Intertidal fish traps at East Head, West Wittering, West Sussex

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with contributions from Sam Griffiths, Therese Kearns, Peter King and Mark Seaman.

Introduction

The fish traps at East Head were first documented archaeologically in the Chichester District HER, CD 10237, as a post alignment and circular structure at 476278/98786. Members of the public had reported the structures to the National Trust and Chichester Harbour Conservancy in March-April 2014, (final entry 09/11/2018). They lie directly offshore from the National Trust property of East Head. A site inspection by James Kenny, Archaeologist for Chichester District Council, in 2014 added nothing to this, for the site was covered by sand during his visit. A report that the structures were exposed again in 2020 by a member of the public led to the involvement of the Chichester and District Archaeology Society (CDAS). During work there, conversations with walkers on the beach indicated that the structures were well known to locals and had been interpreted correctly as fish traps. Initial work by Mark Seaman defined the following elements at the site, and the terminology he developed will be adopted here. The more northerly circle or 'pound' and its associated linear alignments ('leaders') will be designated East Head 1 (EH 1); the smaller and less complete southerly pound and partial alignment East Head 2 (EH 2). The locations of these structures are shown in Figure 1.

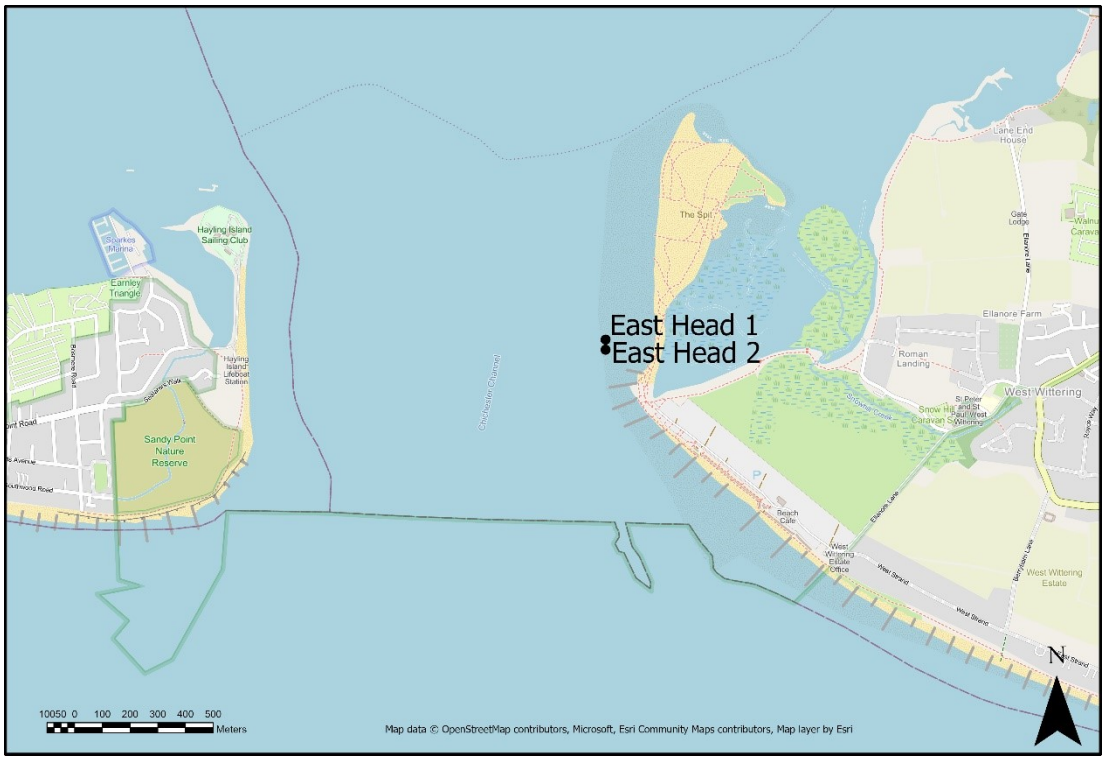

Figure 1. General plan of the mouth of Chichester Harbour with position of East Head and the archaeological structures East Head 1 and 2 (EH1 and EH2). Data collected by Therese Kearns and plotted by Sam Griffiths of CITiZAN.

