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Medmerry, West Sussex

An early-fifteenth century fish trap

Peter Murphy, Hugh Fiske, Mike Kallaway, Therese Kearns, Peter King, Peter Marshall, Mark Seaman and Lukas Wacker

Scientific Dating Team

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Summary

The results from excavations by Archaeology South-East and subsequent intertidal recording by the Chichester and District Archaeology Society have defined a large intertidal fish trap, at least 225m long. It comprised a V- or tick-shaped structure of linear post and wattle alignments with an associated circular post and wattle structure. Radiocarbon dating and chronological modelling suggest that it was constructed in the first quarter of the fifteenth century cal AD. The circular structure and the V-shaped trap were in use simultaneously, but it is not clear how they would have operated.

Contributors

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Acknowledgements

We would like to thank John Vallender (Historic England) for producing Figures 6–8. Front cover image: MBE21, north–south alignment showing posts, wattling and a horizontal timber. Photo: © Hugh Fiske.

Archive location

Historic England, The Engine House, Fire Fly Avenue, Swindon, SN2 2EH.

Historic environment record

Hampshire Archaeology and Historic Building Record, Landscape Planning and Heritage Group, Environment Department, Elizabeth II Court West, The Castle, Winchester, SO23 8UD

Date of investigation

The structures were first observed on 12 February 2020. The main phase of recording was on 6 June 2020, though further observations and photography were undertaken subsequently as Covid restrictions permitted. By 21 March 2023 the site had been destroyed by erosion. The report was produced in 2023.

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Introduction

During excavations before construction of the Medmerry Managed Realignment Scheme (Fig. 1), Archaeology South-East (ASE) recorded a series of linear timber post and wattle structures (Stephenson and Krawiec 2019, 236–40). The latest and most extensive of these (LWS1) was exposed over some 155m north–south. It was interpreted as most probably one wing of a medieval V-shaped fish trap, although the intersecting arm to form the V was not exposed. A use for shellfish farming was also considered but was thought less likely. Several small parts of these structures were excavated and recorded in detail. The structures were associated with a southward flowing creek related to the Pagham Estuary and Broad Rife.

In February 2020, on the area of beach designated Medmerry Breach East (MBE) for survey work, continuing inland regression of the shoreline, with associated erosion of intertidal sediments, combined with incision into these sediments by a modern active southward flowing channel, exposed more archaeological features. These were recorded by the Chichester and District Archaeological Society and colleagues. This long-term process of erosion has previously exposed prehistoric, post-medieval and later archaeological features and structures on the shore (Murphy 2020). The newly-exposed structures (collectively numbered MBE 21) included a linear post and wattle feature on the same alignment (roughly north-south) as LWS1 but with an intersection of a second alignment north-west to south-east to make a V-or tick-shaped structure, with the apex of the V at SZ 83411 94240. Other posts defined a circular setting with associated wattling besides other posts of unknown significance. These wooden structures on the beach were first observed on 19 February 2020. By 21 March 2023 all had been completely destroyed by erosion, though at SZ 83459 94244 a small, perhaps unrelated, section of outlying wattling was recorded: MBE 23 (Mike Kallaway, pers. comm.).

Further investigation was plainly needed to relate the linear structure definitively to those recorded by Archaeology South-East inland and to make some sense of the other posts and post settings.

