



Uncovering the Past

An archaeological
study of oyster
beds at Emsworth

Project Report

April
2008

Project 418

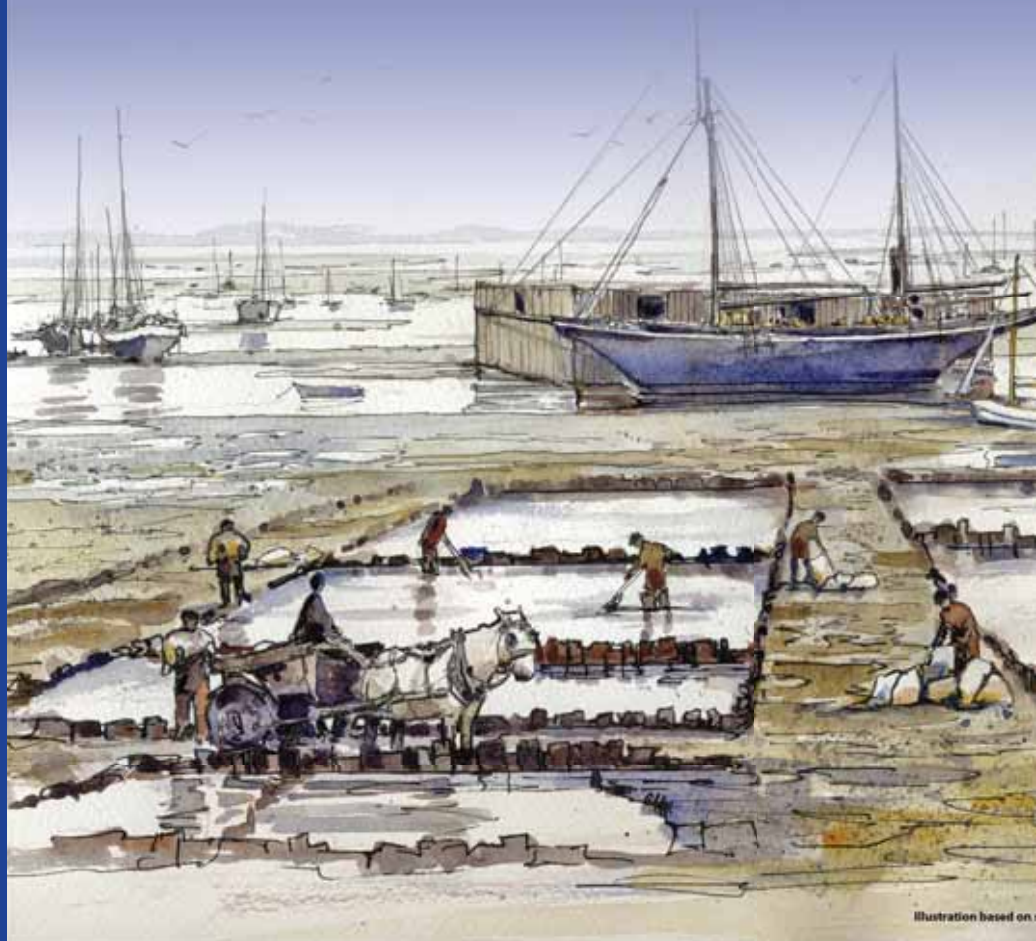


Illustration based on

Uncovering the Past

An Archaeological Study of Oyster Beds at Emsworth

Final Project Report

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1. Introduction

Emsworth Maritime and Historical Trust (EMHT) in partnership with Chichester Harbour Conservancy and the Chichester District Archaeological Society (CDAS) commissioned The Hampshire and Wight Trust for Maritime Archaeology (HWTMA) to advise and assist an archaeological investigation of the old oyster pits on the foreshore at Emsworth.

The archaeological survey of the exposed remains of the oyster pits in the harbour was led by HWTMA as the archaeological consultant, and was carried out by CDAS and EMHT volunteers. Parallel documentary research work was carried out by EMHT to supplement and inform this project report.

Funding for this project has been provided by a grant from the Chichester Harbour Sustainable Development Fund.

1.1 Survey Area

The area surveyed lies at the north side of Emsworth Harbour just below the present sea wall, west of the remains of the slipway on the foreshore and the east of the hard still in use on the foreshore by the quay. The main concentration of surviving oyster pits lies approximately around the point 475053, 105491 (OSGB 1936)