Fieldwork

Recording at this location is far from easy, for the structures are only exposed at low Spring Tides, and often not then. Moreover, Covid-19 restrictions in 2020-1 meant that only a small team of people could assemble outdoors, so this was very much a 'Covid project' for which it was not possible to involve the wider membership of CDAS. However, recording by a few members of CDAS, officers of CITiZAN (MOLA), (Coastal and Intertidal Zone Archaeological Network, Museum of London Archaeological Service) and James Brown (National Trust) was possible on 23.8.20, 29.3.21 and later in 2021 during low tides. The structures were almost dry in 2020 at low tide but still mainly under water in March 2021. Subsequent visits in 2021 proved largely uninformative for changes in sand cover resulted in damming by a minor sand bar, which retained water even at extreme low tide. All posts were then submerged, and sand had accreted over them.

Collection of digital images for 3D modelling by Hugh Fiske proved to be impossible due to flowing water, but a series of photographs of the structures was made. GPS survey of the structures was undertaken by Therese Kearns of CITiZAN (MOLA) using a Leica Zeon Mobile system and GG04 antenna on 23.8.20, to produce an almost complete and geo-located plan of the principal posts of the structures, which was supplemented by further measurements on 29.3.21. These data have been plotted by Sam Griffiths of CITiZAN (MOLA) showing results from both surveys. Hand auger holes were sunk to define shallow stratigraphy related to the structures and to obtain samples for palaeoecological analysis on 29.3.21 by the writer. Samples were also collected from roundwood comprising part of the wattling between the main posts and submitted to the ^{14}Chrono Centre at Queen's University Belfast for radiocarbon dating, with financial support from CBASE (Council for British Archaeology South-East) to whom the contributors are extremely grateful.

East Head 1.

The circular pound at this site is just over 7m in diameter, with its centre at 476284 098718/ 476285 098720. It is, however, not a simple structure for it includes a setting of posts and a few slabs of sandstone externally to the SW (possibly related to the position of the catch net) and a roughly sub-rectangular arrangement of posts internally. The bases of roundwood hurdles with the rods lying horizontally are present between and around the posts. Apart from the roundwood, the pound also included a plank placed with its narrow edge vertical, between two posts in the NE of the structure. The North Leader and East Leader are well defined by lines of substantial posts up to about 140mm in diameter; the Cross Leader is much less substantial, comprising posts only up to about 100mm, generally much less. The function of the 'East Leader Extension' is unclear; it may relate to another earlier or later structure. A photograph and plans are given in Figures 2-4. One sample taken from horizontal wattling was submitted for radiocarbon dating (Sample D as indicated on Figure 4).

Adjacent to the pound the remains of a basket were photographed on 29.3.21, though these images are unsatisfactory as the basket was submerged at the time. Attempts later in 2021 to locate it to lift it, or parts of it, were unsuccessful. Its position is marked on Figure 4. Detailed recording of individual post diameters, (which might be related to the original heights of the

posts), was attempted in 2021, but was unsuccessful due to submergence. There is, therefore, scope for further work, if and when the structure is once more well exposed.

Figure 2. East Head 1, showing the pound and east leader. Photo by Peter King.