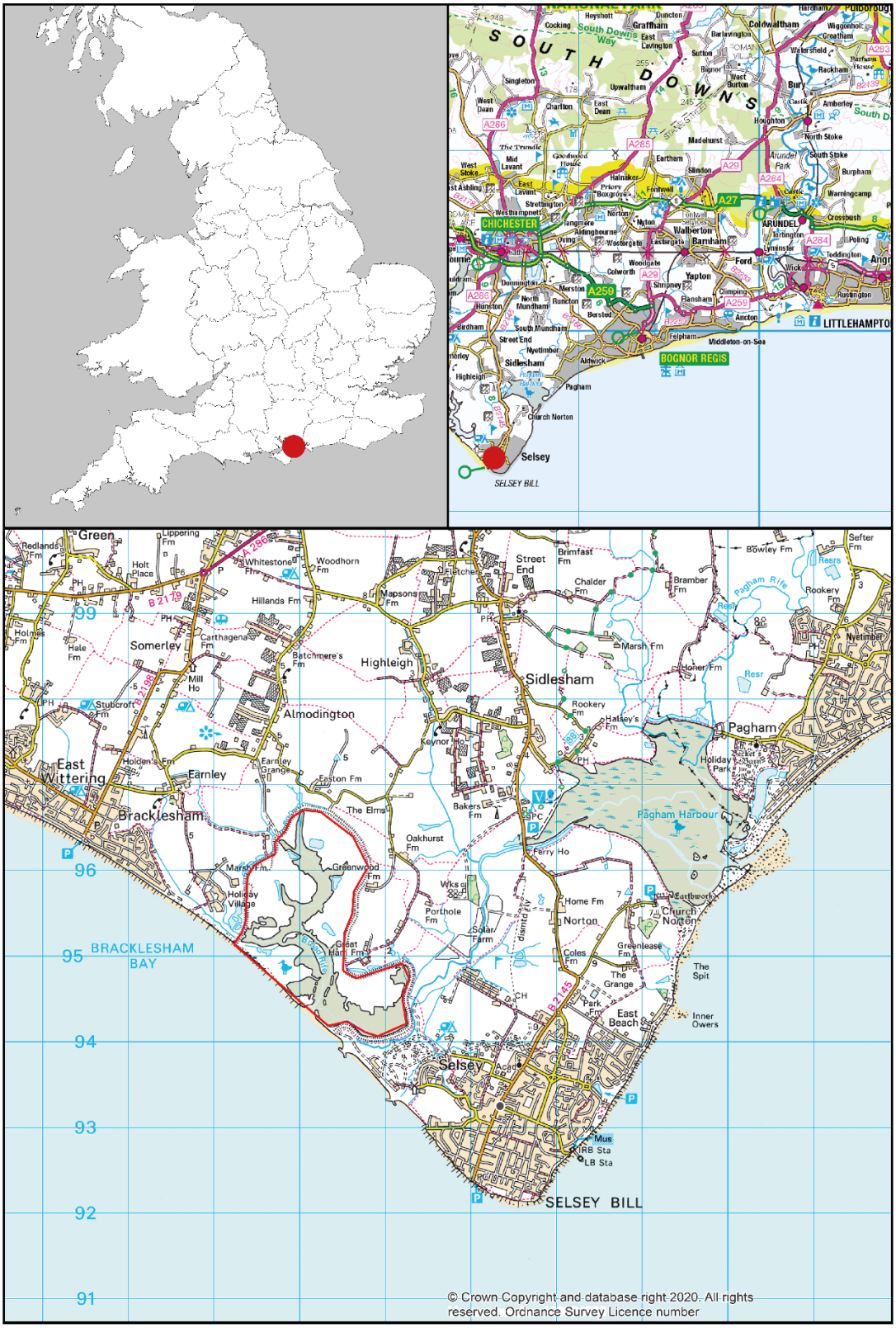

Figure 1: Maps to show the location of Medmerry Managed Realignment Scheme, (red). Top right: Scale 1: 211,654. Bottom: Scale 1:52,913 © Crown Copyright and database right 2023. All rights reserved. Ordnance Survey Licence number 100024900. Image Peter Marshall.

Methods

The general situation of the intertidal site, at the point of the V- or tick-shaped structure, in relation to the modern channel outflowing into the English Channel is shown in Figure 2. The practical difficulties of access and recording due to flowing water — even at low tide — are evident.

Figure 2: General view of MBE 21, looking NW. Photo: © Hugh Fiske.

Shortly after their discovery, GPS survey of the structures was undertaken by Therese Kearns of the then-CITiZAN (Coastal and Intertidal Zone Archaeological Network based at the Museum of London and University College London) using a Leica Zeon Mobile system and GG04 antenna, to produce an almost complete and geo-located plan of the principal posts of the structures visible at that time (Fig. 3).

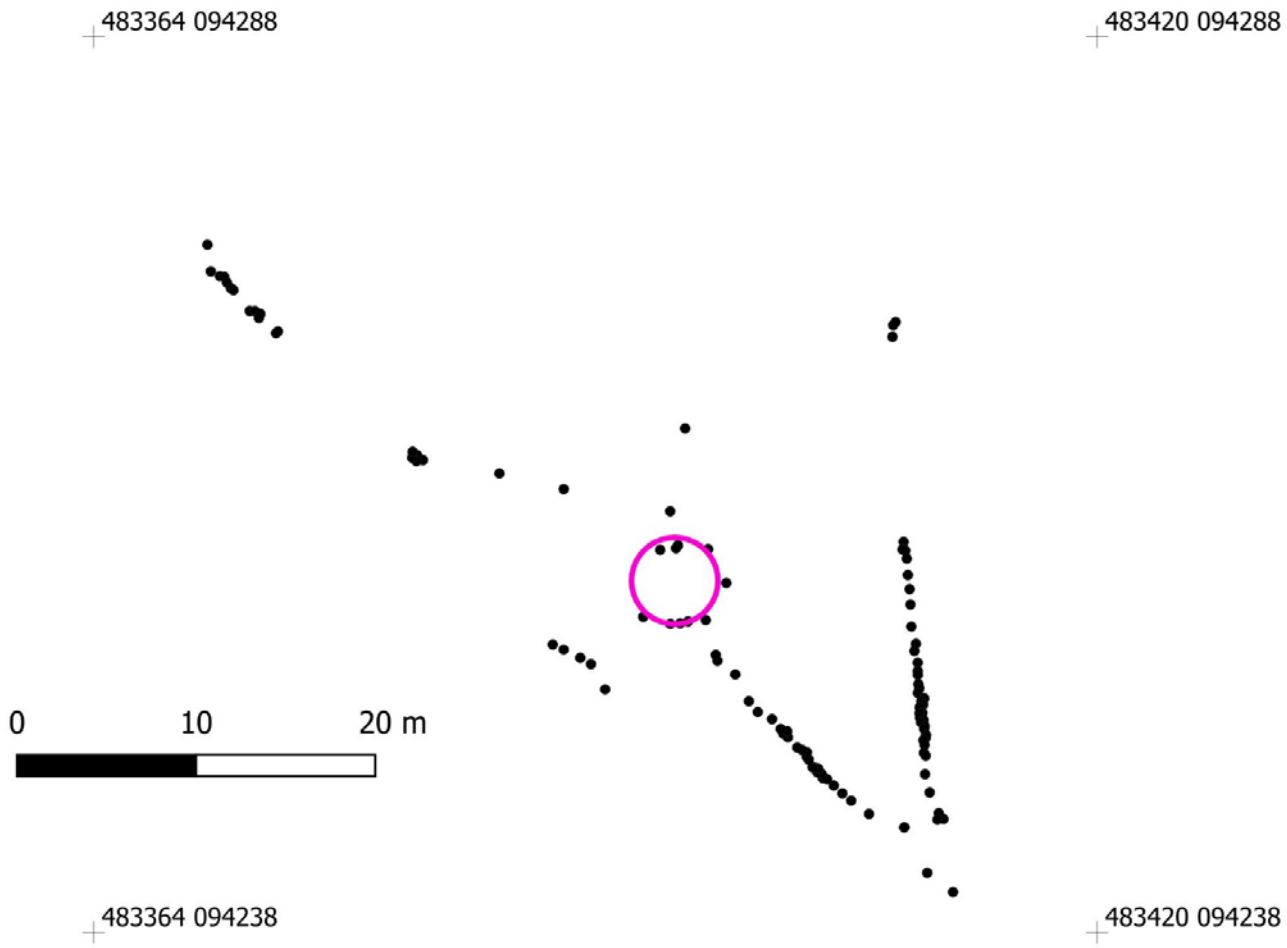

Figure 3: Plan of MBE21, showing the intertidal exposure only. Data from Therese Kearns, compiled by Mike Kallaway. © Therese Kearns and Mike Kallaway.

