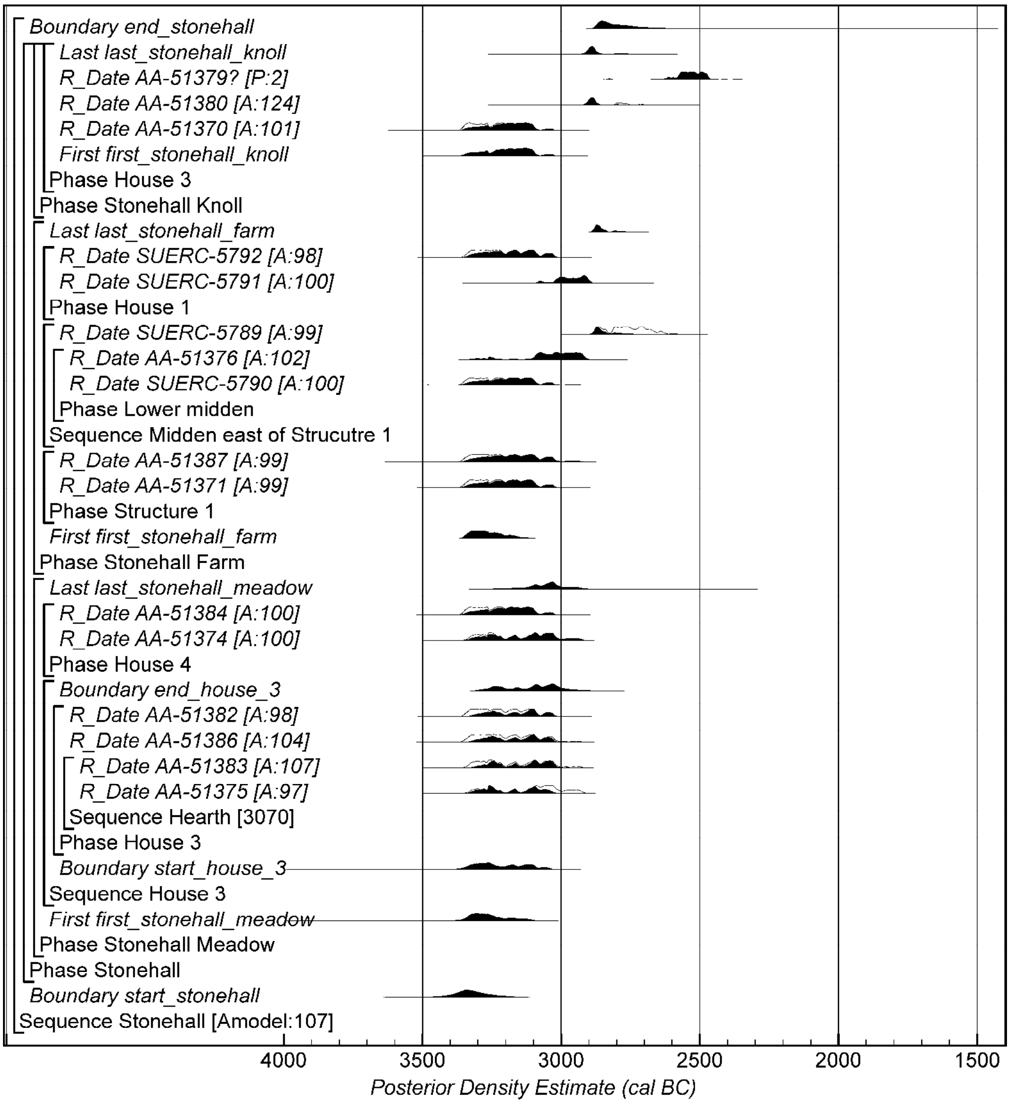

Figure S10. Probability distributions of dates from the Stones of Stenness, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

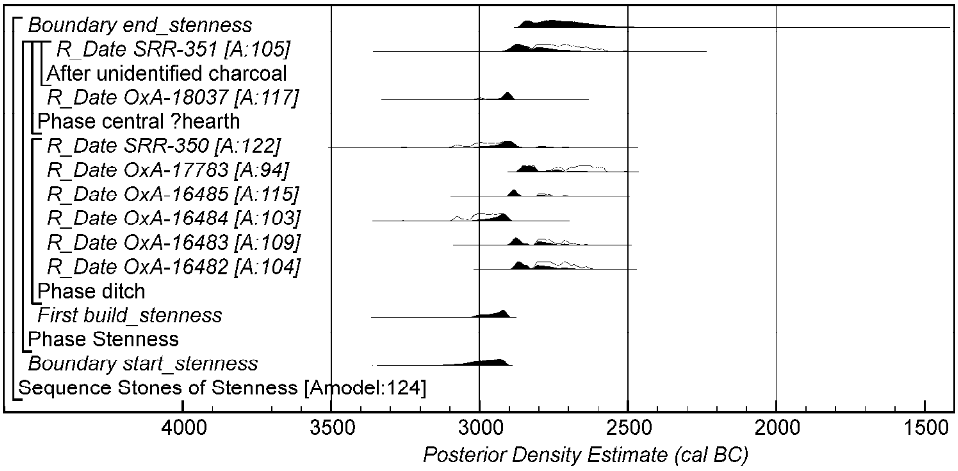

Figure S11. Probability distributions of dates from Wideford Hill, Mainland. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

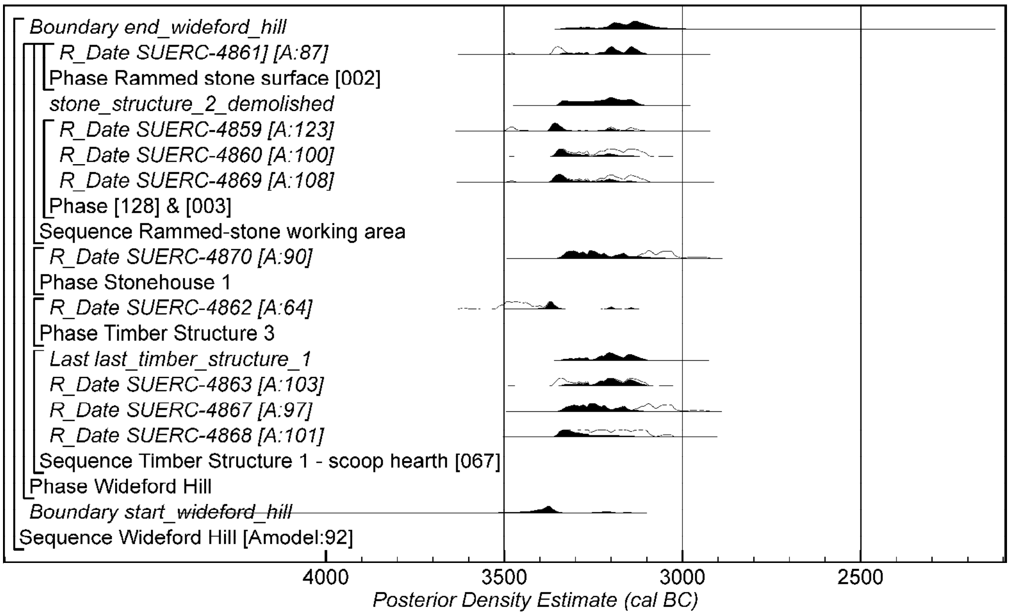

Figure S12. Probability distributions of dates from Ha'Breck, Wyre. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

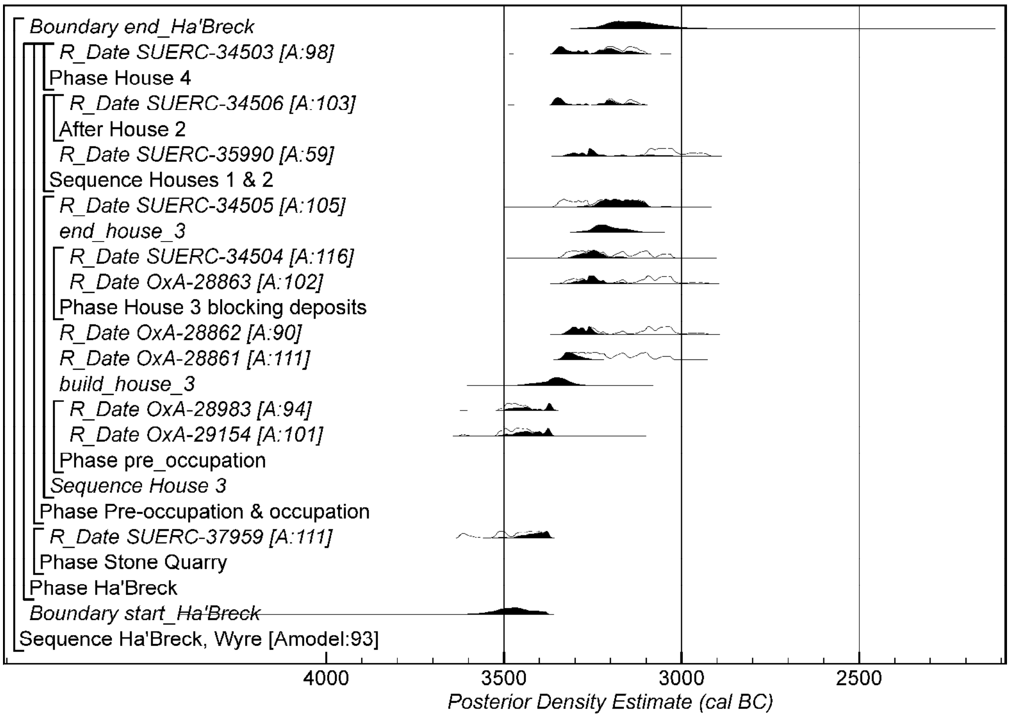

Figure S13. Probability distributions of dates from Knowe of Rowiegar, Rousay. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

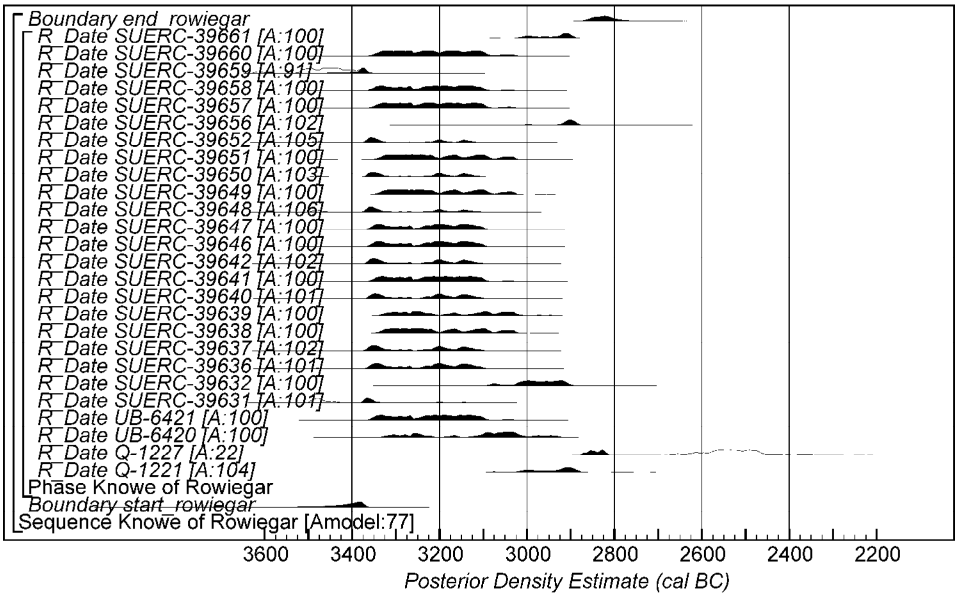

Figure S14. Probability distributions of dates from Green, Eday. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