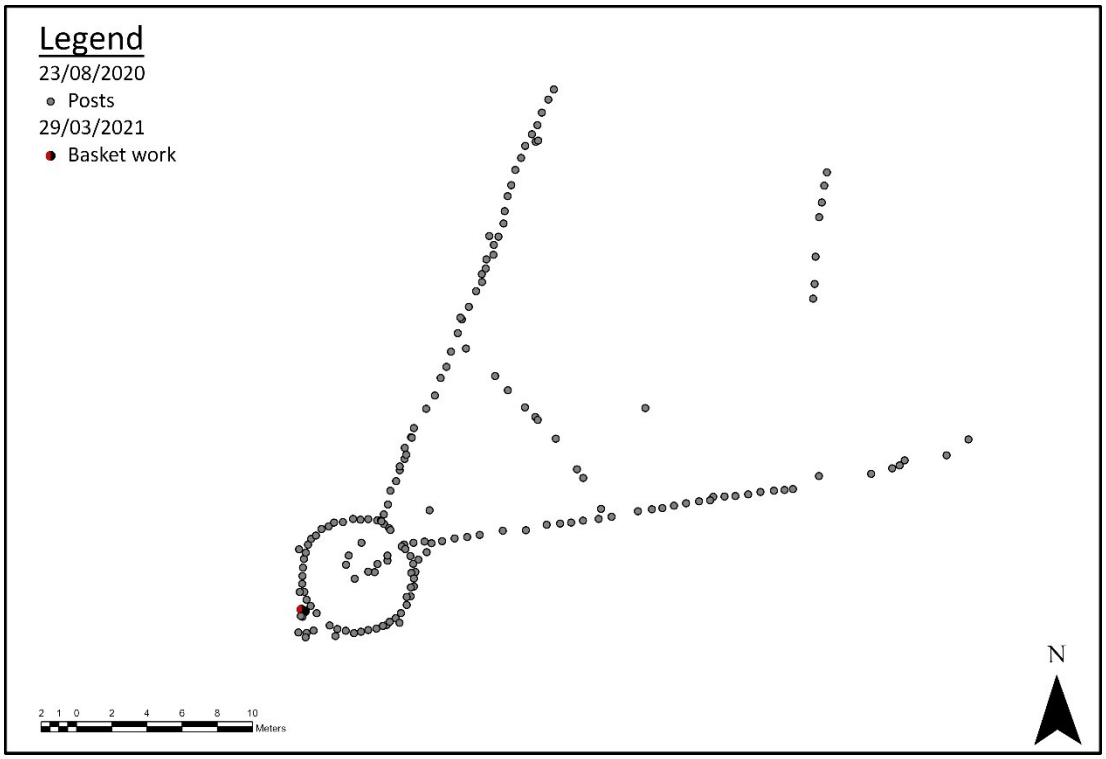

Figure 3. East Head 1 and its leaders (north, east, cross and 'extension'). Data collected by Therese Kearns and plotted by Sam Griffiths of CITiZAN (MOLA).