Relating this plan of the elements now in the intertidal zone to that of the linear alignment of posts of LWS1 recorded by ASE showed a convincing alignment, although the intervening section was still obscured by the modern sand bank along the present shoreline (Fig. 4).

Figure 4: Relationship of the intertidal structures, MBE 21, to the inland post alignment, LWS 1, excavated by Archaeology South East. Data for MBE21 from Therese Kearns; data for LWS1 from James Kenny; compiled by Mike Kallaway. © Therese Kearns, James Kenny and Mike Kallaway.

However, active erosion at the site, submergence during tides and re-deposition of sediment between site visits meant that a different suite of timbers was seen during each visit. The site was re-visited on 6 June 2020 and 22 July 2020 for more detailed recording and wood sampling. Thereafter further fieldwork was curtailed by the Covid-19 lockdown, but the site was re-visited in 2023.

On 6 June 2020 Hugh Fiske took a suite of 96 photographs with a view towards developing a 3D model of the exposed structures and a detailed ground plan using Agisoft Metashape. In the event the software could not integrate the data due to the presence of flowing water. However, the images collected remain a useful photographic record (Figs 5a and 5b).

Figure 5: a) MBE 21 looking SW, showing the post alignments of the V-shaped structure. Photo: © Hugh Fiske; b) MBE 21, looking East, showing posts of the circular structure. Photo: © Hugh Fiske.

A measured sketch plan of the V- or tick-shaped structure numbering vertical posts, 1–30, (including No. 26, which was horizontal), was drawn. During that fieldwork it was anticipated that the 3D model would be the basis for an accurate plan; consequently, precise location was not thought to be required. Samples were taken from each post for wood identification. Four samples for radiocarbon dating (A–D) were taken from horizontal wattling between the posts, though only C and D were submitted. The wood was all roundwood with no larger timber (though an earlier photograph of the structure does show one squared vertical, eroded away by 6 June 2020). The measured sketch plan produced does not purport to be very positionally accurate but is approximately correct and does show the relationships of all the timbers visible (Figs 6–8).