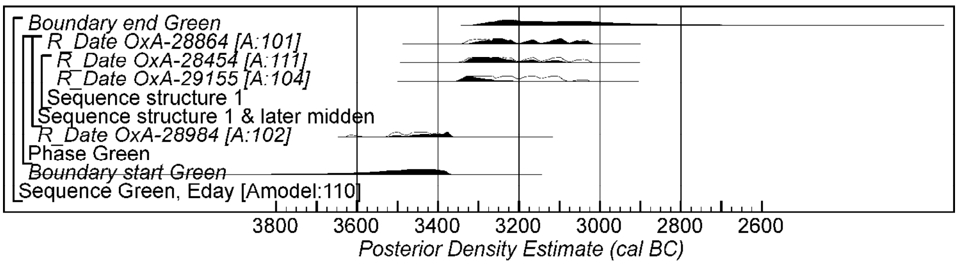

Figure S15. Probability distributions of dates from Pierowall Quarry, Westray. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

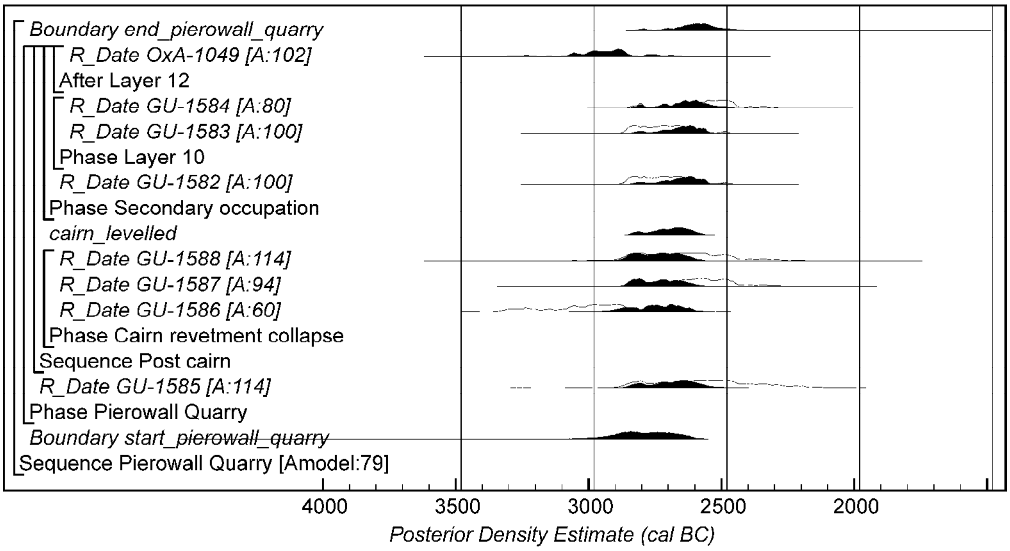

Figure S16. Probability distributions of dates from Point of Cott, Westray. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

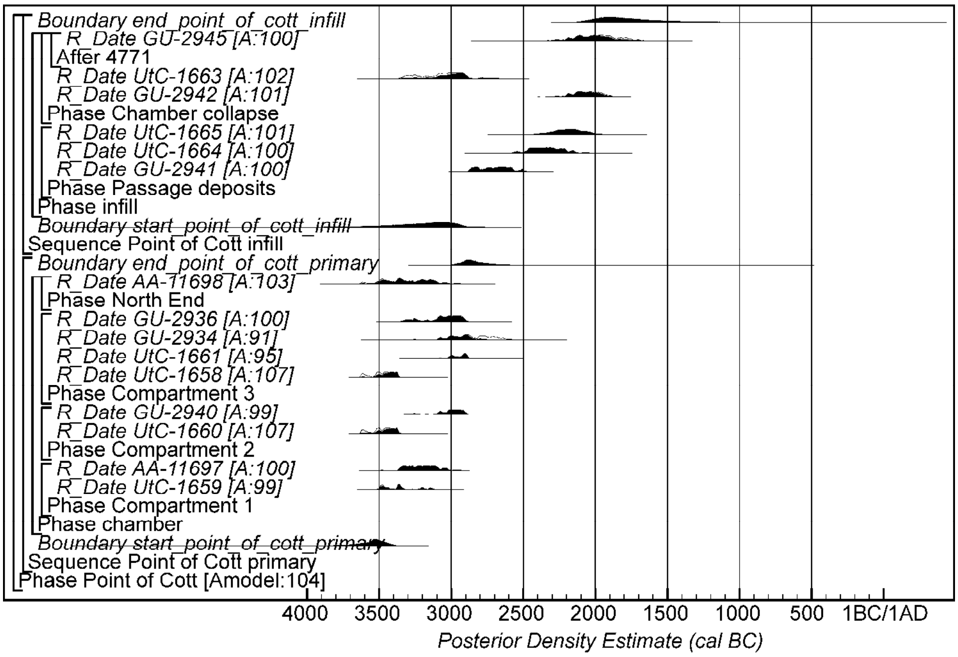

Figure S17. Probability distributions of dates from Knap of Howar, Papa Westray. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

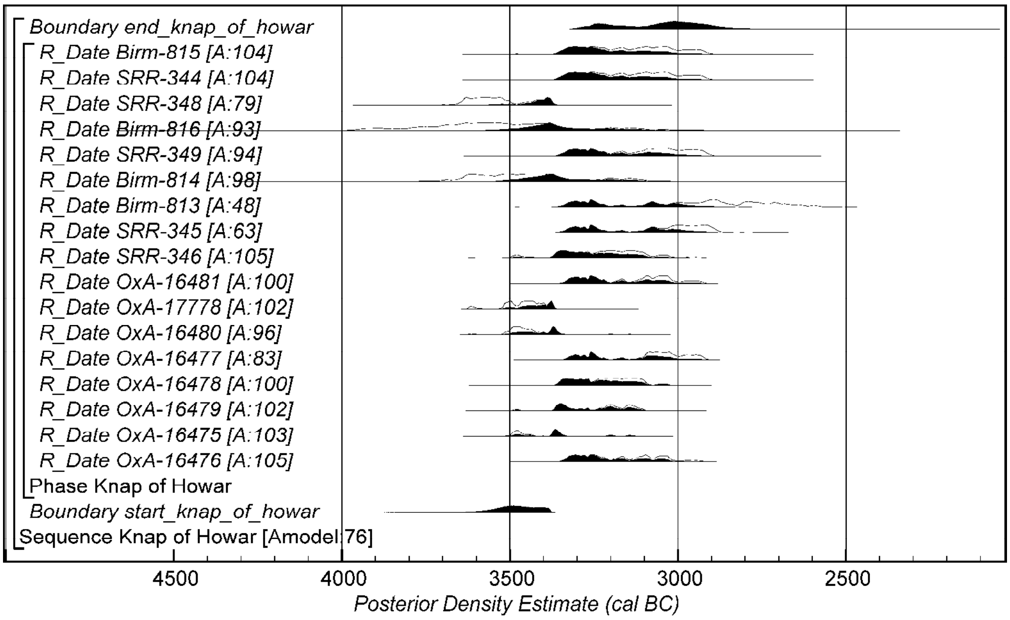

Figure S18. Probability distributions of dates from Holm of Papa Westray North, Holm of Papa Westray. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

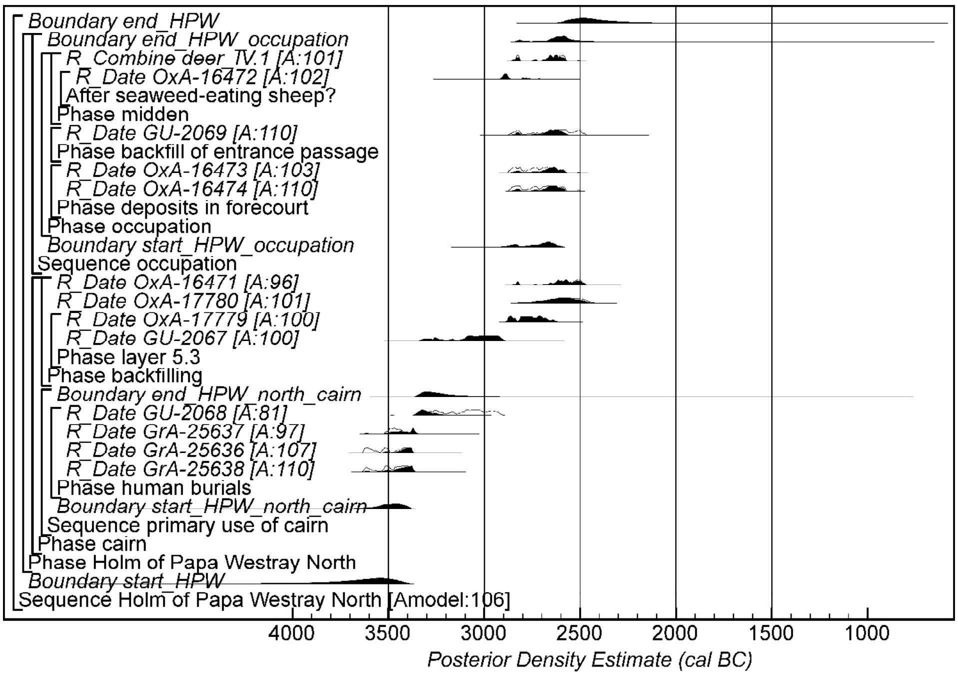

Figure S19. Overall structure for the model for the chronology of Orkney houses and related structures. The component sections of the model are shown in detail in Figs S20–S25. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

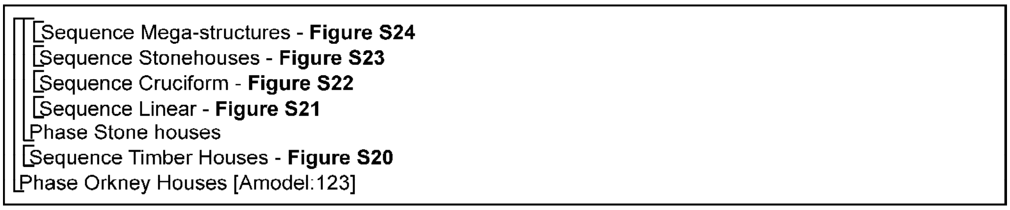

Figure S20. Probability distributions of dates relating to the use of timber houses. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