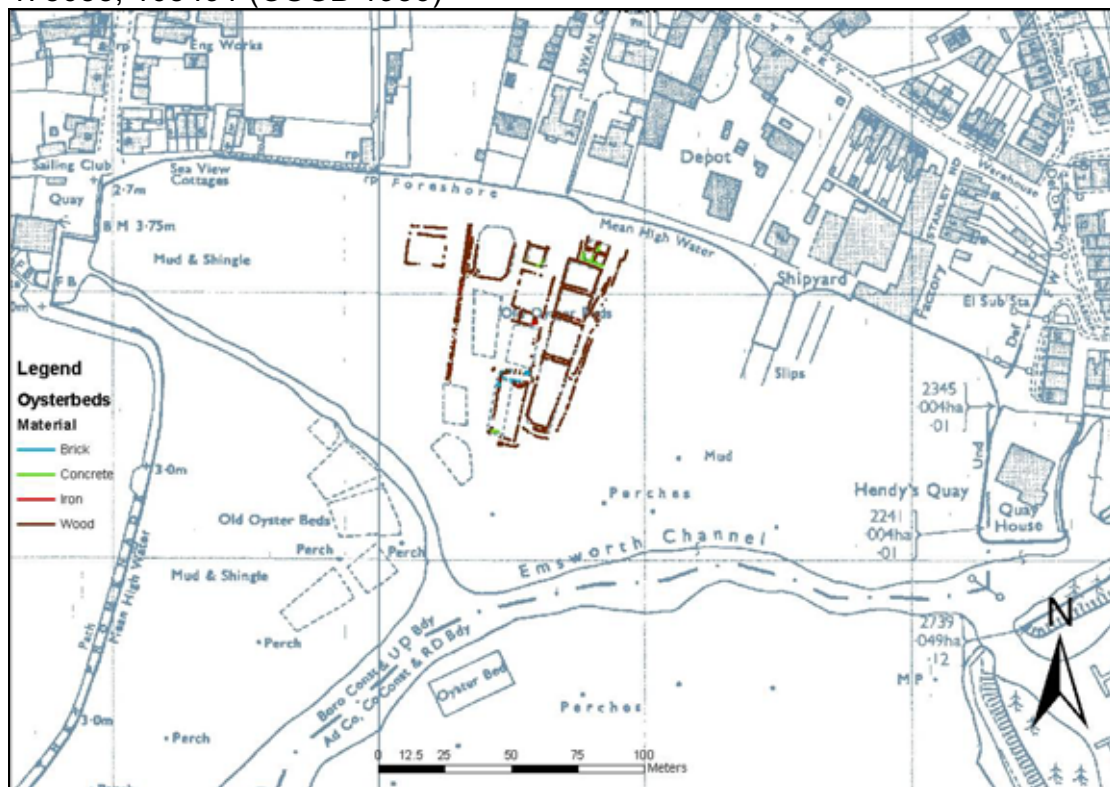


Figure 1: Emsworth Harbour showing surveyed structures, the Ark is marked as an Oyster Bed south of the Channel (Based on 1974 OS map)

The Ark lies to the south of the main Emsworth Channel and the surviving pits and its centre point is approximately 475035, 105356 (OSGB 1936).

1.2 A Note on Terminology

During the course of research and investigations into the oyster industry of Emsworth, it became apparent that the name bed has a specific meaning within the oyster fishing industry so the following definitions are given for clarity and are the terms used within the text.

Oyster pit - a timber lined pit or pond constructed on the foreshore, covered by high water in which immature oysters or oysters close to maturity are stored for easy harvesting for the market. These structures are also called oyster ponds.

Oyster bed – also called a lay. This is a patch of seabed either natural or manmade where oysters could grow. Potential bed sites are sometimes prepared by dumping broken shells. This as an aggregate known as 'cultch', which encourages young oysters, called 'spats', to form new beds.

1.3 Project Background

This project has been developed by the EMHT in partnership with Chichester Harbour Conservancy, arising from the Heritage Lottery Fund project "Rhythms of the Tide" 2004-2007. The programme supported projects which increased understanding of the Harbour resource, developed a greater awareness of its special qualities and promoted the sustainable management of the Harbour environment.

As part of the History and Archaeology programme of the Heritage Lottery funded projects, an archaeological investigation of foreshore structures in Chichester Harbour was undertaken, with a desk-based assessment followed by field investigation of some 37 sites across Chichester Harbour. Structures associated with oyster farming were identified at 5 sites, with the structures at Emsworth being noted as the best preserved.

Emsworth Museum has a substantial number of documentary records relating to the former oyster industry. This project has sought to develop on the existing basic field investigation and combine a more detailed archaeological survey with documentary research to meet agreed project aims outlined below.

1.4 Project Aims

There are five principle project aims, which are described in further detail below.

1. To investigate the extent of the remains of the oyster pits on Emsworth foreshore and to describe their character, methods of construction and development.
2. To establish a control framework using modern survey methods to act as reference points for detailing and mapping
3. To involve volunteers and where necessary train them to undertake detailed site descriptions and mapping

4. To assess the significance of the current archaeological resource and to understand how the pits were used within the oyster farming process.
5. To provide expert assistance to enable the results of the field work to be written up to an appropriate standard.

Aim I.

To investigate the extent of the remains of the oyster pits on Emsworth foreshore and to describe their character, methods of construction and development.

Objectives:

- To undertake a reconnaissance of the site to determine the visible extent of the structures.
- To compare with the descriptions made by consultants, Maritime Archaeology Ltd, in 2006.
- To examine OS Landmark series maps dating from Epoch 1 (1866), Epoch 2 (1898), and Epoch 3 (1909) and determine which structures have been lost.
- To examine contemporary photographs held in Emsworth Museum or known to Chichester Harbour Conservancy.
- To examine recent aerial photos of the site to aid assessment.
- To produce a record of the current remains and assess what has been lost.
- To describe materials and methods of construction and whether all the pits experience similar tidal conditions and may serve a similar purpose.