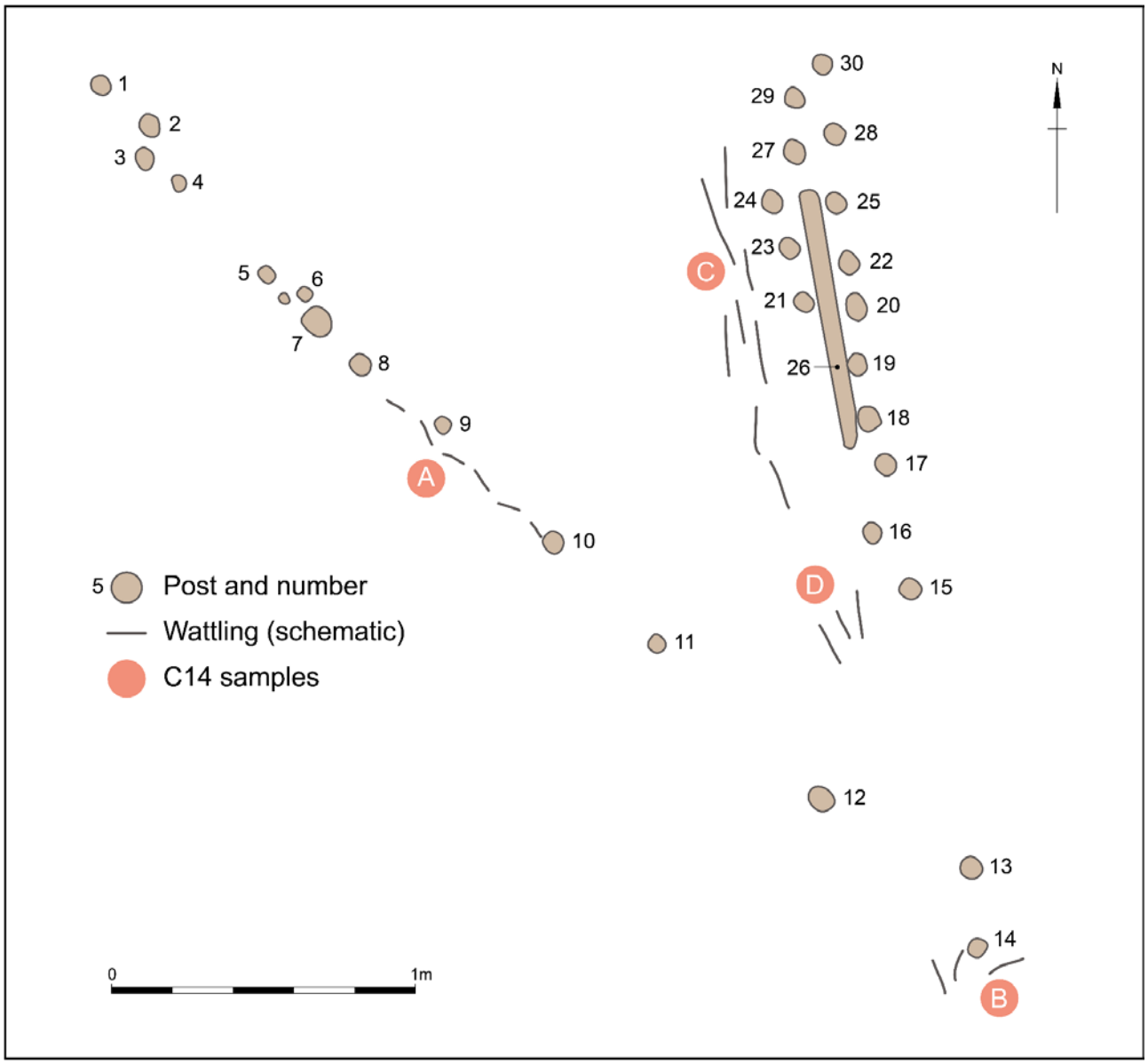

Figure 6: Measured sketch plan of the posts at the apex of the V-shaped structure, MBE 21. Image: John Vallender, © Historic England.

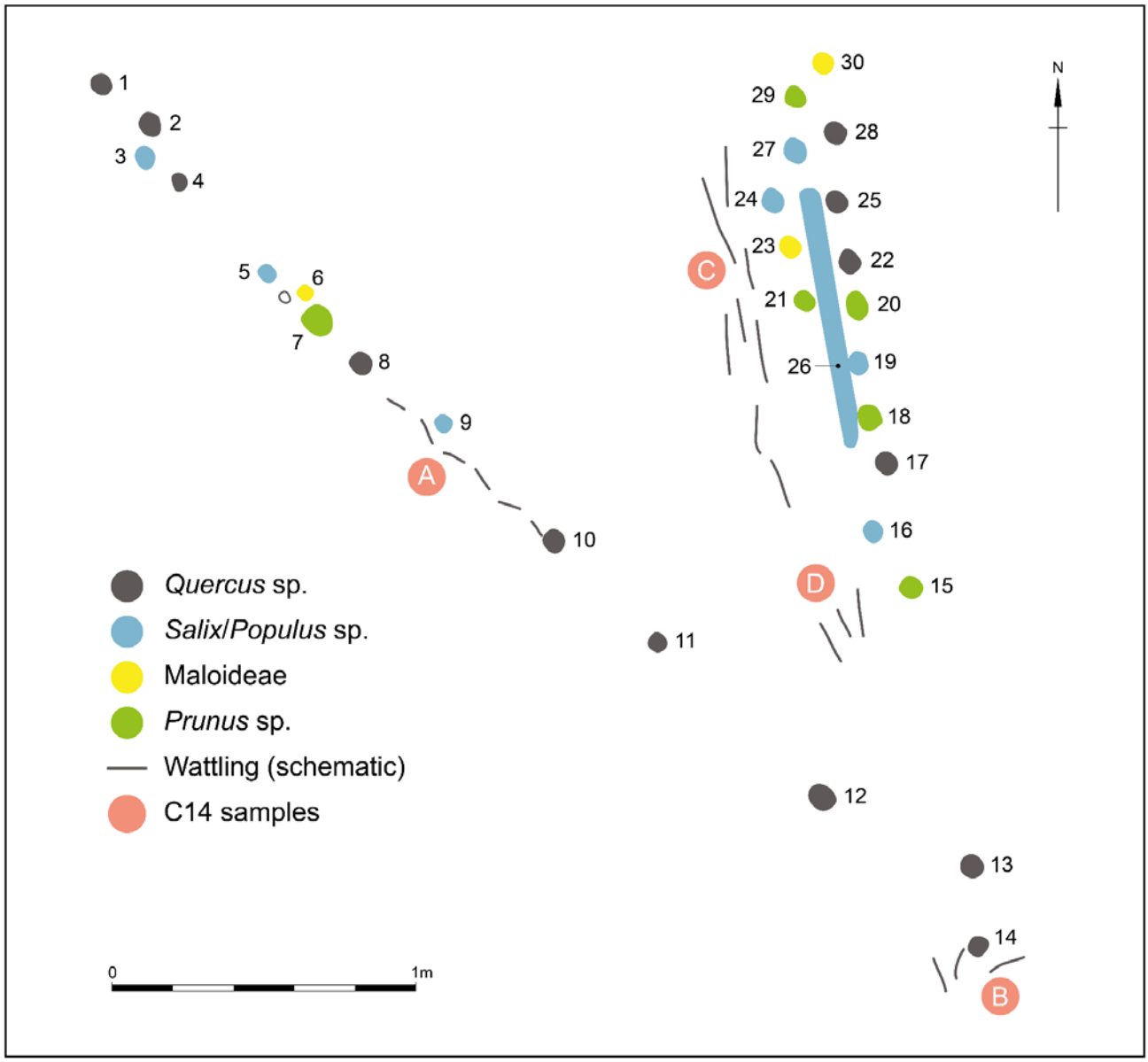

Figure 7: Measured sketch plan of the posts at the apex of the V-shaped structure, MBE 21, with wood identifications. Image: John Vallender, © Historic England.

On 22 July 2020 the circular ‘pound’ of which five posts with circular wattle lining were visible was planned (Fig. 8). Two samples (A and B) were taken from the horizontal wattling for radiocarbon dating.