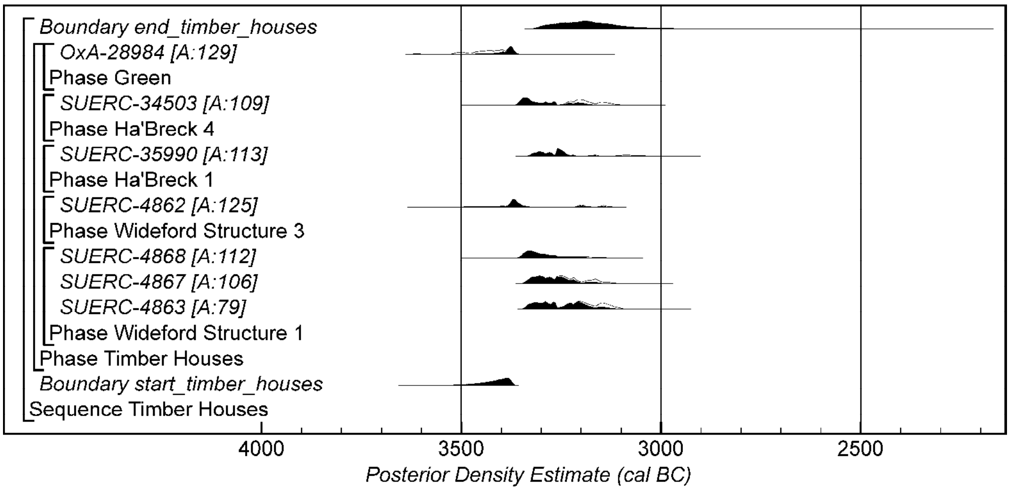

Figure S21. Probability distributions of dates relating to the use of linear (stone) houses. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

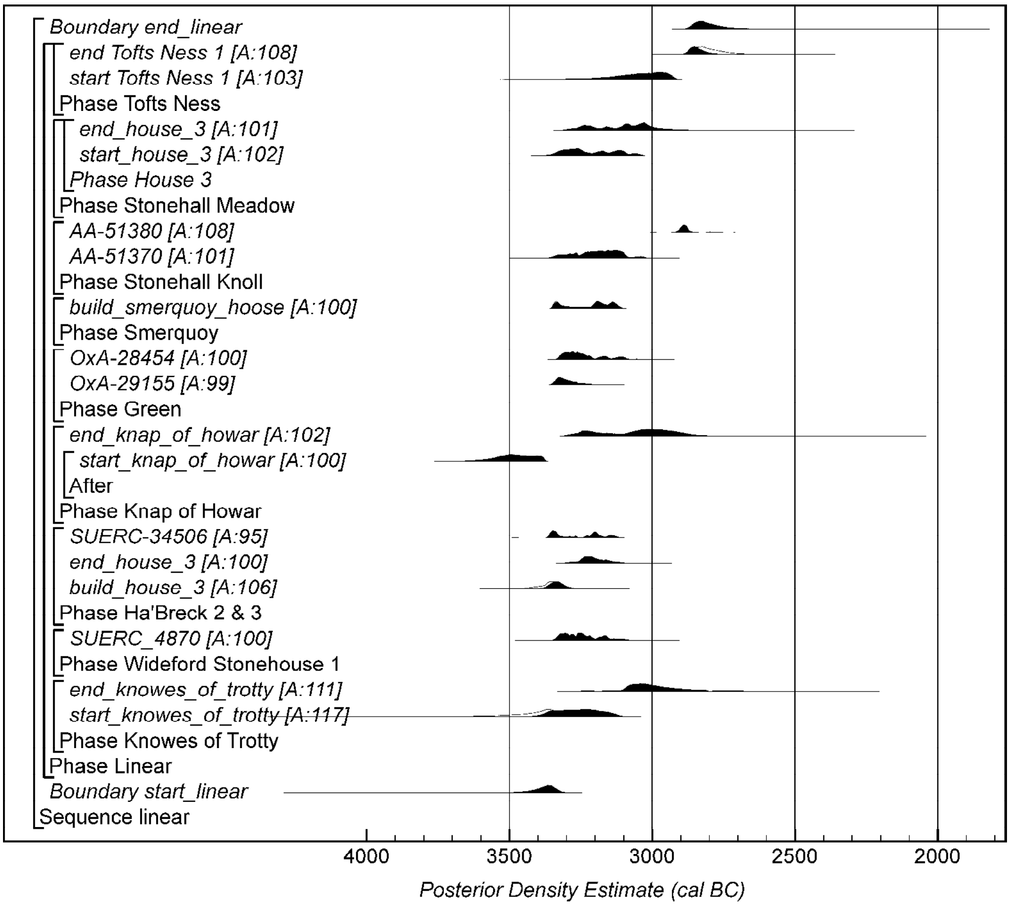

Figure S22. Probability distributions of dates relating to the use of cruciform (stone) houses. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

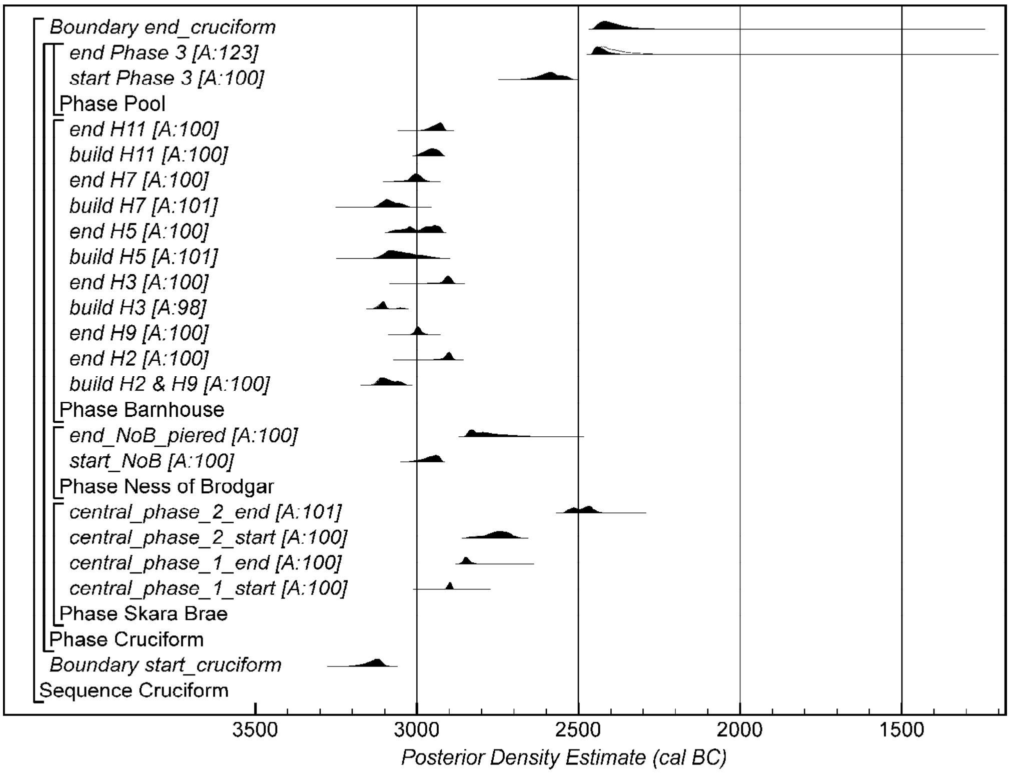

Figure S23. Probability distributions of dates relating to the use of stone houses. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

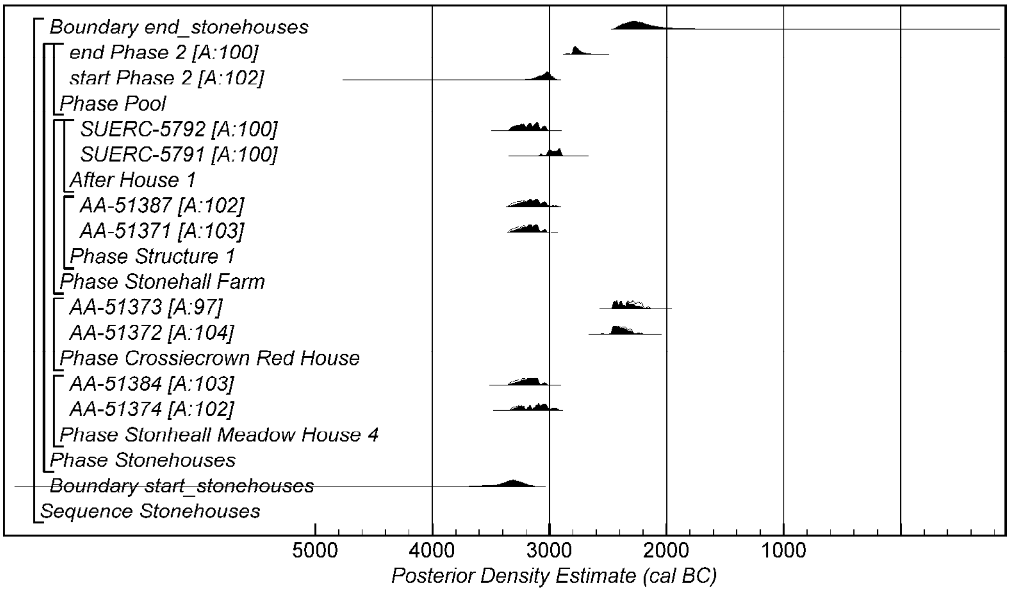

Figure S24. Probability distributions of dates relating to the use of stone mega structures. The format is identical to that of Fig. S1. The large square brackets down the left-hand side of the figure along with the OxCal keywords define the model exactly.

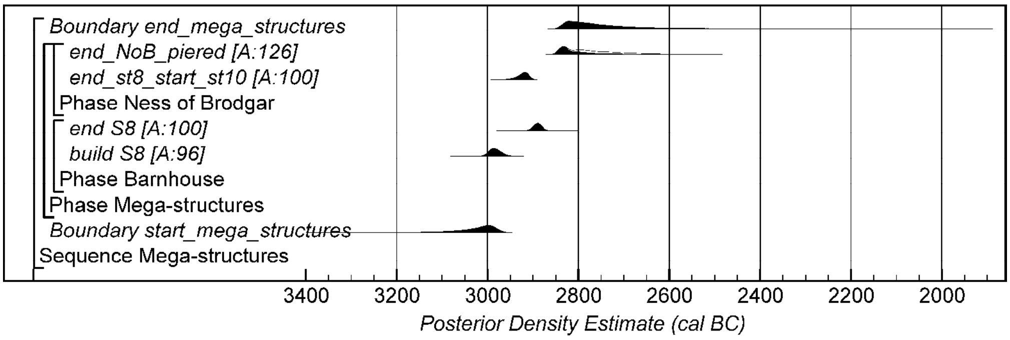

Table S1. Radiocarbon measurements and associated $\delta^{13}C$ values from selected Neolithic sites in Orkney.