Aim II.

To establish a control framework using modern survey methods to act as reference points for detailing and mapping.

Objectives:

- To undertake a field survey to establish accurate positions and dimensions of visible structures
- To establish control points using suitable stable positions so that all structures are within 30 metres of at least 2 control points. Control point locations should be to Ordnance Survey datum and coordinates with expected accuracy of +/- 20mm in height and +/- 50mm in X,Y.
- To supply coordinates electronically so that they are compatible with MapInfo or similar GIS format
- To supply suitable base plans of the control points, which can then be used by volunteers to fill in details.

Aim III.

To involve volunteers and where necessary train them to undertake detailed site descriptions and mapping.

Objectives:

- To produce a volunteer guidance manual
- To plan and provide a volunteer training exercise for up to 25 volunteers.
- To liaise with EMHT and CDAS who will provide names of willing volunteers to help with detailed field survey and recording of structures
- To assess the skills of volunteers and offer basic training in field recording and taking the necessary measurements for accurate detail surveying. Equipment may include tape measures, ranging rods, set squares and level and staff for heighting. Should a theodolite be available then an experienced operator will be present (CDAS trained)
- To oversee the production of a photographic record of the structures
- To act as supervisor for the initial part of the detail survey, to brief the volunteers in what to survey and how to record, and ensure that data is being gathered appropriately to the task. Sufficient experienced volunteers will be available to organise subsequent survey days and to collate the results.

Aim IV.

To assess the significance of the current archaeological resource and to understand how the pits were used within the oyster farming process.

Objectives:

- To make an assessment of the potential for further studies including an excavation and possible dating techniques.
- To assess the risks, threats to and vulnerability of the features given their location on the foreshore.
- To examine any clues as to the role of the pits within the oyster farming process especially in relation to the transfer of oysters between pits, the “Ark” and with the larger vessels of the Oyster fleet. Documentary evidence exists relating to a famous court case over compensation to JD Foster.
- To produce an outline report putting the oyster pens in context of the Emsworth oyster industry.

Aim V

To provide expert assistance to enable the results of the field work to be written up to an appropriate standard and presented to the public.

Objectives:

- To assist in the collation of results and the production of plans from observations carried out by the trained volunteers.
- Compile a summary report with recommendations for further work. This should provide an assessment of the significance of the surveyed remains in the context of the oyster industry
- To advise on the appropriate standards for the reporting of results

- To suggest appropriate means of presenting the results of the studies in displays at Emsworth Museum

2. Documentary Research

At the time of writing the synthesis of documentary data was not complete. However, there is sufficient material based on the data gathered for the museum exhibit and from other sources to provide an outline of the nature and size of the documentary resource from the Emsworth oyster industry.

2.1. Documentary Evidence

Key primary sources include evidence and documents from the court case surrounding J. D. Foster's challenge to the closure of his oyster fishery in the 20th Century and his action against Warblington Council. These records and additional records on the case from the Worshipful Fishmonger's Hall in London are an invaluable resource for understanding the workings of the late 19th and 20th century oyster fishery at Emsworth.

There are also a number of booklets and local history materials that mention in various degrees of detail the oyster industry of Emsworth including works by David J. Rudkin and Robert Whitfield. A full list of documents cited in this report is given in the References section at the end of this report.

2.2 Map and Chart Evidence

Early Map Evidence

Maps and charts predating the earliest Ordnance Survey maps of Emsworth were not identified or reviewed as part of this project. The inclusion of smaller coastal features is not always consistent on such maps, but a review of historic charts and maps, predating the date of the 1st edition OS mapping of the area may provide earlier documentary evidence for the development and extent of the Emsworth pits.

19th and 20th Century Mapping

The Ordnance Survey Mapping and annotated maps based on similar maps of the 18th and 19th centuries show the extent and arrangement of the oyster pits from the early 19th century onwards. Mapping with quite closely spaced date range has been used to provide a more detailed analysis of the development of the pits. **Figure 2** below is provided here to allow for the identification of the extant pits, discussed below.