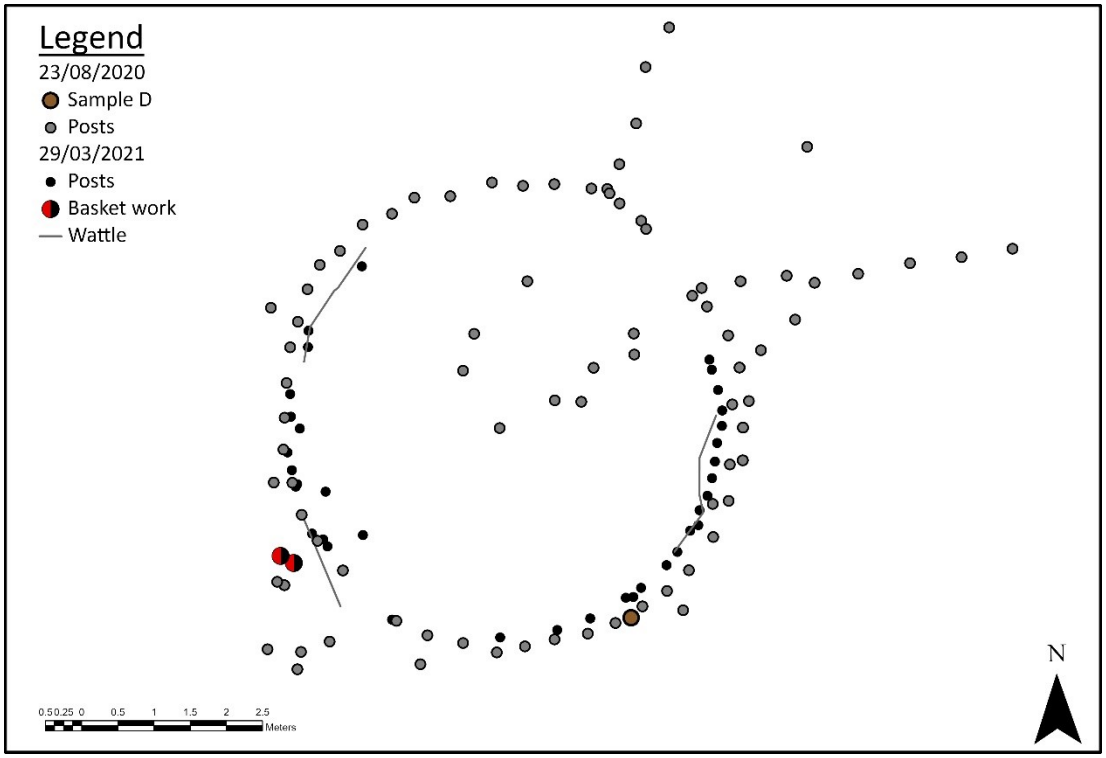

Figure 4. East Head 1 pound. The positions of the basket and of the sample of wood collected for radiocarbon dating (Sample D) are indicated. Data collected by Therese Kearns and plotted by Sam Griffiths of CITiZAN (MOLA).

East Head 2.

The circular pound here, just to the south of EH1, is smaller (just over 5m diameter) and apparently less complete, at 476283 98683. A few vertical posts were seen in the interior of the pound, which may form the remains of a similar sub-rectangular structure to that in EH1, and just outside it. There was hardly any wattling between the posts, just a few horizontal roundwood stems towards the NE: one horizontal roundwood stem was sampled for radiocarbon dating (Sample E). A photograph and plan are given in Figures 5-6. Flint nodules and sandstone slabs had been used to reinforce the posts, or to secure them in position, and stones (mainly flint nodules) were scattered across the interior, but planning was impossible due to standing water. Again, further observation may increase knowledge of the construction of the pound and leaders of this structure if they are better exposed in future.

In addition another post structure was seen by Mark Seaman and Peter King on an outer sand bank to the south-west at 476153 98536. The short span of low tide did not permit planning and sampling, but this may be possible in future. It was described by Mark Seaman as "looking a little like a fish trap or a miniature fish weir with a small pound and only one arm as far as we could see." Further inspection is plainly required.

Figure 5. East Head 2 pound from the south. Photo by the writer. Workers at East Head 1 can be seen in the distance to the north.