Laboratory Number	Sample Description	Radiocarbon age (BP)	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	C:N ratio	Weighted mean	References
Isbister							
GU-1178	Sample 100, human bone, right tibia, male 25–30 from ST 5, L12	4245±100	−20.2±0.2				Renfrew *et al.* 1983
GU-1179	Sample 101, human bone, right tibia, female 18–23 from ST 5, L12	4430±55	−20.2±0.2				Renfrew *et al.* 1983
GU-1180	Sample 102, human bone, left humerus, adult 21–23 from ST 4, L3	4420±90	−20.2±0.2				Renfrew *et al.* 1983
GU-1181	Sample 103, human bone, left humerus, female 18–20 from ST 4, L3	4410±130	−20.2±0.2				Renfrew *et al.* 1983
GU-1182	Sample 104, human bone, right femur, female 17–23 from ST 5, L3. Right femur pairs with GU-1185 (Renfrew *et al.* 1983, 63)	4480±80	−20.2±0.2			4391±32 BP; T'=1.6; T'(5%)=7.8; ν=3	Renfrew *et al.* 1983
Q-3013	Replicate of GU-1182	4375±50	−19.9				Renfrew *et al.* 1983
GU-1185	Sample 107, human bone, left femur, female 20–25 from SC 3, L3. Left femur pairs with GU-1182 (Renfrew *et al.* 1983, 63)	4420±95	−20.2±0.2				Renfrew *et al.* 1983
Q-3016	Replicate of GU-1184	4360±55	−20.0				Renfrew *et al.* 1983
GU-1183	Sample 105, human bone, left femur, male 20–25 from ST 5, L3	3910±80	−20.2±0.2			3853±43 BP; T'=2.4; T'(5%)=3.6; ν=1	Renfrew *et al.* 1983
Q-3014	Replicate of GU-1183	3830±50	−20.0				Renfrew *et al.* 1983
GU-1184	Sample 106, human bone, left femur, male 20–25 from ST 5, L3	4365±90	−20.2±0.2			4285±44 BP; T'=0.7; T'(5%)=3.6; ν=1	Renfrew *et al.* 1983
Q-3015	Replicate of GU-1184	4260±50	−21.0				Renfrew *et al.* 1983
GU-1186	Sample 108, human bone, cranium, male 17–25 from ST 4, L2	4040±100	−20.2±0.2			4032±45 BP; T'=0.0, T'(5%)=3.6; ν=1	Renfrew *et al.* 1983
Q-3017	Replicate of GU-1186	4030±50	−21.2				Renfrew *et al.* 1983
GU-1190	Sample 109, animal bone, mandible, from L10	4260±55	−20.2±0.2			4275±235 BP; T'=0.1; T'(5%)=3.6; ν=1	Renfrew *et al.* 1983
Q-3018	Replicate of GU-1190	4285±45	−21.5				Renfrew *et al.* 1983
GU-1187	Sample 110, human bone, humerus, adult 20–25, from L16	3250±55	−20.2±0.2				Renfrew *et al.* 1983
UB-6552	BC7 ST5 L12 (153) animal bone,	4017±38	−14.1±0.2				Sheridan 2005

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	white-tailed sea eagle, left ulna from, 'foundation deposit' (L12) sealed under the floor of stall 5 (ST5)						
UB-6553	BC6 ST5 L3 (157)) animal bone, white-tailed sea eagle, long bone from ST 5	4072±39	−15.6±0.2				Sheridan 2005
MAMS-14922	ISB 1, human bone, rib	4517±18	−19.2				Sheridan *et al.* 2012
MAMS-14923	ISB 2, human bone, long bone	4427±19	−20.2				Sheridan *et al.* 2012
MAMS-14924	ISB 3, human bone, femur	4483±19	−19.7				Sheridan *et al.* 2012
MAMS-14925	ISB 4, human bone, tarsal or carpal	4483±19	−19.7				Sheridan *et al.* 2012
OxA-25626	IS(7210), human bone, cranium, juvenile *c* 2–4 years from ST 3	4507±39	−20.3±0.2	12.0	3.3	4463±27 BP; T'=2.4; T'(5%)=3.6; ν=1	Lawrence & Lee-Thorp 2012
OxA-25627	Replicate of OxA-25626	4425±36	−20.4±0.2				Lawrence & Lee-Thorp 2012
OxA-25623	IS(2783), human bone, cranium, adult male from ST 4	4516±37	−19.2±0.2	11.9	3.2		Lawrence & Lee-Thorp 2012
OxA-25624	IS(7015), human bone, cranium, adult male from ST 4	4507±37	−19.9±0.2	11.9	3.3		Lawrence & Lee-Thorp 2012
OxA-25578	IS(1958), human bone, cranium, adult from ST 3	4416±32	−20.5±0.2	12.3	3.3		Lawrence & Lee-Thorp 2012
OxA-25625	IS(7209), human bone, cranium, juvenile *c* 2 years from ST 3	4467±36	−20.8±0.2	12.4	3.3		Lawrence & Lee-Thorp 2012
OxA-25622	IS(2642), human bone, cranium, adult from SC1–2/ST1–2	3915±34	−19.5±0.2	13.0	3.3		Lawrence & Lee-Thorp 2012
OxA-25628	IS(7284), human bone, cranium, young adult female from SC1–2/ST1–2	4456±36	−20.6±0.2	11.2	3.4		Lawrence & Lee-Thorp 2012
OxA-25579	IS(1972), human bone, cranium, adult female from north horn cist	3255±29	−18.8±0.2	12.8	3.2		Lawrence & Lee-Thorp 2012
Crossiecrown							
AA-51372	114, charcoal (*Prunus*), from an ashy floor deposit [012] associated with the central hearth [018] of the Red House	3895±40	−26.6±0.2				Ashmore 2003; 2005; Card *et al.* 2016
AA-51373	282, charcoal (willow) from lower hearth ash [315] of the Red House	3830±40	−26.9±0.2				Ashmore 2003; 2005; Card *et al.* 2016
AA-51381	550, charred grain (naked barley) from	3535±40	−22.2±0.2				Ashmore 2003; Ashmore 2005;

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	the spread of ash associated with hearth [491]. The hearth was unrelated to any building						Card *et al.* 2016
SUERC-4852	CC02 (1), charred plant remain (*Conopodium majus*) from the upper midden [204] in Trench 3	4100±35	−26.7±0.2				Ashmore 2005; Card *et al.* 2016
SUERC-4853	CC02 (2), charred plant remain (*Conopodium majus*) the intermediate midden [204] in Trench 3	4115±40	−27.1±0.2				Ashmore 2005; Card *et al.* 2016
SUERC-4857	CC02 (3a) charred grain (*Hordeum vulgare*) from the lower midden [204] in Trench 3	4315±35	−22.8±0.2				Ashmore 2005; Card *et al.* 2016
SUERC-4858	CC02 (3b) charcoal (*Betula*) from the lower midden [204] in Trench 3	4405±40	−26.5±0.2				Ashmore 2005; Card *et al.* 2016
Cuween							
SUERC-4847	Animal bone, *Canis*, humerus, from the lower filling of the chamber tomb	4010±35	−20±0.2				Ashmore 2005; Charleson & Turner 1902
SUERC-4848	Animal bone, *Canis*, humerus, from the lower filling of the chamber tomb	3965±40	−21.7±0.2				Ashmore 2005; Charleson & Turner 1902
SUERC-4849	Animal bone, *Canis*, humerus, from the lower filling of the chamber tomb	4025±40	−18.9±0.2				Ashmore 2005; Charleson & Turner 1902
UB-6422	Human bone left femur, from the entrance passage	3668±36	−23.9±0.2				Sheridan 2005; Charleson & Turner 1902
Knowes of Trotty							
Phase 1							
SUERC-18239	Charcoal, *Betula* sp. from hearth [302]	4490±35	−26.2±0.2				Downes *et al.* 2016; Griffiths 2016
SUERC-18241	Charcoal, *Betula* sp. from hearth [302]	4485±35	−25.8±0.2				Downes *et al.* 2016; Griffiths 2016
SUERC-18235	Charcoal, *Betula* sp. from pit [282] under Phase 2 walling	4570±35	−26.5±0.2				Downes *et al.* 2016; Griffiths 2016
Phase 2							
SUERC-18242	Charcoal, *Betula* sp. from spread [311] over flagstones of the porch	4475±35	−27.3±0.2				Downes *et al.* 2016; Griffiths 2016
SUERC-18244	Charcoal, *Calluna* sp. from hearth rake-out [340]	4525±30	−26.4±0.2				Downes *et al.* 2016; Griffiths 2016
SUERC-18243	Charcoal, unidentified from hearth	4490±35	−25.4±0.2				Downes *et al.* 2016; Griffiths 2016

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	rake-out [331], overlies [340]						
SUERC-18240	Charcoal, *Calluna* sp. from the fill [220] of a fire-pit cut into the original hearth pit	4405±35	−27.3±0.2				Downes *et al.* 2016; Griffiths 2016
SUERC-18234	Carbonised rhizome, unidentified, from lower layer of stone-built hearth [215]	4405±35	−26.5±0.2				Downes *et al.* 2016; Griffiths 2016
Phase 3							
SUERC-18233	Charcoal, *Betula* sp. from hearth [082]	4495±35	−27.2±0.2				Downes *et al.* 2016; Griffiths 2016
Ring of Brodgar							
SRR-502	A, organic mud from north trench. Basal organic deposit overlying deep silt infill, 0.7m below surface.	2210±60	−28.6				Renfrew 1979
SRR-503	B, organic mud from north trench, above sample A. Depth 0.6m	2320±50	−29.3				Renfrew 1979
Stonehall Farm							
Structure 1							
AA-51371	Charcoal, *Betula* from the fill (816) of clay bowl [815]	3895±40	−25.4				Ashmore 2003; Richards *et al.* 2016c
AA-51387	Charcoal, *Betula* from midden material [631] within the central cist	3535±40	−24.5				Ashmore 2003; Richards *et al.* 2016c
Midden east of Structure 1							
SUERC-5790	Carbonised grain, *Hordeum vulgare* var *nudum* from lower part (809) of midden	4115±40	−24				Ashmore 2005; Richards *et al.* 2016c
AA-51376	Charcoal, *Betula* from lower part (809) of midden	4395±40	−24.90				Ashmore 2003 ; Richards *et al.* 2016c
SUERC-5789	Carbonised grain, *Hordeum vulgare* from interface between [868] and [869] of midden	4100±35	−24.1±0.2				Ashmore 2005; Richards *et al.* 2016c
House 1 and associated midden							
SUERC-5791	Carbonised grain, *Hordeum vulgare* var *nudum* from midden layer 2015 adjacent to House 1	4315±35	−22.5±0.2				Ashmore 2005; Richards *et al.* 2016c
SUERC-5792	Carbonised grain indeterminate from	4405±40	−21.8±0.2				Ashmore 2005; Richards *et al.*