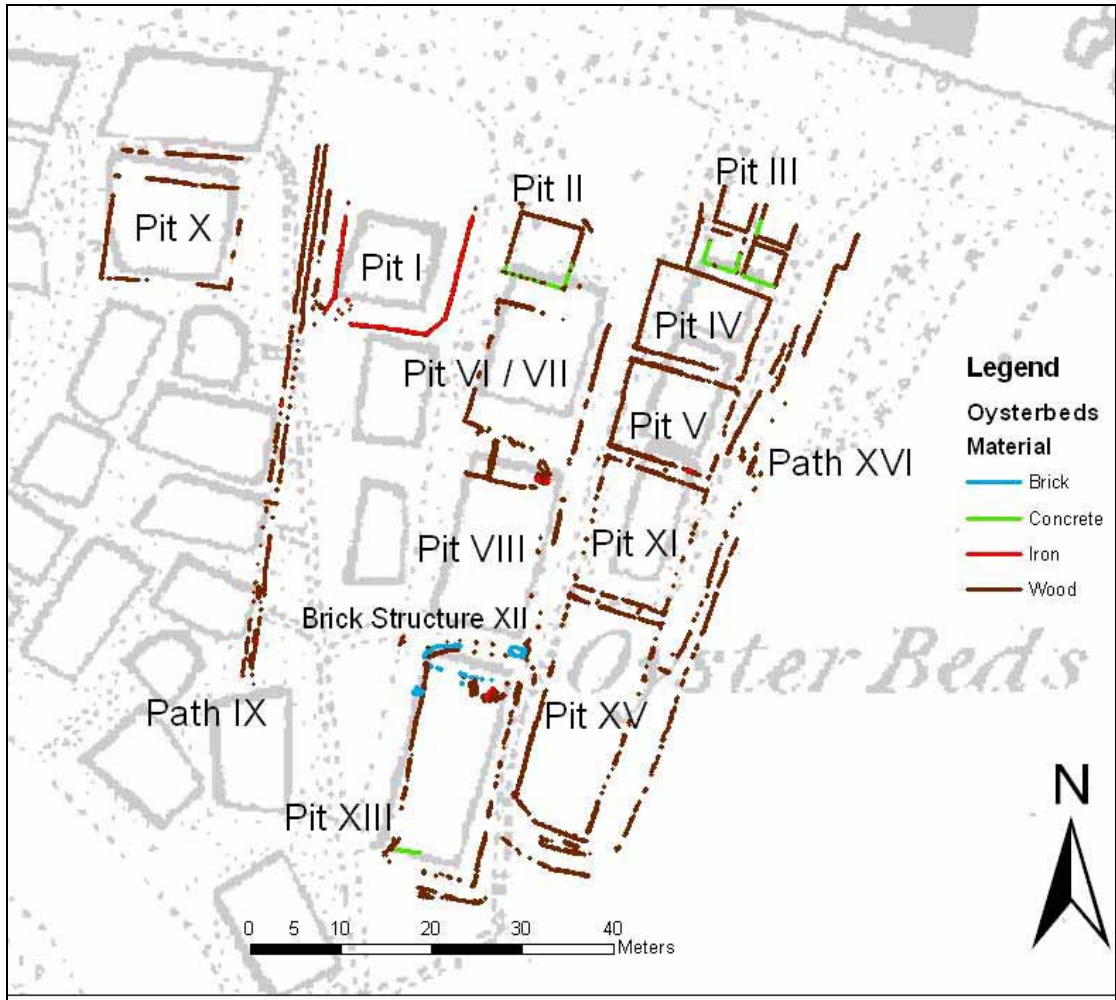


Figure 2: Overall Site Plan showing main exposed features including oyster pits and pathways on the Emsworth foreshore discussed below.

Epoch 1- Hants 1866

On this map of 1866, it is clear that the oyster pits dominate the foreshore between the slipway to their east and the Mill pond to the west, and further pits are shown south of the channel running from the Mill that flowed into the main navigation channel.