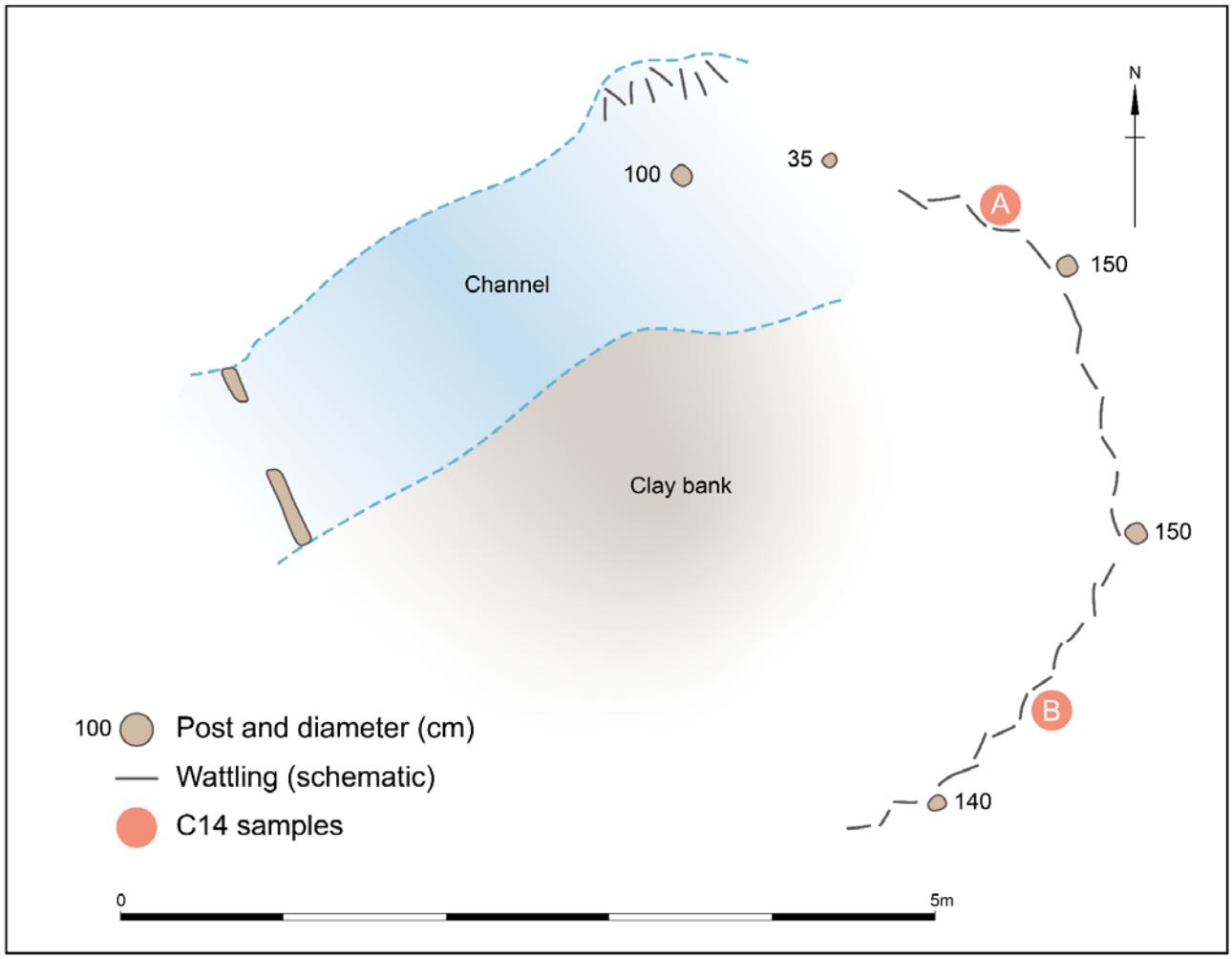

Figure 8: Measured sketch plan of the circular post setting, MBE 21. Image: John Vallender, © Historic England.

Some unrelated wattling very close to the granite blocks adjacent to the caravan park was noted on 21 March 2023, (MBE 23), well to the east of the principal fish trap complex, by Mike Kallaway. However, continued erosion had removed almost all other wooden structures on the foreshore by that date.

The structures defined

Positional data apparently defined continuity between LWS1 and MBE 21, indicating a V-shaped or tick-shaped fish trap (Fig. 4). It was constructed of vertical posts with associated wicker panels. The north-south linear arm of the trap was at least 225m north–south whilst that extending to the north-west was at least 56m long. In addition, an incomplete near-circular pound of posts and wattle, approximately 4m in diameter, was recorded. Other posts nearby are of uncertain significance.

The relationships and dating of these structures is considered below but plainly there were problems of interpretation. First, although LWS1 and MBE 21 appeared to have been originally continuous from the plans obtained, radiocarbon dating was required to confirm this. Secondly, the date of the circular structure was uncertain. How did it relate to the V- or tick-shaped fish trap? Was it contemporary, earlier or later? Dating is therefore considered below.

Wooden posts and horizontal elements from the V-or tick-shaped structure

All samples were from intact roundwood (Table 1). They were washed and further sub-sampled, the sub-samples being stored in methanol, sectioned in transverse, radial longitudinal and tangential longitudinal directions and examined under transmitted light at x50 to x300 identifying diagnostic anatomical characteristics in reference works (Schweingruber 1990). Samples of roundwood from the wattling were kept moist and chilled before submission for radiocarbon dating (see below) whilst further sub-samples from them were removed for identification (Table 2) as above.

Table 1: Wood identifications of the posts from the V-shaped terminal.