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	the upper fill [2051] of central hearth in House 1						2016c
Stonehall Knoll							
AA-51370	Charcoal, *Salix* sp. from secondary floor [4041] of House 3	4510±40	−26.3				Ashmore 2003; Richards *et al.* 2016b
AA-51379	Charcoal, *Betula* sp. from secondary floor [4041] of House 3	4010±40	−25.4				Ashmore 2003; Richards *et al.* 2016b
AA-51380	Charcoal, *Betula* sp. from secondary floor [4041] of House 3	4250±40	−26.5				Ashmore 2003; Richards *et al.* 2016b
AA-53185	Charcoal, *Salix* sp. from a large pit [471] cut through Neolithic deposits	1610±35	−25.3				Ashmore 2003; Richards *et al.* 2016b
Stonehall Meadow							
House 3							
AA-51383	Charcoal, *Salix* sp., from upper ash fill [3068] of oval scoop hearth [3070]	4455±40	−25.6				Ashmore 2003; Richards *et al.* 2016b
AA-51375	Carbonised grain, *Hordeum vulgare* from lower ash fill [3069] of oval scoop hearth [3070]	4435±40	−24.1				Ashmore 2003; Richards *et al.* 2016b
AA-51386	Carbonised grain, *Hordeum vulgare* var *nudum* from fill [3075] of pit [3074] in the front compartment of House 3	4475±45	−25.7				Ashmore 2003; Richards *et al.* 2016b
AA-51382	Charcoal, *Betula* sp. from occupation deposit [3050] in the rear compartment of House 3	4485±40	−25.6				Ashmore 2003; Richards *et al.* 2016b
House 4							
AA-51374	Carbonised grain, *Hordeum vulgare* from fill [019] of hearth [018]	4450±40	−22.6				Ashmore 2003; Richards *et al.* 2016b
AA-51384	Carbonised grain, *Hordeum vulgare* var *nudum* from ash spread [029] around hearth [018]	4500±40	−22.4				Ashmore 2003; Richards *et al.* 2016b
Stones of Stenness							
OxA-16482	Animal bone, *Canis lupus*, a single bone from the organic basal ditch fill 1 B16.	4178±38					Ashmore 2000; Sheridan & Higham 2006
OxA-16483	Animal bone, cattle hoof core from the organic basal ditch fill 2 B17	4209±39					Ashmore 2000; Sheridan & Higham 2006
OxA-16484	Animal bone, cattle left radius from	4346±39					Ashmore 2000; Sheridan &

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	the organic basal ditch fill 4						Higham 2006
OxA-16485	Animal bone, cattle mandibular ramus from the organic basal ditch fill 5 B13	4243±39					Ashmore 2000; Sheridan & Higham 2006
OxA-17783	Animal bone, cattle from the organic basal ditch fill 3 B 25	4111±32					Ashmore 2001; Sheridan & Higham 2006
OxA-18037	Cremated bone, sheep from central hearth-like feature	4305±35	−21.1				Sheridan and Higham 2007
SRR-350	Animal bone, unidentified from the organic layer at the base of the ditch of a henge	4310±70	−21.9				J.N.G. Ritchie 1976
SRR-351	Charcoal, unidentified, found with cremated bone in a stone feature in the centre of a henge, associated with vitrified mineral (cramp) and Grooved Ware sherds.	4190±70	−28.7				J.N.G. Ritchie 1976
SRR-352	Charcoal (n.i) from Pit C, dug 0.6m into till, to the south of the centre of the ring of stones. The pit also contained some cereal grains and undiagnostic pottery	1430±150	−26.9				J.N.G. Ritchie 1976
SRR-592	Decomposed wood (n.i) in the bedding trench of a putative small timber structure	3680±270	−25.0				J.N.G. Ritchie 1976
Wideford Hill							
SUERC-4859	Carbonised grain, *Hordeum vulgare* from [003] ash dumps incorporated in [128] a layer of orange-brown ashy soil mixed burnt stone sealed beneath the stone-rammed surface [002]	4580±40	−22.4				Ashmore 2005; Richards & A.M. Jones 2016
SUERC-4860	Carbonised grain, *Hordeum vulgare* var *nudum* from [128[a layer of orange-brown ashy soil mixed burnt stone sealed beneath the stone-rammed surface [002]	4525±35	−23.9				Ashmore 2005; Richards & A.M. Jones 2016
SUERC-4861	Carbonised grain, *Hordeum vulgare* var *nudum* from the stone-rammed surface [002]	4555±35	−24.9				Ashmore 2005; Richards & A.M. Jones 2016

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
SUERC-4862	Carbonised grain, *Hordeum vulgare* var *nudum* from basal fill [054] pf posthole [053] from timber structure 1	4645±40	−24.7				Ashmore 2005; Richards & A.M. Jones 2016
SUERC-4863	Charcoal, *Corylus avellana* from upper mixed fill [068] of hearth scoop [067] in timber structure 1	4530±35	−25.5				Ashmore 2005; Richards & A. M. Jones 2016
SUERC-4867	Charcoal, *Betula* sp. from intermediate fill [089] of hearth scoop [067] in timber structure 1	4455±35	−26.5				Ashmore 2005; Richards & A.M. Jones 2016
SUERC-4868	Charcoal, *Corylus avellana* from primary ash fill [115] of hearth scoop [067] in timber structure 1	4495±35	−25.5				Ashmore 2005; Richards & A.M. Jones 2016
SUERC-4869	Carbonised grain, *Hordeum vulgare* var *nudum* from [128[a layer of orange-brown ashy soil mixed burnt stone sealed beneath the stone-rammed surface [002]	4545±40	−22.8				Ashmore 2005; Richards & A.M. Jones 2016
SUERC-4870	Sample 10, charred barley grain from spread of ash 148	4450±35	−22.4				Ashmore 2005; Richards & A.M. Jones 2016
Ha'Breck							
OxA-28983	Charcoal, Salicaceae, roundwood, from Old Land Surface [1232]	4640±32	−26.8±0.2				Griffiths 2016
OxA-29154	Charcoal, Salicaceae, roundwood, from Old Land Surface [1232]	4662±33	−26.1±0.2				Griffiths 2016
SUERC-35990	Carbonised grain, Hordeum vulgare from House 1 pit fill (528) sealed by House 2 hearth	4425±30	−25.0 (assumed)				Griffiths 2016
SUERC-34506	Carbonised grain, *Hordeum vulgare* from House 2, deposit (436) around hearthstones	4550±30	−22.7±0.2				Griffiths 2016
OxA-28861	Carbonised grain, *Hordeum vulgare* var *nudum*, from House 3, burnt deposit	4474±30	−22.7±0.2				Griffiths 2016
OxA-28862	Carbonised grain, *Hordeum vulgare* var *nudum*, from House 3, south hearth	4444±30	−23.4±0.2				Griffiths 2016
OxA-28863	Carbonised grain, *Hordeum vulgare*	4448±30	−22.7±0.2				Griffiths 2016

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	var *nudum*, from House 3, closing deposit in house entrance						
SUERC-34505	Carbonised nut shell, *Corylus avellana* from midden deposit (139) overlying House 3	4510±30	−28.4±0.2				Griffiths 2016
SUERC-34504	Carbonised grain, *Hordeum vulgare* from House 3, blocking deposit (197)	4470±30	−22.3±0.2				Griffiths 2016
SUERC-34503	Charcoal, *Crataegus* sp. from House 4	4530±30	−24.5±0.2				Griffiths 2016
SUERC-37959	Charcoal, *Betula* sp. from primary fill of stone quarry	4690±35	−24.8±0.2				Griffiths 2016
SUERC-37960	Carbonised grain, *Hordeum vulgare* from midden deposit associated with Grooved Ware	3780±35	−22.0±0.2				Griffiths 2016
Knowe of Rowiegar							
Q-1221	Cattle tibia and radius recovered from the cairn	4305±60					Renfrew *et al.* 1976, table A
Q-1227	Red deer femur, tibia, and humerus from the cairn	4005±60					Renfrew *et al.* 1976, table A
UB-6420	Sheep skull fragment from 'level above human bones'	4435±36	−22.4				Griffiths 2016, table 10.1
UB-6421	Human skull fragment from same level as UB-6420	4515±37	−21.5				Griffiths 2016, table 10.1
SUERC-26856	Adult ?female right humerus, 90047H1, from human remains recovered in cairn	4605±35	−20.5±0.2	10.4±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26857	Adult male right humerus, 90029H2, from human remains recovered in cairn	4355±35	−20.2±0.2	10.8±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26858	Adult ?female right humerus, 15084H3, from human remains recovered in cairn	4540±35	−19.5±0.2	10.3±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26859	Infant (2 years) right humerus, 90072H4, from human remains recovered in cairn	4555±35	−20.9±0.2	11.2±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26860	Adult ?female right humerus, 90076H5, from human remains recovered in cairn	4470±35	−20.8±0.2	10.8±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
SUERC-26861	Adult ?female right humerus, 90076H6, from human remains recovered in cairn	4455±35	−20.3±0.2	11.1±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26862	Child (7 years) right humerus, 163197H7, from human remains recovered in cairn	4545±35	−19.9±0.2	9.8±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26863	Infant skull (5 years), 90085S1, from human remains recovered in cairn	4510±35	−20.8±0.2	10.8±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26864	Infant skull (2–3 years), 90060S2, from human remains recovered in cairn	4555±35	−20.8±0.2	11.5±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26865	Adult ?male skull, 90070S3, from human remains recovered in cairn	4525±35	−20.9±0.2	10.8±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26866	Adult ?male skull, 90066S4, from human remains recovered in cairn	4545±35	−20.5±0.2	11.2±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26867	Adult male skull, 90068S5, from human remains recovered in cairn	4575±35	−20.6±0.2	10.8±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26868	Adult male skull, 90071S6, from human remains recovered in cairn	4475±35	−19.9±0.2	10.5±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26869	Adult ?male skull, 90057S8, from human remains recovered in cairn	4560±35	−20.4±0.2	11.6±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26870	Adult ?female skull, 90035S9, from human remains recovered in cairn	4475±35	−20.3±0.2	10.2±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26871	Adult male skull, 90035S10, from human remains recovered in cairn	4570±35	−20.4±0.2	11.1±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26872	Adult male skull, 90063S11, from human remains recovered in cairn	4290±35	−19.5±0.2	10.5±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26873	Adult male skull, 90064S12, from human remains recovered in cairn	4500±35	−20.5±0.2	11.1±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26874	Adult ?male skull, 90065S13, from human remains recovered in cairn	4515±35	−19.7±0.2	10.6±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26875	Skull of young adult male, 14981S14, from human remains recovered in cairn	4665±35	−20.3±0.2	10.5±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26876	Adult male skull, 000x1S15, from human remains recovered in cairn	4495±35	−20.7±0.2	11.2±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-26877	Child skull (8–9 years), 90057aS16,	4320±35	−20.5±0.2	10.1±0.3			Curtis & Hutchison 2013;