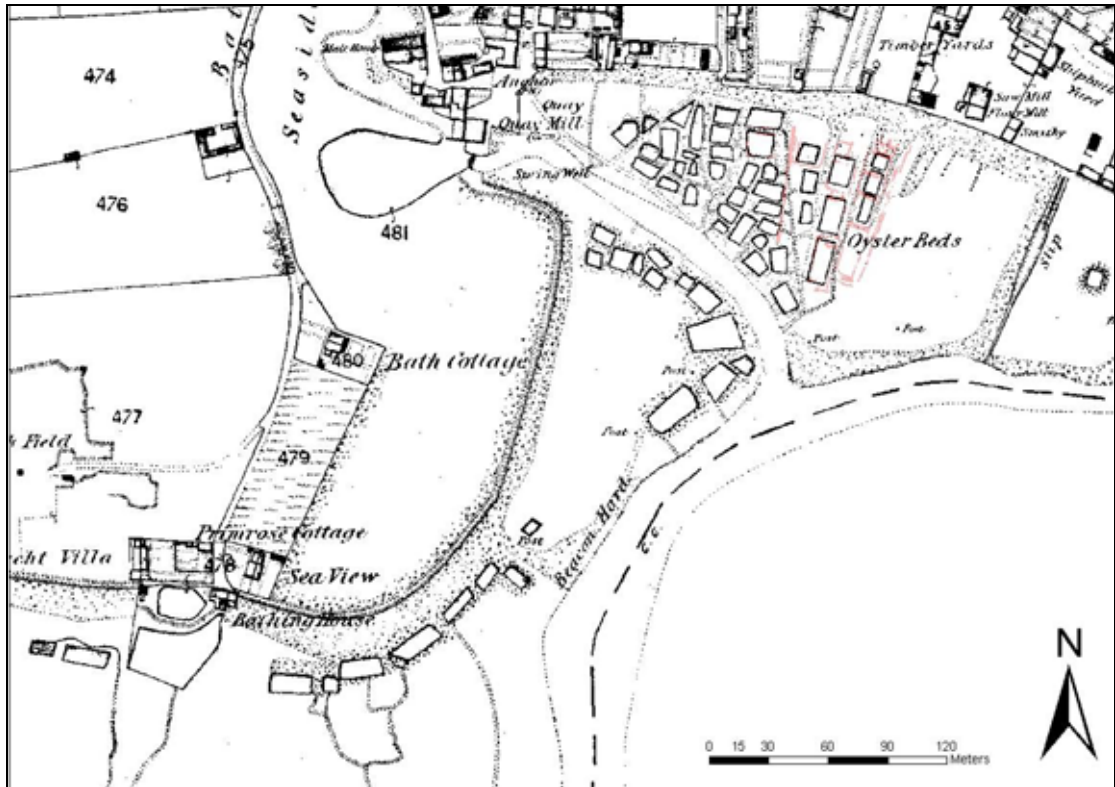


Figure 3: The 1866 map showing extensive Oyster beds to the north of the Emsworth foreshore and along the Mill Pond to the west.

The paths and small channels used to provide access to the pits and control the water levels in at some of the pits are also mapped and were obviously quite apparent and visible for survey.

The map shows that most surviving pits (IV, V, VI, VIII, X, XI, XIII) on the foreshore seem to be located in approximately the same positions as the pits shown in this map, suggesting these pits have been around for at the very least 140 years.

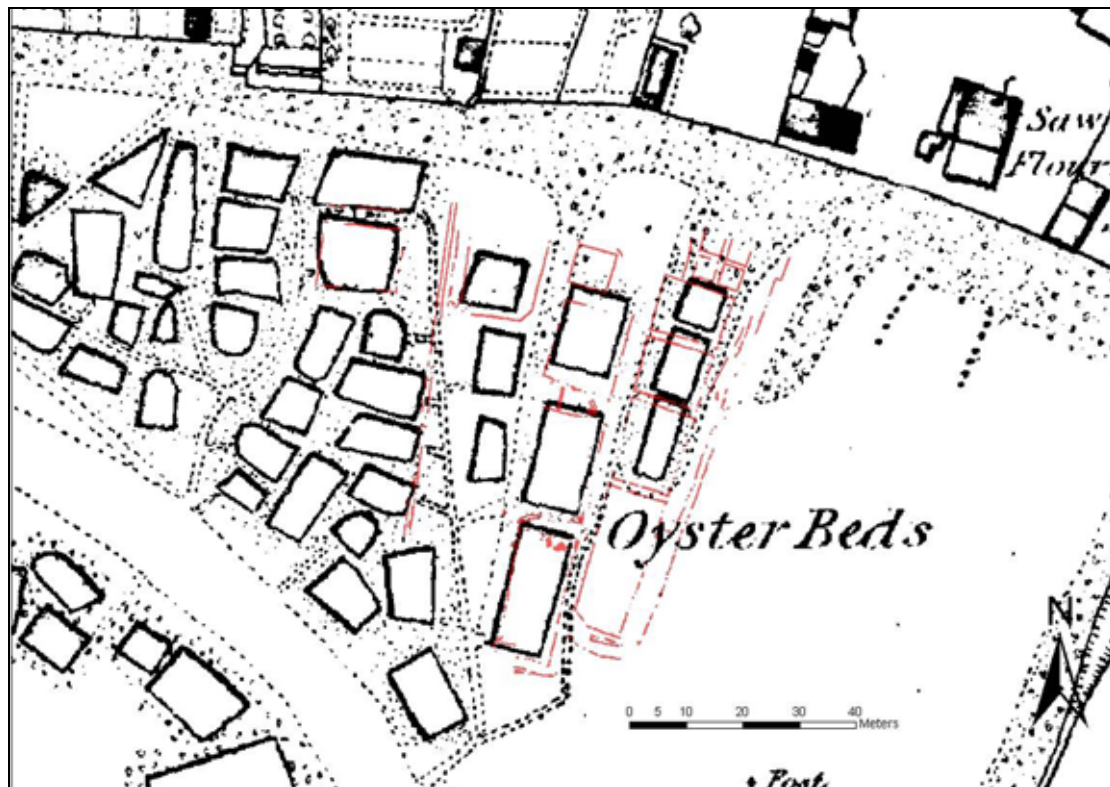


Figure 4 The main cluster of pits on the Emsworth foreshore in 1866, showing the outline of the surviving pits in red.

Given the extent of the pits shown on the map, it is quite likely that some of the surviving pits may well have been around for some time prior to the date of this map, but their appearance on this map provides a useful *terminus ante quem*.

Pits II, III and IV do not appear to have been built at this point and Pits I, IV, V and XI appear to be very different in size and shape. There is a possibility that this may be due to survey error on the map, but the surveyed remains of Pits VI, VIII and XIII seem very similar to those portrayed on the map indicating that IV, V and XI have probably been modified to some extent since this period.