Wood number	Diameter (mm)	Taxa	Comments
1	65	*Quercus* sp.	-
2	80	*Quercus* sp.	-
3	85	*Salix/Populus* sp.	-
4	50	*Quercus* sp.	-
5	65	*Salix/Populus* sp.	-
6	70	Maloideae	-
7	100	*Prunus* sp.	-
8	75	*Quercus* sp.	-
9	50	*Salix/Populus* sp.	-
10	80	*Quercus* sp.	-
11	80	*Quercus* sp.	-

Wood number	Diameter (mm)	Taxa	Comments
12	100	*Quercus* sp.	-
13	90	*Quercus* sp.	-
14	100	*Quercus* sp.	-
15	50	*Prunus* sp.	-
16	50	*Salix/Populus* sp.	-
17	55	*Quercus* sp.	-
18	75	*Prunus* sp.	Possibly split
19	60	*Salix/Populus* sp.	-
20	55	*Prunus* sp.	-
21	65	?*Prunus* sp.	-
22	80	*Quercus* sp.	-
23	70	Maloideae	-
24	75	*Salix/Populus* sp.	-
25	75	*Quercus* sp.	-
26	65	*Salix/Populus* sp.	Horizontal wood
27	65	*Salix/Populus* sp.	-
28	75	*Quercus* sp.	-
29	75	*Prunus* sp.	-
30	80	Maloideae	-

Table 2: Samples of stems from wattling. Samples MBE21VA and MBE21VB from the V-shaped structure were not submitted for dating.

Sample code	Diameter (mm)	Number of rings	Taxa
MBE210A	18	?	*Corylus* sp.
MBE210B	13	5	*Corylus* sp.
MBE21VA	18	5+	*Corylus* sp.
MBE21VB	20	4	*Quercus* sp.
MBE21VC	12	2	*Salix/Populus* sp.
MBE21VD	15	3	*Salix/Populus* sp.

The wooden posts from this structure were of a similar range of taxa to those from LWS 1: predominantly oak (*Quercus* sp.) with lesser amounts of Maloideae (hawthorn etc), willow/poplar (*Salix/Populus* sp.) and occasional cherry/blackthorn (*Prunus* sp.) (Stephenson and Krawiec 2019, 418–21). The larger sample of wood from LWS1 also included a few identifications of birch and beech, rare constituents that would probably not appear in the smaller sample from MBE 21. A plot of wood identifications from posts of the V-shaped structure is shown in Figure 7. No obvious patterning, indicating species selection, is obvious, although posts of *Quercus* sp. (oak) show a moderately regular

spacing in the SW arm. The wattling included stems of hazel (*Corylus* sp.), willow/poplar and oak, though plainly this was an exceedingly small sample of identified stems.

Radiocarbon dating

Four samples were submitted to the Laboratory of Ion Beam Physics, ETH Zürich, Switzerland for radiocarbon dating in 2022. Cellulose was extracted from each waterlogged wood sample using the base-acid-base-acid-bleaching (BABAB) method described by Němec et al. (2010), combusted and graphitised as outlined in Wacker et al. (2010a), and dated by Accelerator Mass Spectrometry (Synal et al. 2007; Wacker et al. 2010b). Data reduction was undertaken as described by Wacker et al. (2010c). The facility maintains a continual programme of quality assurance procedures, in addition to participation in international inter-comparison exercises (Scott et al. 2017). Details of quality assurance data and error calculation are provided in Sookdeo et al. (2020).

The results in Table 3 are conventional radiocarbon ages, corrected for fractionation using $\delta^{13}C$ values measured by Accelerator Mass Spectrometry (Stuiver and Polach 1977). Sample MBE210B (ETH-122452) from the circular post setting failed due to an extremely low carbon yield. The two measurements on wattle samples (ETH-122449–50) from the V-shaped terminal are statistically inconsistent at the 5% significance level (T'=20.2; T'(5%)=3.8; v =1; Ward and Wilson 1978) and appear to be of different ages, although as Bayliss and Marshall (2019, 1156) have shown, the reproducibility of radiocarbon dates on waterlogged wood can be challenging due to different cellulose preservation across sites.

Table 3: Radiocarbon measurements and associated $\delta^{13}C$ values from Medmerry East, MBE 21.

Laboratory Number	Sample details	Radiocarbon Age (BP)	$\delta^{13}C_{AMS}$ (‰)
V-shaped terminal			
ETH-122449	MBE21VC. Waterlogged wood, *Salix/Populus* sp., 2 rings, from horizontal wattling	633±17	−25.6
ETH-122450	MBE21VD. Waterlogged wood, *Salix/Populus* sp., 3 rings, from horizontal wattling	525±17	−22.5
Circular post-setting			
ETH-122451	MBE210A. Waterlogged wood, *Corylus* sp., outer ring, from circular wattle lining	529±17	−24.1
ETH-122452	MBE210B. Waterlogged wood, *Corylus* sp., outer ring, from circular wattle lining	Failed	

Chronological modelling

The chronological modelling presented here has been undertaken using OxCal 4.4 (Bronk Ramsey 2009), and the internationally agreed calibration curve for the northern hemisphere (IntCal20; Reimer et al. 2020). The model is defined by the OxCal CQL2 keywords and by the brackets on the left-hand side of Figure 9. In the figure, calibrated radiocarbon dates are shown in outline, and the posterior density estimates produced by the chronological modelling are shown in solid black. The other distributions correspond to aspects of the model. For example, the distribution *BuildLWS1* (Fig. 9) is the posterior density estimate for the date when the wooden structure LWS1 was constructed. In the text and tables highest posterior density intervals, which describe the posterior distributions, are given in italics.