Laboratory Number	Sample Description	Radiocarbon age (BP)	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	C:N ratio	Weighted mean	References
	from human remains recovered in cairn						Griffiths 2016, table 10.1
Knowe of Lairo							
SUERC-45833	Adult male skull 24761 from human remains recovered in cairn	4537±34	−20.8±0.2	11.2±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
Knowe of Yarso							
SUERC-45838	Adult male skull 14662 from human remains recovered in cairn	4500±35	−20.2±0.2	10.2±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
Q-1225	Bulked sample of three tibia, probably red deer, recovered from cairn	4225±60					Renfrew *et al.* 1976, table A
Midhowe							
SUERC-46400	Adult male skull 25898 from human remains recovered in cairn	4700±30	−20.5±0.2	10.3±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
SUERC-46401	Sub-adult male skull 25899 from human remains recovered in cairn	4531±28	−20.6±0.2	10.3±0.3			Curtis & Hutchison 2013; Griffiths 2016, table 10.1
Green							
OxA-28984	Charcoal, *Calluna* sp. twig from posthole fill of ?timber structure	4676±32	−26.3±0.2				Griffiths 2016, table 10.1
OxA-29155	Carbonised grains, *Hordeum vulgare* var *nudum*, from House 1, lower hearth fill (290)	4489±32	−22.8±0.2				Griffiths 2016, table 10.1
OxA-28454	Carbonised grain, *Hordeum vulgare* from House 1, upper hearth fill (116)	4472±31	−21.3±0.2				Griffiths 2016, table 10.1
OxA-28864	Carbonised grains, *Hordeum*/*Triticum*, from midden (214) post-dating House 1	4463±30	−23.5±0.2				Griffiths 2016, table 10.1
Pierowall Quarry							
GU-1580	Animal bone, cattle? bulked, from layer [8] a thin black organic rich soil midden	2510±80	−20.0				Sharples 1984
GU-1581	Animal bone, cattle, from layer [6] a thick black organic rich soil surrounding arrangement of slabs	2425±60	−20.0				Sharples 1984
GU-1582	Animal bone, *Bos* humerus from wall [21]	4140±60	−20.0				Sharples 1984
GU-1583	Animal bone cattle from layer [10] a secondary occupation deposit in a	4140±60	−20.0				Sharples 1984

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
	small structure built over a demolished cairn						
GU-1584	Animal bone cattle from layer [10] a secondary occupation deposit in a small structure built over a demolished cairn	4030±65	−20.0				Sharples 1984
GU-1585	Animal bone sheep/ goat from layer [7?] a translocated shillet layer (PQ81 Layer 7I) used to construct a platform against the round cairn	4045±140	−20.8				RCAHMS (online)
GU-1586	Animal bone, sheep/goat radius from layer 22 the collapse of the revetment of the chambered cairn	4330±110	−20.0				Sharples 1984
GU-1587	Animal bone cattle scapula, from layer 22 the collapse of the revetment of the chambered cairn	4065±90	−21.8				Sharples 1984
GU-1588	Animal bone, sheep/ goat tibia from layer 20 of the revetment of the chambered cairn	4105±120	−21.5				Sharples 1984
OxA-1049	Animal bone, *Martes martes* from layer [12] a rubble deposit that lies to east of structure	4310±80					Hedges *et al.* 1987
Point of Cott							
UtC-1659	Human bone, , adult, right and left ulna (skeleton D) from Compartment 1	4600±50	−20.8				Barber 1997
AA-11697	Human bone, right radius, infant (f54) from Compartment 1	4505±60	−20.1				http://canmore.org.uk/c14sample/AA-11697
UtC-1660	Human bone, adult male, left ulna (skeleton E) from, Compartment 2	4680±50	−20.9				Barber 1997
GU-2940	Human bone, right radius, right and left femur, and right humerus (skeleton I), from Compartments 1 & 2	4360±50	−22.3				Barber 1997

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
UtC-1658	Human bone, adult, right ulna (skeleton B) from, Compartment 3	4680±50	−20.8				Barber 1997
UtC-1661	Human bone, adult, right ulna (skeleton F) from, Compartment 3	4300±50	−20.7				Barber 1997
GU-2934	Human bone, right and left tibia, right femur and right fibula (skeleton A), from Compartment 3	4250±90	−21.8				Barber 1997
GU-2936	Human bone, subadult, right and left tibia, right and left fibula, sacrum, vertebra, left metacarpal, right clavicle, sternum, right radius, pelvis, and patella (skeleton C) from Compartment 3	4390±60	−21.2				Barber 1997
GU-2941	Animal bone, sheep from the lower level of blocking in the passage (157, sample 4767)	4110±50	−22.2				Barber 1997
UtC-1664	Animal bone, dog and cattle, from the loose upper fill of the passage (sample 4770)	3870±80	−20.2				Barber 1997
UtC-1665	Animal bone, otter s behind the wall face at the north end of the passage (66) from a shattered stone layer over-lying the cairn	4040±50	−12.7				Barber 1997
GU-2942	Animal bone, cattle, sheep and bird bone (54 upper, sample 4767) from the collapse of the chamber roof	3670±70	−20.3				Barber 1997
UtC-1663	Animal bone, sheep, vole and bird from the lowest level in the collapse of the chamber roof (54)	4380±90	−22.6				Barber 1997
GU-2945	Animal bone, sheep and dog and bird bone sea eagle (106 sample 4771), in collapse into Compartment 4	3610±100	−20.7				Barber 1997

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ13C (‰)	δ15N (‰)	C:N ratio	Weighted mean	References
AA-11698	Human bone from an infant burial (skeleton J) in the collapsed matrix of the cairn at the north end of the chambered tomb	4585±85	−19.6				http://canmore.org.uk/c14sample/AA-11698
Knap of Howar							
House 1							
SRR-347	Animal bone, mixed, from primary midden D/I/9 in the wall core of House 1	5706±85	−22.2				A. Ritchie 1983
SRR-352	Animal bone, mixed, from primary midden D/I/9 in the wall core of House 1	4081±65	−23.1				A. Ritchie 1983
OxA-16475	Animal bone, sheep, from layer 9, primary midden redeposited within the wall-core House 1	4603±39	−20.5±0.2				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006
OxA-16476	Animal bone, sheep scapula, from layer 16, primary midden sealed below the wall of House 1	4458±39	−18.8±0.2				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006
SRR-345	Animal bone, mixed, from House 1 refuse in floor deposit B/I/2 of period II.	4348±75	−20.7				A. Ritchie 1983
SRR-346	Animal bone, mixed, from refuse in secondary floor C/I/4 in the passage of House 1a.	4532±70	−21.2				A. Ritchie 1983
House 2							
Birm-813	Animal bone, mixed, from the primary midden in the wall core of house 2	4270±100	−23.1				A. Ritchie 1983
Birm-814	Animal bone, mixed, from the secondary floor deposit, House 2	4690±130	−19.1				A. Ritchie 1983
OxA-16477	Animal bone, sheep/goat humerus, from, passage B layer 4, a secondary floor deposit in House 2 at the entrance to the passage linking the two houses, sealed by blocking	4420±39	−19.9±0.2				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ^{13}C (‰)	δ^{15}N (‰)	C:N ratio	Weighted mean	References
	material and thus providing a *terminus post quem* for the latter						
OxA-16478	Animal bone, cattle metatarsal, from layer 7, a secondary floor deposit of House 2	4510±39	−20.6±0.2				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006
OxA-16479	Animal bone, sheep/goat phalanx, from layer 12, a primary floor deposit of House 2	4552±39	−19.7±0.2				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006
Trench II							
SRR-348	Animal bone, mixed, from E/II/3, secondary midden in Trench II outside S wall of house	4765±70	−21.9				A. Ritchie 1983
SRR-349	Animal bone, mixed, from the primary midden F/II/11 in Trench II	4422±70	−22				A. Ritchie 1983
OxA-16480	Animal bone, sheep metatarsal, from Trench III, layer 3, secondary midden some 20 m south of House 1	4633±41	−18.9±0.2				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006
Trench III							
SRR-344	Animal bone, mixed from a secondary midden A/III/3, Trench III outside the S wall of a house	4451±70	−21.1				A. Ritchie 1983
OxA-17778	Animal bone, pig humerus, from Trench III, layer 4, primary midden some 20 m south of House 1	4673±31	−20,1				Bronk Ramsey *et al.* 2002; Sheridan & Higham 2006
Trench IV							
Birm-815	Animal bone, unidentified, from the primary midden in Trench IV, Period I.	4250±130	−19.1				A. Ritchie 1983
Trench V							
Birm-816	Animal bone, unidentified, from the primary midden in Trench V, Period I.	4770±180	−19.4				A. Ritchie 1983
OxA-16481	Animal bone, sheep/goat left calcaneum, from Trench V, layer 2,	4443±39	−20.7±0.2				Bronk Ramsey *et al.* 2002;

Laboratory Number	Sample Description	Radiocarbon age (BP)	δ^{13}C (‰)	δ^{15}N (‰)	C:N ratio	Weighted mean	References
	secondary midden outside House 2						Sheridan & Higham 2006

Table S2. Optically Stimulated Luminescence dates from the Ring of Brodgar.