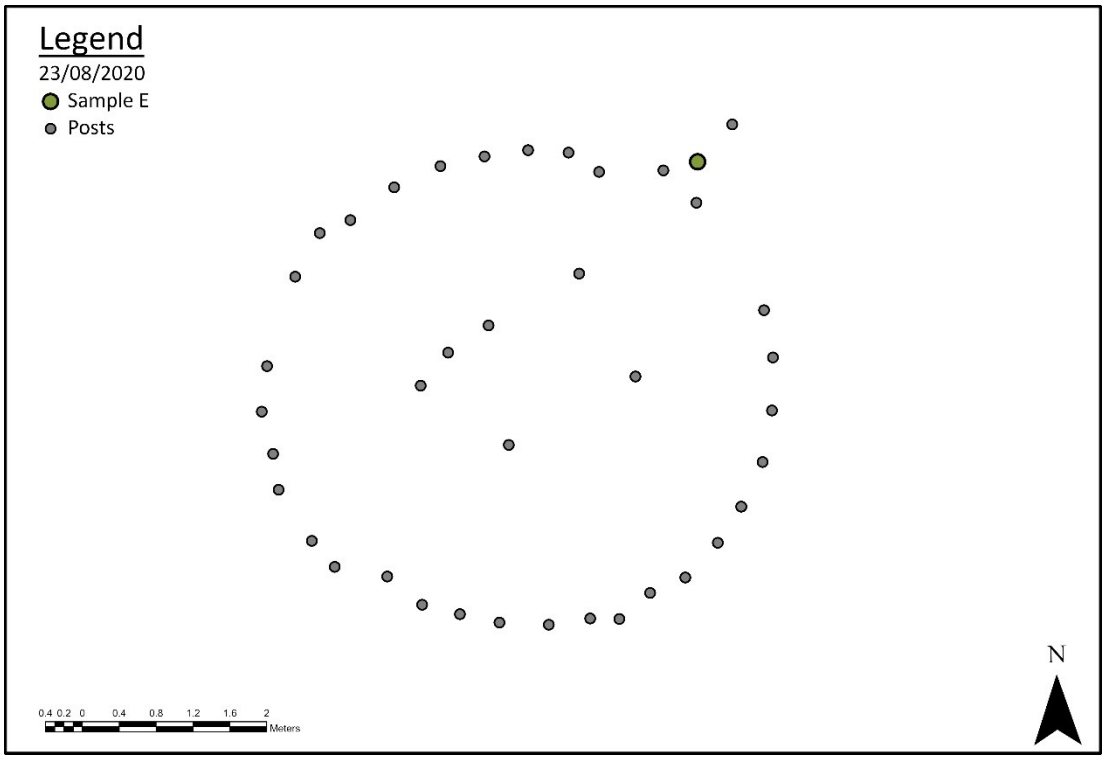

Figure 6. East Head 2 pound. The position of the sample of wood collected for radiocarbon dating (Sample E) is shown. Data collected by Therese Kearns and plotted by Sam Griffiths of CITiZAN (MOLA).

Stratigraphy and palaeoecology

Two hand auger holes were sunk just landwards of East Head 1 (A) and between posts at the 'pound' end of the East Leader (B) using a hand-driven gouge auger. Only the top 50cm of the stratigraphy was considered to relate to the structures, since it is into these sediments that the posts were driven. Both holes showed that this comprised soft grey intertidal mud (clay/silt with a trace of fine sand) with occasional brown flecks of decomposed wood beneath a thin surface cover of modern sand/fine shingle.

Figure 7. Auger Hole B (East Leader) showing soft grey intertidal mud, into which the posts were driven, contrasting with the modern sand surface.

Two small samples (*c.* 60 cm^3) of the top 10cm of the mud were disaggregated and washed over a 500-micron mesh sieve under cold water. The residue retained was scanned under a binocular microscope at magnifications of up to x50 to characterise the main types of macrofossils present. There were too few macrofossils for quantification to be worthwhile, but an indication of relative abundance is given in Table1.

	A	B (East Leader)
Plant macrofossils		
Salt marsh/halophyte seeds/fruits		
Salicornia sp.	+	++
cf Triglochin maritima L.		+
Wetland taxa (brackish-fresh)		
Ranunculus sceleratus L.	+	
Others		
Bryophyta	+	
Small wood fragments	+	+
Monocotylenous stem/leaf	+	+
Degraded deciduous leaf fragments		+
Charcoal fragment 1mm		+
Mollusca		
Peringia (Hydrobia) ulvae Pennant.	+	+
Cerastoderma sp. (fragments of valve)	+	+
Indeterminate immature bivalve hinge and valve fragments	+	+
Others		
Foraminifera	+	+
Ostracoda	+	
Coleoptera elytron	+	
Mineral components > 0.5mm		
Sand	+	+
Sub-rounded sandstone, 3mm		+
Sub-rounded flint up to 11mm		+

Table 1. Macrofossils and other components from auger holes A and B.

The organic residues from these samples were small and the numbers of macrofossils low. However, the predominant macrofossils – seeds of *Salicornia* sp and juvenile shells and apices of *Peringia (Hydrobia) ulvae* and fragments of *Cerastoderma* sp are entirely characteristic of lower salt marshes and intertidal mud flats and creeks. Sample B from the East Leader shows slightly more evidence for disturbance – sub-rounded pebbles and a small charcoal fragment – no doubt introduced by foot traffic.

Dating

Results and calibrations from the two roundwood samples were provided by Queens University Belfast, as follows. The locations of the samples are shown on Figures 4 and 6 as 'D' and 'E'.

East Head 1. EH1D. 20mm diameter stem. 4+ years. *Salix/Populus* sp.