The model for the chronology of wooden structures at Medmerry is shown in Figure 9 and includes the radiocarbon dates from linear wooden structures (LWS1–3 and shell layer BP8; Stevenson and Krawiec 2019, table 12.2). The model differs from that shown in Stevenson and Krawiec (2019, fig 12.9) in that we interpret the measurements on shells from BP8 as providing a constraint on the use of the wooden structures that are stratigraphically earlier as opposed to *termini post quos* for stratigraphically later deposits (Stevenson and Krawiec (2019, 330) and more importantly we have taken the last dated event for each structure as providing the best estimate for its construction. It has good overall agreement (Amodel: 124) and provides the following estimates for the date of construction of various wooden features:

- LWS1*: cal AD 1363–1381* (*3% probability; BuildLWS1*; Fig. 9) or *cal AD 1390–1435* (*90% probability*) probably *cal AD 1399–1418* (*68% probability*).
- LWS2*: cal AD 1379–1419* (*68% probability; BuildLWS2*; Fig. 9) or *cal AD 1322–1368* (*27% probability*) probably *cal AD 1399–1418* (*68% probability*) or *cal AD 1348–1357* (*7% probability*) or *cal AD 1384–1410* (*61% probability*)
- LWS3*: cal AD 1310–1395* (*95% probability*; *BuildLWS3*; Fig. 9) probably *cal AD 1352–1393* (*68% probability*)
- MBE 21: *cal AD 1400–1430* (*95% probability*; *BuildMBE21*; Fig. 9) probably *cal AD 1408–1422* (*68% probability*)
- Circular post setting: *cal AD 1399–1428* (*95% probability*; *BuildCPS*; Fig. 9) probably *cal AD 1407–1422* (*68% probability*).

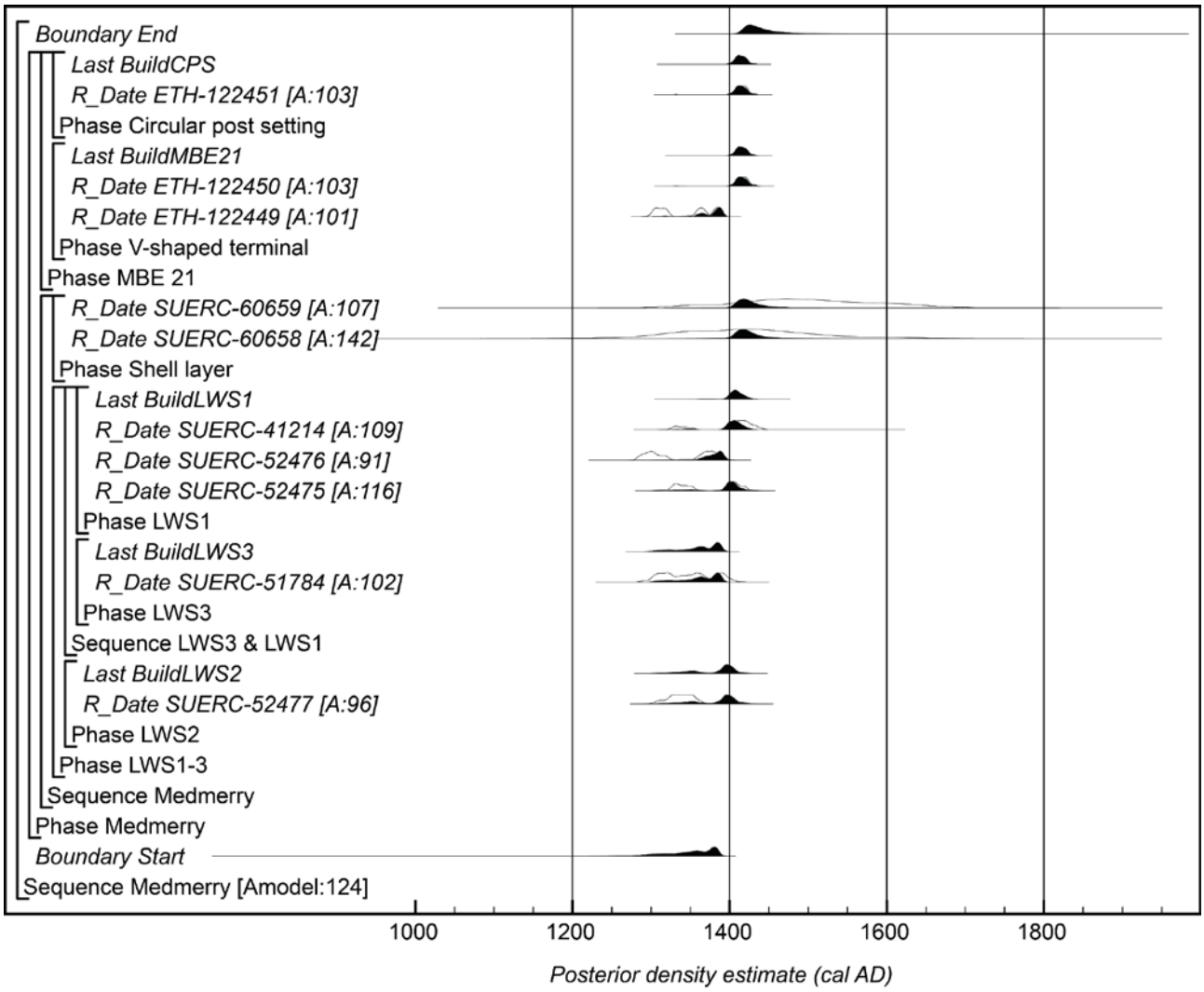

Figure 9: Probability distributions of dates from Medmerry (wooden structures). Each distribution represents the relative probability that an event occurs at a particular time. For each of the dates two distributions have been plotted: one in outline, which is the result of simple radiocarbon calibration, 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 '*BuildLWS1*' is the estimated date when structure LWS1 was built. The large square brackets down the left-hand side along with the OxCal keywords define the overall model exactly. Image: Peter Marshall, © Historic England.