Laboratory Number	Sample Description	Age (BP)	References
Ring of Brodgar (measurements 2009)			
SUTL-2286	Peaty layer, context (206), 10.95m ADL, Trench C	3200±200	Sanderson *et al.* 2010
SUTL-2287	Base of peaty layer, context (206), 10.91m ADL, Trench C	3600±200	Sanderson *et al.* 2010
SUTL-2288	Top step silt, context (208), 10.48m ADL, Trench C	3800±300	Sanderson *et al.* 2010
SUTL-2289	Mixed stony layer, context (210), 10.31m ADL, Trench C	4200±600	Sanderson *et al.* 2010
SUTL-2290	Mixed stony layer, context (213), 10.05m ADL, Trench C	4900±700	Sanderson *et al.* 2010
SUTL-2291	Mixed stony layer, context (212), 9.87m ADL, Trench C	4100±700	Sanderson *et al.* 2010
SUTL-2292	Basal clay, context (209), 9.87m ADL, Trench C	4200±200	Sanderson *et al.* 2010
SUTL-2278	Silt in peat, context (120), 7.72m ADL, Trench A	2200±300	Sanderson *et al.* 2010
SUTL-2279	Stone and silt, context (111), 7.38m ADL, Trench A	3600±300	Sanderson *et al.* 2010
SUTL-2280	Stone and silt, context (111), 7.19m ADL, Trench A	3300±500	Sanderson *et al.* 2010
SUTL-2281	Below tip line, context (112), 6.95m ADL, Trench A	4200±200	Sanderson *et al.* 2010
SUTL-2282	Below iron pan, context (115), 6.6m ADL, Trench A	4400±400	Sanderson *et al.* 2010
SUTL-2283	Just above basal clay, context (114), 6.41m ADL, Trench A	5100±600	Sanderson *et al.* 2010
SUTL-2284	Above basal clay, context (114), 6.38m ADL, Trench A	5500±800	Sanderson *et al.* 2010
SUTL-2285	Top of shillet, context (121), 7.14m ADL, Trench A	6600±500	Sanderson *et al.* 2010

Table S3. Radiocarbon measurements and associated $\delta^{13}C$ values of specimens of common vole (*Microtus arvalis*) from Orkney

Laboratory number	**Sample reference**	**Material and context**	**Radiocarbon Age (BP)**	**$\delta^{13}C$ (‰)**	**Reference**
Quanterness					
OxA-18668	R177	Animal bone, *M. arvalis* mandible, from compartment 3, layer 3	4414±27	−23.1±0.2	Martínková *et al.* 2013
OxA-18784	R179	Animal bone, *M. arvalis* mandible, from compartment 3, layer 3	4400±33	−23.6±0.2	Martínková *et al.* 2013
Skara Brae					
OxA-18663	R3	Animal bone *M. arvalis* mandible from level 8 Trench IVB [408 – gold sand with admixture of clay and clay/amalgam clumps]	3946±27	−22.6±0.2	Martínková *et al.* 2013
OxA-18664	R11	Animal bone *M. arvalis* mandible from intermidden Layer 34 Trench 1 [134 – sand interleaved with edges of major clay /ash/ refuse deposits 126]	4124±28	−23.0±0.2	Martínková *et al.* 2013
OxA-20309	R84	Animal bone *M. arvalis* right hemimandible from Layer 139	4145±29	−23.2±0.2	Martínková *et al.* 2013
OxA-18669	R193	Animal bone *M. arvalis* mandible from level 8 Trench IVB [408 – as OxA-18663]	3906±27	−22.7±0.2	Martínková *et al.* 2013
OxA-18785	R189	Animal bone *M. arvalis* mandible from level 8 Trench IVB [408 – as OxA-18663]	3884±31	−22.5±0.2	Martínková *et al.* 2013
OxA-18786	R191	Animal bone *M. arvalis* mandible from level 8 Trench IVB [408 – as OxA-18663]	4199±33	−21.8±0.2	Martínková *et al.* 2013
OxA-18787	R194	Animal bone *M. arvalis* mandible from level 8 Trench IVB [408 – as OxA-18663]	3939±32	−22.7±0.2	Martínková *et al.* 2013
Links of Noltland					
OxA-1080		Animal bone, *M. arvalis*, from LN80 FGG005	3590±80		Armour-Chelu 1992
OxA-1081		Animal bone, *M. arvalis*, from LN81 FQ83	4800±120		Armour-Chelu 1992
Pierowall Quarry					
OxA-18327	R99	Animal bone, *M. arvalis* mandible, from chamber cairn, layer 25	3822±38	−24.4±0.2	Martínková *et al.* 2013
OxA-18328	R126	Animal bone, *M. arvalis* mandible, from chamber cairn, layer 25	4000±45	−23.1±0.2	Martínková *et al.* 2013
OxA-18783	R124	Animal bone, *M. arvalis* mandible, from cairn, layer 25	3824±34	−22.4±0.2	Martínková *et al.* 2013
Point of Cott					
OxA-18324	R44	Animal bone, *M. arvalis* mandible, from compart 1, F54	4555±40	−23.5±0.2	Martínková *et al.* 2013
OxA-18325	R45	Animal bone, *M. arvalis* mandible, from compart 1, F54	4451±38	−22.4±0.2	Martínková *et al.* 2013

Laboratory number	Sample reference	Material and context	Radiocarbon Age (BP)	$\delta^{13}C$ (‰)	Reference
OxA-18782	R37	Animal bone, *M. arvalis* mandible, from compart 1, F54	4459±33	−22.1±0.2	Martínková *et al.* 2013
Holm of Papa Westray					
OxA-18665	R20	Animal bone, *M. arvalis* mandible, from entrance passage, layer 3	4054±38	−23.2±0.2	Martínková *et al.* 2013
OxA-18666	R23	Animal bone, *M. arvalis* mandible, from entrance passage, layer 3	4089±29	−23.0±0.2	Martínková *et al.* 2013

Table S4. Key parameters for Late Neolithic cultural activity on Orkney: site-based chronological models.

Parameter name	*Parameter description*	***Posterior Density Estimate (95% probability unless otherwise stated)*** *cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)*** *cal BC unless stated*
Isbister: model shown in Fig. S1			
start_isbister_primary	`Boundary` parameter estimating the start of the deposition of human remains in the cairn	*3380–3105*	*3350–3250* (41%) or *3200–3160* (12%) or *3150–3115* (15%)
end_isbister_primary	`Boundary` parameter estimating the end of the deposition of human remains in the cairn	*3080–2835*	*3010–2875*
109	`R_Combine` parameter estimating the date of the animal mandible from layer 10 within the hornwork	*3010–2975* (3%) or *2940–2865* (87%) or *2805–2760* (5%)	*2915–2880*
start_isbister_secondary	`Boundary` parameter estimating the start of the secondary activity associated with the cairn	*2920–2345*	*2665–2475*
end_isbister_secondary	`Boundary` parameter estimating the end of the secondary activity associated with the cairn	*2415–1880*	*2330–2125*
Barnhouse: model shown in Richards *et al.* 2016, figs 6–8			
build H2 & H9	`First` parameter estimating the first dated event in Houses 2 and 9	*3140–3035*	*3130–3070*
end H2	`Date` parameter estimating the end of activity associated with House 2, occurring after the occupation of the structure, and before the formation of context 130, which represents the infilling of House 2	*2955–2880*	*2915–2890*
build H3	`First` parameter estimating the first dated event in House 3	*3145–3080* (83%) or *3070–3030* (12%)	*3125–3095*
end H3	`Last` parameter estimating the last dated event in House 3	*3000–2990* (1%) or *2980–2880* (94%)	*2920–2890*
build H5	`First` parameter estimating the first dated event in House 5	*3125–2955*	*3105–3015*
end H5	`Last` parameter estimating the last dated event in House 5	*3080–2920*	*3040–3005* (18%) or *2990–2925* (50%)
build H7	`First` parameter estimating the first dated event in House 7	*3130–3025*	*3120–3060*
end H7	`Last` parameter estimating the last dated event in House 7	*3055–2965*	*3020–2985*
build S8	`First` parameter estimating the first dated event in Structure 8	*3010–2955*	*3000–2975*
end S8	`Last` parameter estimating the last dated event in Structure 8	*2915–2870*	*2905–2880*
end H9	`Last` parameter estimating the last dated event in House 9	*3020–2970*	*3010–2985*
build H11	`First` parameter estimating the first dated event in House 11	*3000–2920*	*2975–2930*
end H11	`Last` parameter estimating the last dated event in House 11	*2980–2910*	*2955–2915*
start work area	`First` parameter estimating the first dated event in work area	*3140–3080* (84%) or *3070–3035* (11%)	*3125–3090*
end work area	`Last` parameter estimating the last dated event in work area	*2995–2870*	*2950–2890*

Parameter name	*Parameter description*	***Posterior Density Estimate (95% probability unless otherwise stated)*** *cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)*** *cal BC unless stated*
start Barnhouse	`Boundary` parameter estimating the start of occupation of Barnhouse	*3160–3090* (*86%*) or *3080–3045* (*9%*)	*3135–3100*
end Barnhouse	`Boundary` parameter estimating the end of occupation of Barnhouse	*2890–2845*	*2885–2860*
Crossiecrown: model shown in Fig. S2			
first_crossiecrown_red_house	`First` parameter estimating the first dated event in the Red House	*2480–2285*	*2470–2360*
last_crossiecrown_red_house	`Last` parameter estimating the last dated event in the Red House	*2445–2195* (*94%*) or *2165–2150* (*1%*)	*2390–2380* (*1%*) or *2350–2205* (*67%*)
start_midden	`Boundary` parameter estimating the start of the deposition of midden material	*3245–2910*	*3065–2925*
end_midden	`Boundary` parameter estimating the end of the deposition of midden material	*2860–2340*	*2845–2700* (*44%*) or *2675–2555* (*24%*)
Cuween: model shown in Fig. S3			
start_cuween	`Boundary` parameter estimating the start of the deposition of material in the cairn	*2920–2470*	*2625–2495*
end_cuween	`Boundary` parameter estimating the start of the deposition of material in the cairn	*2570–2225*	*2550–2425*
Knowes of Trotty: model shown in Fig. S4			
start_knowes_of_trotty	`Boundary` parameter estimating the start of the activity associated with the house	*3475–3115*	*3390–3330* (*19%*) or *3300–3155* (*49%*)
build_phase_2	`Date` parameter estimating the start of activity associated with second phase of construction of the house	*3285–3095*	*3195–3105*
build_phase_3	`Date` parameter estimating the start of activity associated with third phase of construction of the house	*3115–2800*	*3090–2965*
end_knowes_of_trotty	`Boundary` parameter estimating the end of the activity associated with the house	*3115–2695*	*3080–2920*
Ness of Brodgar: model 2 shown in Card *et al.* in press, fig. 9			
start_NoB	`Boundary` parameter estimating the start of the dated late Neolithic activity and providing a *terminus ante quem* for the start of activity	*3020–2920*	*2975–2925*
end_st8_start_st10	`Date` parameter estimating the end of activity associated with Structure 8 and the start of activity associated with the construction of Structure 10	*2965–2895*	*2935–2905*
end_NoB_piered	`Boundary` parameter estimating the end of the dated activity associated with piered architecture	*2855–2665*	*2850–2755*
start_st10_last_use	`Boundary` parameter estimating the start of the dated activity associated with last use of Structure 10	*2720–2480*	*2620–2500*