The outline of a three sided structure is marked north of Pit VI, where the remains of Pit II are now located. The outline of the structure is much larger than the surveyed remains of Pit II so this may represent an earlier Pit already disused or obscured in some way at the time of the survey. This may even be evidence of an earlier phase of pits built over or replaced by more clearly marked pits.

There is another three sided feature at the top of the foreshore visible on the map between the main concentration of pits and the slip to their east which seems to indicate another pit possibly out of use or obscured at the time of the survey of this map. Similar outlines are visible to the west of the main concentration of pits. These features may indicate earlier outlines of pit structures, alternatively they may represent areas of standing water on the

foreshore or simply areas defined by the paths or channels visible on the foreshore.

Epoch 1 Sussex 1887

The next map dating approximately 20 years from the Epoch 1 map shows no change to the beds on the foreshore. However, there is a one notable difference. Behind the seawall to the west of the harbour inside the Mill Pond, a large area is shown with a number of long interlinked linear structures inside it, clearly marked as 'Old Oyster Beds'. These features do not appear on the previous map, nor on any subsequent maps.

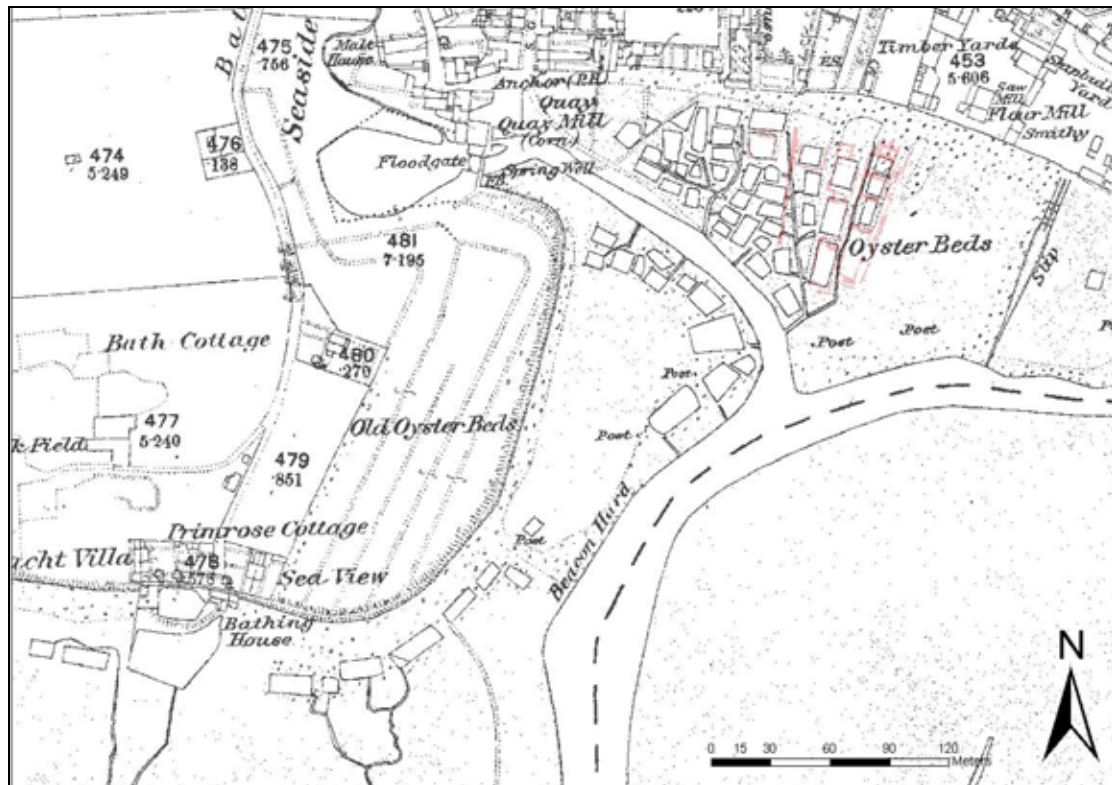


Figure 5: The 1887 map showing the general extent and size of the oyster pits

There is a possibility that these features have been incorrectly marked, and it is curious that these structures are clearly marked on this OS map but not any others. There may have been lower water levels in the lake during the survey for this map that exposed these features that have not occurred since, although it seems odd these were not noted again.