If as outlined above wooden structures LWS1 and MBE 21 are interpreted as forming part of the same structure, then a combined probability distribution estimating its date of construction can be determined (Fig. 10) using their independent construction estimates. This suggests that the massive structure a minimum of 225m north-south and a minimum of 56m long north-west was built in *cal AD 1401–1424* (*95% probability*; *MBE21_LWS1*; Fig. 10) probably *cal AD 1406–1417* (*68% probability*).

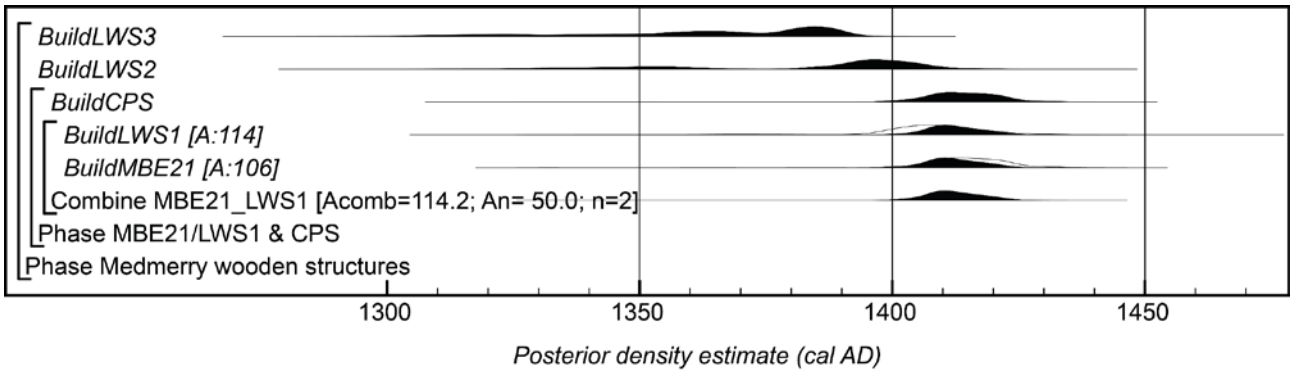

Figure 10: Combined probability distribution estimating the construction date of wooden structure MBE 21/LWS1, if it is interpreted as representing a single planned construction, together with the estimated dates of construction of structures LWS2 and LWS3 (derived from the model shown in Figure 10). Image: Peter Marshall, © Historic England.

Discussion

The massive construction, MBE 21/LWS1, was at least 225m north–south whilst the alignment extending to the north-west was at least 56m long. It is estimated to have been constructed in *cal AD 1401–1424* (*95% probability: MBE 21_LWS1;* Fig. 10), probably in *cal AD 1406–1417 (95% probability)*. So far as Sussex is concerned it is without comparison, though comparably large fish traps have been reported from elsewhere, for example at Colin's Creek, Blackwater Estuary, Essex (Strachan 1998). Obtaining the necessary raw materials (posts and roundwood for wattling) and directing the construction works, besides the operation of the trap, would plainly have needed the authority of some powerful seigneurial or monastic body: Stephenson and Krawiec (2019) speculate on some possibilities, which need not be reiterated here.

The circular structure at MBE 21 presents some problems of interpretation as it is clearly contemporary with the V- or tick-shaped structure, MBE 21/LWS1 (Fig. 10). Intertidal wooden fish traps in the UK are of two main types. V-shaped fish traps are common around much of the British coast. Pound-and-leader fish traps (Cooper et al. 2017, Murphy forthcoming) have a more restricted distribution, occurring only in the Solent area. The circular structure at MBE 21 was notably smaller than somewhat similar pounds, forming part of 16th century pound-and-leader fish traps from East Head, West Wittering (4m as against 7m and 5m) though less well exposed than them (Murphy forthcoming**).**

So far as the writer is aware these two types of traps (V-shaped and post-and-leader) have previously proved to be mutually exclusive, not occurring at the same site. But the present results from MBE 21 indicate that both occurred at Medmerry, and that they were almost certainly constructed simultaneously. It is therefore necessary to consider two possible interpretations.

First, that the circular structure is not a trap at all but rather some kind of holding pond. However, if so, there seems to be no obvious reason why it should be placed as it is, rather than at, or near to, the apex of the V. Secondly, that two different types of trap were constructed together so as to operate as a 'trap within a trap'. Perhaps the circular element could have operated as a pound with independent leaders (now only partly surviving or exposed) so that the entire trap system did not need to be operational at once. Either way, the present results show that circular post-and-wattle structures, whether pounds or not, were constructed in the first quarter of the fifteenth century. This provides a chronological bridge between the Anglo-Saxon period and the 16th century pound-and-leader traps known from the Solent area (see Murphy forthcoming for earlier discussion, when this was not evident).

James Kenny has pointed out that MBE 21 sits in the position of a creek shown on a map of 1587, then flowing NE to Pagham Harbour. For the fish trap to have operated there must have been a north-south flow but changing palaeogeography would have accommodated this.

Table 4 demonstrates that it is possible to define a sequence of construction for the wooden structures (*contra* Stephenson and Krawiec 2019, 236). LWS3 was the earliest structure to be built (*74.6%* probable), followed by LWS2 (*68.0% probable*) and finally MBE 21/LWS1 and the circular post setting.

Table 4: Percentage probabilities of the relative order of the construction of wooden structures, from the models defined in Figures 9–10. The cells show the probability of the distribution on the left-hand column being earlier than the distribution on the top row. For example, the probability that *BuildLWS3* is earlier than *BuildLWS2* is 75.1%.

Parameter	***BuildLWS3***	***BuildLWS2***	***BuildCPS***	***MBE21_LWS1***
BuildLWS3		75.1	99.4	100.0
BuildLWS2	24.9		95.1	95.2
BuildCPS	0.6	5.0		42.4
MBE21_LWS1	0.0	4.8	57.6	0.0

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