Parameter name	*Parameter description*	***Posterior Density Estimate (95% probability unless otherwise stated)*** *cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)*** *cal BC unless stated*
end_st10_last_use	`Boundary` parameter estimating the end of the dated activity associated with Structure 10	*2460–2270*	*2455–2380*
Quanterness: model shown in Fig. S6			
start Quanterness	`Boundary` parameter estimating the start of the activity associated with the cairn	*3535–3330 (87%)* or *3325–3210 (8%)*	*3435–3350*
end Quanterness	`Boundary` parameter estimating the end of the activity associated with the cairn	*2855–2620*	*2845–2755 (66%)* or *2735–2725 (2%)*
Ring of Brodgar: model shown in Figs S7–8			
Ring of Brodgar	`Combine` parameter estimating the digging of the ditch	*2750–2210 BC*	*2600–2330 BC*
Skara Brae: model shown in Clarke & Shepherd forthcoming, illus 2.4.3/1–4			
central_phase_1_start	`Boundary` parameter estimating the start of the activity associated with the first phase of settlement in the central area	*2920–2885*	*2910–2890*
central_phase_1_end	`Boundary` parameter estimating the end of the activity associated with the first phase of settlement	*2870–2815 (92%)* or *2795–2760 (3%)*	*2860–2835*
central_phase_2_start	`Boundary` parameter estimating the start of the activity associated with the second phase of settlement	*2840–2685*	*2785–2705*
central_phase_2_end	`Boundary` parameter estimating the end of the activity associated with the second phase of settlement	*2545–2440*	*2530–2455*
Stonehall: model shown in Fig. S9			
start_stonehall	`Boundary` parameter estimating the start of activity at the Stonehall settlement	*3470–3165*	*3395–3260*
first_stonehall_meadow	`First` parameter estimating the first dated event at Stonehall Meadow	*3360–3110*	*3345–3215*
start_house_3	`Boundary` parameter estimating the start of activity associated with House 3	*3355–3045*	*3335–3235 (43%) or 3195–3160 (9%) or 3145–3095 (16%)*
end_house_3	`Boundary` parameter estimating the end of activity associated with House 3	*3305–2915*	*3260–3200 (17%) or 3170–3145 (5%) or 31202990 (46%)*
last_stonehall_meadow	`Last` parameter estimating the last dated event at Stonehall Meadow	*3245–2905*	*3115–2965*
first_stonehall_farm	`First` parameter estimating the first dated event at Stonehall Farm	*3355–3145*	*3340–3220*
last_stonehall_farm	`Last` parameter estimating the last dated event at Stonehall Farm	*2900–2740*	*2890–2835*
first_stonehall_knoll	`First` parameter estimating the first dated event at Stonehall Knoll	*3350–3085 (94%)* or *3050–3035 (1%)*	*3275–3265 (2%)* or *3240–3095(66%)*
last_stonehall_knoll	`Last` parameter estimating the last dated event at Stonehall Knoll	*3000–2845 (86%)* or *2815–2755 (9%)*	*2910–2870*
end_stonehall	`Boundary` parameter estimating the start of activity at the Stonehall settlement	*2885–2655*	*2875–2765*

Parameter name	*Parameter description*	***Posterior Density Estimate (95% probability unless otherwise stated)*** *cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)*** *cal BC unless stated*
Stones of Stenness: model shown in Fig. S10			
build_stenness	`First` parameter estimating the first dated material deposited at the Stones of Stenness	*3030–2895*	*2995–2990* (1%) or *2975–2905* (67%)
Wideford Hill: model shown in Fig. S11			
start_wideford_hill	`Boundary` parameter estimating the start of activity at Wideford Hill	*3545–3330* (78%) or *3285–3135* (17%)	*3455–3345* (64%) or *3225–3200* (4%)
stone_structure_2_demolished	`Date` parameter estimating when stone structure 2 was demolished	*3345–3125*	*3340–3315* (7%) or *3255–3130* (61%)
end_wideford_hill	`Boundary` parameter estimating the end of activity at Wideford Hill	*3335–3030*	*3210–3085*
Ha'Breck: model shown in Fig. S12			
start_Ha'Breck	`Boundary` parameter estimating the start of activity at Ha'Breck	*3585–3375*	*3530–3410*
build_house_3	`Date` parameter estimating when House 3 was built	*3445–3280*	*3390–3310*
end_house_3	`Date` parameter estimating when House 3 went out of use	*3290–3115*	*3255–3155*
end_Ha'Breck	`Boundary` parameter estimating the end of activity at Ha'Breck	*3270–2980*	*3215–3070*
Knowe of Rowiegar: model shown in Fig. S13			
start_rowiegar	`Boundary` parameter estimating the start of the deposition of human remains in the cairn	*3515–3360*	*3430–3365*
end_rowiegar	`Boundary` parameter estimating the end of the deposition of human remains in the cairn	*2875–2750*	*2855–2800*
Green: model shown in Fig. S14			
start Green	`Boundary` parameter estimating the start of activity at Green	*4045–3365*	*3580–3375*
end Green	`Boundary` parameter estimating the end of activity at Green	*3320–2520*	*3280–2980*
Pool: model shown in MacSween *et al.* 2015, fig. 9			
start Phase 2.2–2.3	`Boundary` parameter estimating the start of Phase 2.2/2.3 activity at Pool	*3210–2935*	*3100–2980*
end Phase 2	`Boundary` parameter estimating the end of Phase 2 activity at Pool	*2860–2830* (2%) or *2815–2650* (93%)	*2805–2735*
start Phase 3	`Boundary` parameter estimating the start of Phase 3 activity at Pool	*2680–2515*	*2625–2545*
end 3.1/start 3.2	`Date` parameter estimating when the transition from Phase 3.1 to Phase 3.2	*2510–2395*	*2495–2445*
end Phase 3	`Boundary` parameter estimating the end of Phase 3 activity at Pool	*2460–2280*	*2455–2370*
Quoyness: model shown in MacSween *et al.* 2015, fig. 13			
start Quoyness	`Boundary` parameter estimating the start of deposition of human bone in the cairn	*4275–4140* (5%) or *4005–3100* (90%)	*3575–3110*

Parameter name	*Parameter description*	***Posterior Density Estimate (95% probability unless otherwise stated)*** *cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)*** *cal BC unless stated*
end Quoyness	`Boundary` parameter estimating the end of deposition of human bone in the cairn	*2885–1885* (*90%*) or *1725–1555* (*5%*)	*2875–2385*
Tofts Ness: model shown in MacSween *et al.* 2015, fig. 13			
start Tofts Ness 1	`Boundary` parameter estimating the start of Phase 1 activity at Tofts Ness	*3330–2910*	*3115–2930*
end Tofts Ness 1	`Boundary` parameter estimating the end of Phase 1 activity at Tofts Ness	*2880–2695*	*2865–2775*
start Tofts Ness 2	`Boundary` parameter estimating the start of Phase 2 activity at Tofts Ness	*2855–2610*	*2820–2685*
end Tofts Ness 2	`Boundary` parameter estimating the end of Phase 2 activity at Tofts Ness	*2120–545*	*2005–1475*
Links of Noltland: model shown in Clarke *et al.* submitted, illus 10–12			
start_LoN	`Boundary` parameter estimating the start of activity associated with the Late Neolithic settlement at the Links of Noltland	*3160–2870*	*3015–2890*
end_LoN	`Boundary` parameter estimating the end of activity associated with the Late Neolithic settlement at the Links of Noltland	*2170–1840*	*2120–1960*
Pierowall Quarry: model shown in Fig. S15			
start_pierowall_quarry	`Boundary` parameter estimating the start of activity at Pierowall Quarry following collapse of the cairn, and a *terminus ante quem* for use of the cairn	*3040–2605*	*2910–2685*
cairn_levelled	`Date` parameter estimating when cairn was levelled	*2860–2600*	*2770–2625*
end_ pierowall_quarry	`Boundary` parameter estimating the end of secondary activity at Pierowall Quarry	*2850–2430*	*2725–2715* (*1%*) or *2700–2515* (*67%*)
Point of Cott: model shown in Fig. S16			
start_point_of_cott_primary	`Boundary` parameter estimating the start of the primary phase of deposition of human remains in the chamber	*3800–3380*	*3620–3435*
end_point_of_cott_primary	`Boundary` parameter estimating the end of the primary phase of deposition of human remains in the chamber	*3010–2545*	*2950–2755*
start_point_of_cott_infill	`Boundary` parameter estimating the start of the secondary phase of activity that saw the passage infilled	*3465–2695*	*3455–2915*
end_point_of_cott_infill	`Boundary` parameter estimating the end of the secondary phase of activity that saw the passage infilled	*2170–690*	*2060–1565*
Knap of Howar: model shown in Fig. S17			
start_knap_of_howar	`Boundary` parameter estimating the start of activity	*3635–3370*	*3530–3390*
end_knap_of_howar	`Boundary` parameter estimating the end of activity	*3305–2835*	*3260–3195* (*14%*) or *3080–2900*

Parameter name	*Parameter description*	***Posterior Density Estimate (95% probability unless otherwise stated)*** *cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)*** *cal BC unless stated*
			(54%)
Holm of Papa Westray, North: model shown in Fig. S18			
start_HPW_north_cairn	`Boundary` parameter estimating the start of human burials in the cairn	*3685–3375*	*3545–3405*
end_HPW_north_cairn	`Boundary` parameter estimating the end of human burials in the cairn	*3370–2795*	*3350–3155*
start_HPW_occupation	`Boundary` parameter estimating the start of activity	*2965–2580*	*2865–2820* (*11%*) or *2760–2620* (*57%*)
end_HPW_occupation	`Boundary` parameter estimating the end of activity	*2835–2780* (*7%*) or *2745–2445* (*88%*)	*2660–2545*

eolithic cultural activity on Orkney.

r description	***Posterior Density Estimate (95% probability unless otherwise stated)** cal BC unless stated*	***Posterior Density Estimate (68% probability unless otherwise stated)** cal BC unless stated*
2		
y parameter estimating the start of the deposition of human stalled cairns	*3785–3430*	*3635–3475*
y parameter estimating the end of the deposition of human stalled cairns	*2980–2625*	*2925–2765*
y parameter estimating the start of the deposition of human Maeshowe passage graves	*4340–3220*	*3735–3360*
y parameter estimating the end of the deposition of human Maeshowe passage graves	*2815–1690*	*2740–2340*
y parameter estimating the start of the secondary use of the deposition of animals	*3365–2970*	*3190–3025*
y parameter estimating the start of the secondary use of the deposition of animals	*2240–1750*	*2150–1915*
–S24		
y parameter estimating the start of use of timber houses	*3560–3360*	*3445–3370*
y parameter estimating the end of use of timber houses	*3315–3025*	*3275–3125*
y parameter estimating the start of use of linear (stone)	*3490–3300*	*3410–3330*
y parameter estimating the end of use of linear (stone) houses	*2880–2700*	*2865–2780*
y parameter estimating the start of use of cruciform (stone)	*3240–3075*	*3165–3100*
y parameter estimating the end of use of cruciform (stone)	*2455–2295*	*2445–2370*
y parameter estimating the start of use of stone houses (that be classified as linear or cruciform)	*3715–3115*	*3435–3190*
y parameter estimating the end of use of stone houses (that be classified as linear or cruciform)	*2450–1850*	*2395–2140*
y parameter estimating the start of use of mega (stone)	*3280–2950*	*3065–2970*

[i] Formerly known as Unstan Ware, but it is preferable to restrict that name to Unstan bowls within the round-based repertoire: see Sheridan 2016