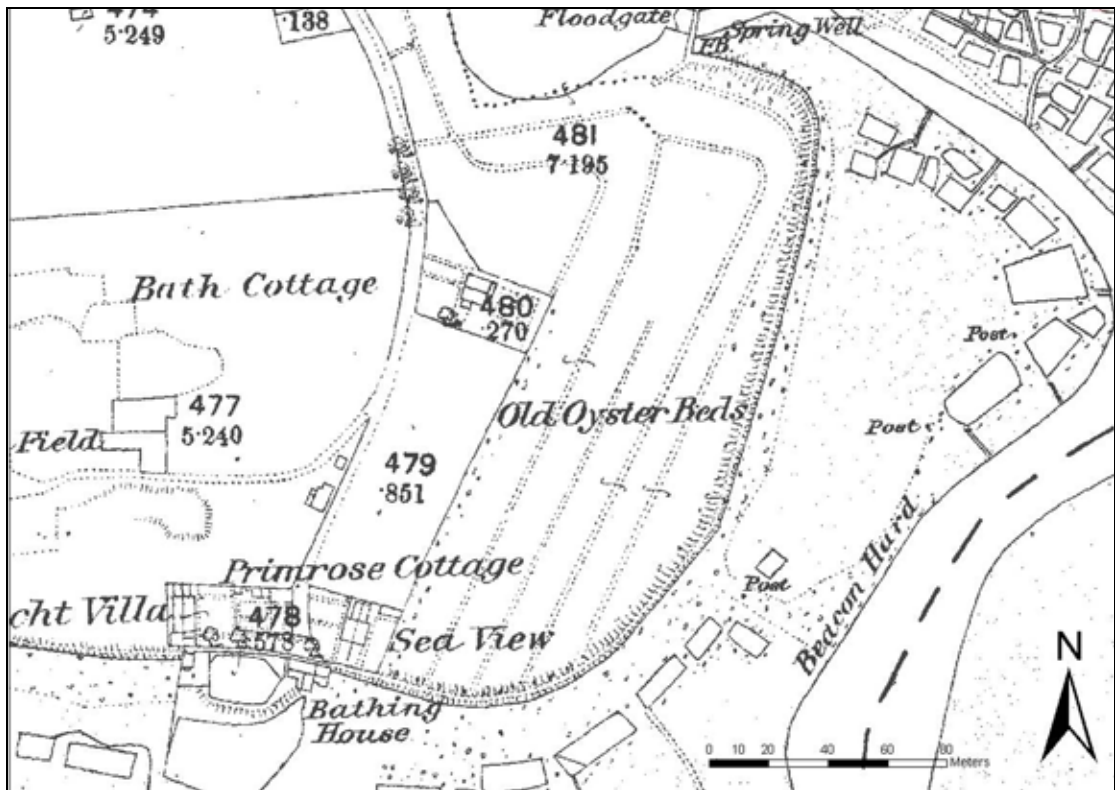


Figure 6: Linear features recorded in the Mill Pond as Old Oyster Beds, these may be drainage channels

The structures are extensive and bear little resemblance to the well defined generally square and rectangular oyster pits of the foreshore. They may indicate earlier oyster farming structures, but the 1948 aerial photograph shows linear drainage features in the pond, it seems the most likely interpretation is that they are drainage channels from the Mill Pond incorrectly identified on the OS map.

Epoch 2 Sussex 1898

The general distribution of the surveyed pits appears unchanged in this map, although there are some changes such as the addition of Pits II and XV.

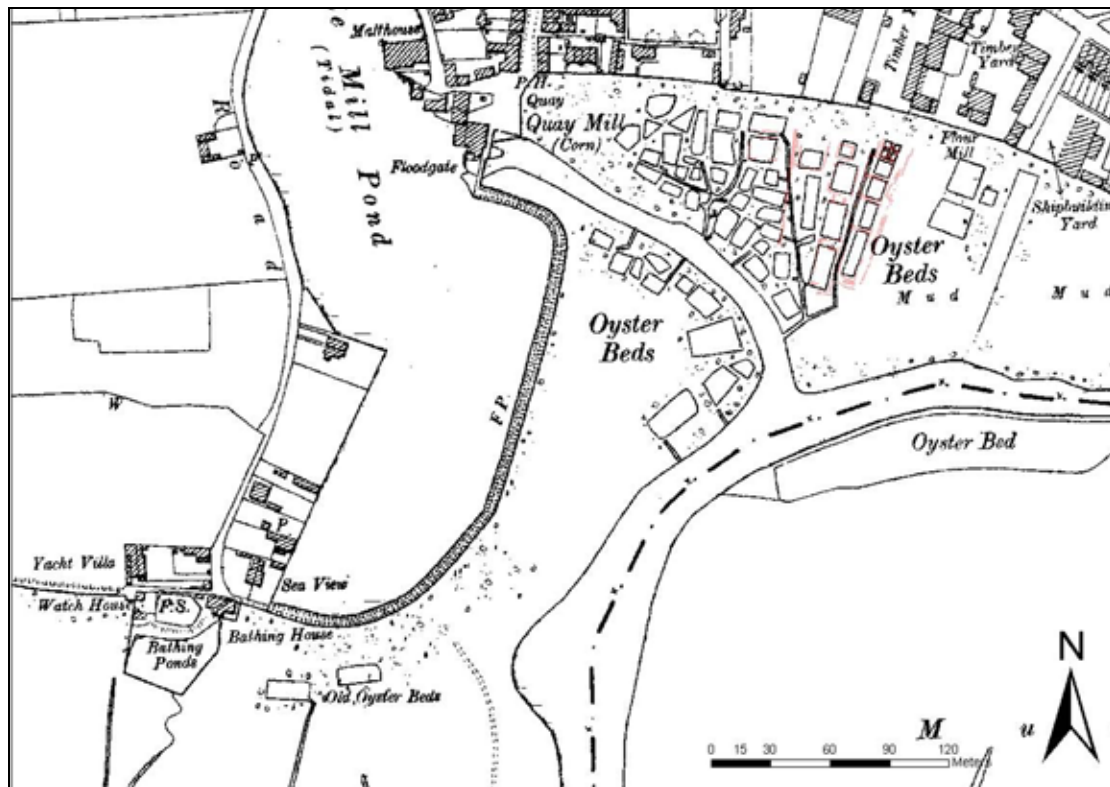


Figure 7: The 1898 map showing the general extent of the oyster pits on the Emsworth Foreshore.