UBA-44774.
Radiocarbon Age 299 ± 23 BP.
Calibration data set: intcal20.14c (Reimer *et al.* 2020)

% area enclosed	cal AD age ranges	probability distribution
68.3 (1 sigma)	cal AD 1524-1572	0.773
	cal AD 1630-1644	0.227
95.4 (2 sigma)	cal AD 1505-1595	0.736
	cal AD 1617-1653	0.264

Median Probability: 1557.

East Head 2. EH2E. 20mm diameter stem. 6+ years. *Corylus* sp.

UBA-44775.
Radiocarbon Age 317 ± 25 BP.
Calibration data set: intcal20.14c (Reimer *et al.* 2020)

% area enclosed	cal AD age ranges	probability distribution
68.3 (1 sigma)	cal AD 1520-1588	0.812
	cal AD 1621-1637	0.188
95.4 (2 sigma)	cal AD 1492-1603	0.781
	cal AD 1608-1644	0.219

Median Probability: 1561.

Plainly these two calibrated dates are penecontemporaneous.

Discussion

Three aspects of these structures require consideration: their palaeogeography and function; their morphology, especially in relation to other sites; and their dating.

Palaeogeography and function

The two structures are, at present, usually inaccessible and often invisible, being situated on intertidal sand flats, dissected by broad shallow channels, just offshore from the beach at East Head. They can be reached only at extreme Spring low tides. According to the tide gauge on Chichester Bar Beacon the tide at 18:15 on 29.3.12 was 0.34m above chart datum: for most of the rest of 2012, Spring low tides were between 0.6-0.8m (Peter King, *pers. comm*). Even given suitable tidal conditions, onshore winds may result in the water not falling locally as far as expected. It seems plain that functioning fish traps, used regularly, needed to be more

accessible than this; and it follows that the geographical position of the traps when they were constructed and used was different, providing a tidal range providing time for clearing of fish from the pounds into baskets and transporting them to the shore at low tide.

Coastal change in Chichester Harbour has been reviewed by the Museum of London Archaeology Service (MoLAS 2004, 11-13). The major historic changes in coastline morphology have taken place at the mouth of the harbour. Map regression shows that East Head has moved eastwards since 1786 by over 500m. (Searle 1975). It is possible that spit migration over this period was increased by groyne construction along beaches to the east as far as Selsey Bill which may have resulted in depletion of sediment supply. Earlier than this, MoLAS note that Chichester Harbour was rejected by the Navy Board in 1698 because it was too dangerous to enter, the entrance to the harbour being less than a quarter of a mile wide. Moreover, in 1845, an Admiralty Chart shows a sounding of just two feet at some locations during Spring low tides.

What we can draw from this is that the spit is mobile. Its location has changed since the fish traps were constructed. The map regression shows that it has over-ridden the archaeological structures once, and it may have done so before. Its position has probably been affected over the last couple of hundred years by groyne construction but, over the longer term, climate change would have been the main driver, in terms of sediment supply and modification of the harbour entrance. Mobility may have been greatest during stormy climatic phases, for example in the 14th century AD and onwards (Murphy, 2014, 4-6 and 132-4). Although archaeological structures are fixed in position, associated geographical features are not.

The sediments and macrofossils from auger holes A and B in intertidal mud, (into which the posts were driven), plainly indicate a low energy intertidal mudflat environment with lower salt marsh in the vicinity. This shows that the traps were originally emplaced in a north-south flowing intertidal creek in a location protected from high energy tidal influence behind a precursor of the modern East Head spit and dunes. Changes in coastal morphology led to their abandonment.

What did they catch? Recent fisheries' monitoring netting within the Medmerry Realignment Area provides some information: of the 27 species caught, sand goby dominated, followed by sand smelt and then bass. 63% of the bass were juveniles, less than 70mm long. Young plaice, flounder, Dover sole and mullet were also caught (Environment Agency 2016, 27-29).

Morphology and inter-site comparisons

The majority of Anglo-Saxon to post-medieval fish traps in the UK are 'simple' V-shaped structures, though sometimes they are exceptionally large (Strachan 1998). However, Cooper *et al* (2017) have reported a trap with distinctive V-shaped leaders and a circular pound, directly comparable to those at East Head, near Ashlett Creek on the tidal mudflats of Southampton Water, Hampshire. Radiocarbon dating of oak roundwood stakes taken from the main weir structure date it to the Middle Saxon period It has a close parallel with another Saxon period weir at Binstead on the Isle of Wight. (Some circular pounds are associated with traps in the Severn estuary, but these are much smaller and seem to relate to a different type of stationary fishery.) In addition, a circular post setting at Medmerry, currently under investigation, may prove to be of similar type.

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The so-called Sinah Circle in Langstone Harbour also requires consideration here. This roughly circular wooden structure at about -2.7 to -3m ± 0.5 m OD, on the northern edge of Sinah Lake is likewise very rarely accessible on foot. It is dated to 980 ± 50 BP (GU-7275) (Allen and Gardiner 2000, 112- 123). Some 6m in diameter, and roughly circular-ovoid in form, it comprised 24 roundwood and split timbers (27 are estimated to have been present originally) with a gap to the northeast. Wattle and sails were present between the main timber uprights. There was a scatter of large flint nodules. Although no leaders were noted at Sinah Lake, the similar size and form of the Sinah Lake pound to those at East Head is worth noting.

The Ashtead Creek, Binstead and East Head traps (and perhaps the Sinah Circle) show strong structural similarities with examples in use today on the French shore of the English Channel, showing a similar round pound and leaders. In particular Cooper et al. (2017) refer to a fish trap at Hauteville-sur-Mer which was photographed in 1927 and 2004. They also reproduce an 18th century illustration of a near-identical structure from France. In England, this form of fish trap seems, so far, to be limited to the Solent region.

Dating

As with most other intertidal wooden structures, datable artefacts are absent and so radiocarbon dating is required to establish a chronology. Cooper *et al.* (2017) and Murphy (2010) provide partly complementary compilations of radiocarbon dates from intertidal fish traps. The majority of dates are Anglo-Saxon and early Medieval.

Consequently, comparable dates were expected for the East Head structures: receiving post-Medieval dates, most probably 16th century, was a surprise. However, recent work on fish traps at Medmerry, west of Selsey, has also produced post-Medieval radiocarbon dates, (Murphy 2020), pointing to a renewed phase of stationary fishery between about 1500-1650 AD. The 'pound and leader' traps at East Head are, however, different from the 'post-and-brace' structures at Medmerry, which may have had to be more robust, being on an open coast. Taken together these traps indicate a post-Medieval phase of stationary fishery on the shoreline. James Kenny notes that Page (1907, 270) records that in 1607 'proceedings were instituted against eleven persons in different parts of the Selsey peninsula for destroying "spawne and frye and the brood of sea fishe" by the use of "weares and other devices". Juvenile fish would, of course, have been present in the shallow shoreline waters in the post-Medieval period at East Head so there was some basis for offshore fishermen to object to, and litigate against, stationary shoreline fishermen using traps to catch, *inter alia*, juveniles. Whether this was on a large enough scale to impact offshore stocks and, so, limit the catch and hence the livelihood of the people fishing offshore is uncertain. At any rate, the offshore fishermen thought it did.

The 'pound and leader' fish traps therefore date to the Anglo-Saxon and post Medieval periods in the Solent area, between Southampton Water and East Head and onto the Isle of Wight. At present they do not seem to occur elsewhere in England. Nor are we aware of any similar structures of intermediate medieval date. We also know of 18th and 20th century structures of very similar type from Northern France. This is a rather scattered and chronologically diverse set of structures. It is possible that structures of intermediate date will be found, giving a more continuous record, but perhaps not. Independent invention of 'pound and leader' traps is possible, but one origin and then the spread of the idea seems perhaps more likely. It may be premature to speculate who influenced whom around and across the

English Channel in this type of construction. Indeed, Cooper *et al.* (ibid) speculate that there may even have been an 'archaeological' transmission of knowledge: later fishers, familiar with their own shorelines, may have observed the remains of earlier structures and then replicated them. Only further observation and recording will help to answer this.

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