There are large changes elsewhere on the foreshore. An oval pit feature to the west of the oyster pits has been built, and another small square pit to the east of the slipway and another square pit by the Mill Pond are no longer present to the north side of the harbour. In addition several pits along the side of the Mill Pond have gone and only two to the south of the Mill Pond are still shown, marked as “Old Oyster Beds”. These pits have clearly fallen out of use and the main concentration of the oyster pits seems to lie further to the north from this period onwards.

A large oyster bed to the south of the main channel is now marked. It is known from documentary research that this large bed was used to grow and mature oysters rather than just store them for market like the pits to its north.

Where the three sided feature to the east of the beds was just noticeable on the Epoch 1 map, a large rectangular structure is now evident, with another large structure to its south and a small square structure immediately to its east. It is assumed that these are oyster pits, but the 1898 OS map based ‘Plan of Oyster Bed and Layings’ does not indicate ownership of these structures as this section of the map is covered by the 1915 derived portion of the map.

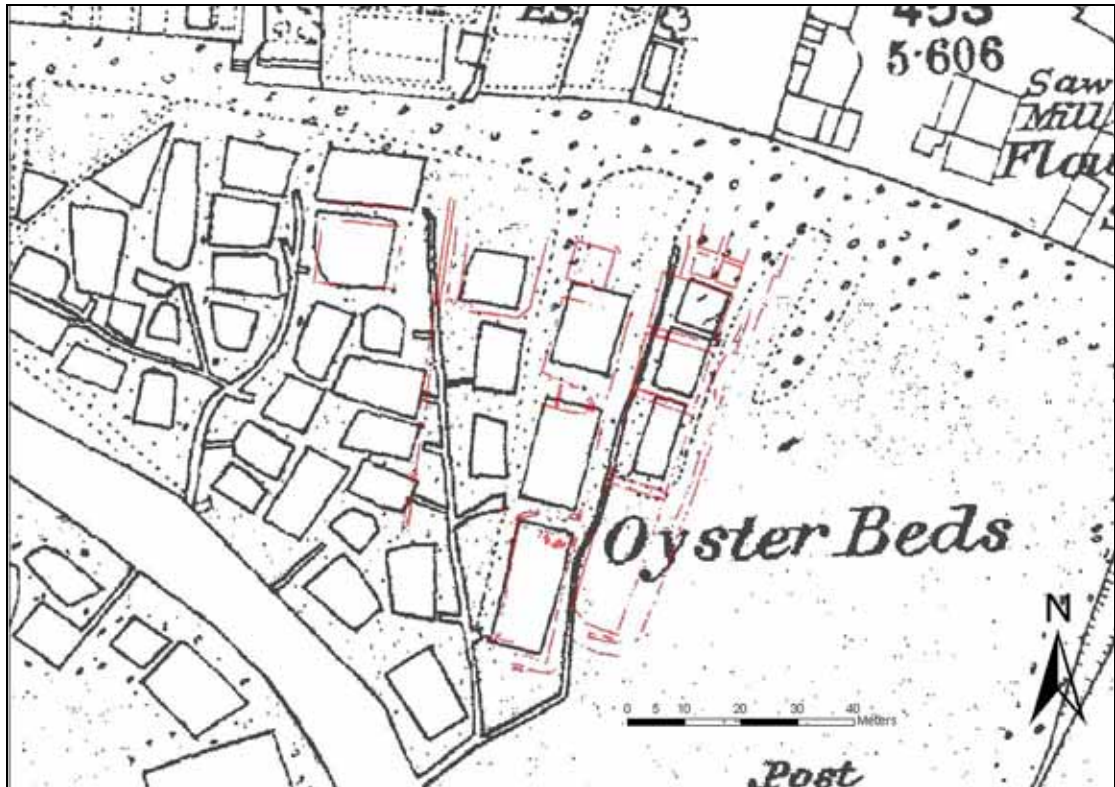


Figure 8: The main cluster of oyster pits from the 1898 map.

Plan of 'Oyster Bed and Layings' (based on 1898 and 1915 OS Map)

The map outlining the ownership of the pits is derived from the 1898 OS map, but the right portion of the map showing the positions of boat moorings is annotated as being from the 1915 OS map.

As a composite of two maps its use is limited for tracing the development of the pits, but it does provide useful ownership information, indicating which pits were owned by Jack Kennett, J. D. Foster, The Fowley Island Oyster Company and by other fishermen. It illustrates quite well how ownership of the beds in the late 19th century was dominated by Foster and Kennett.

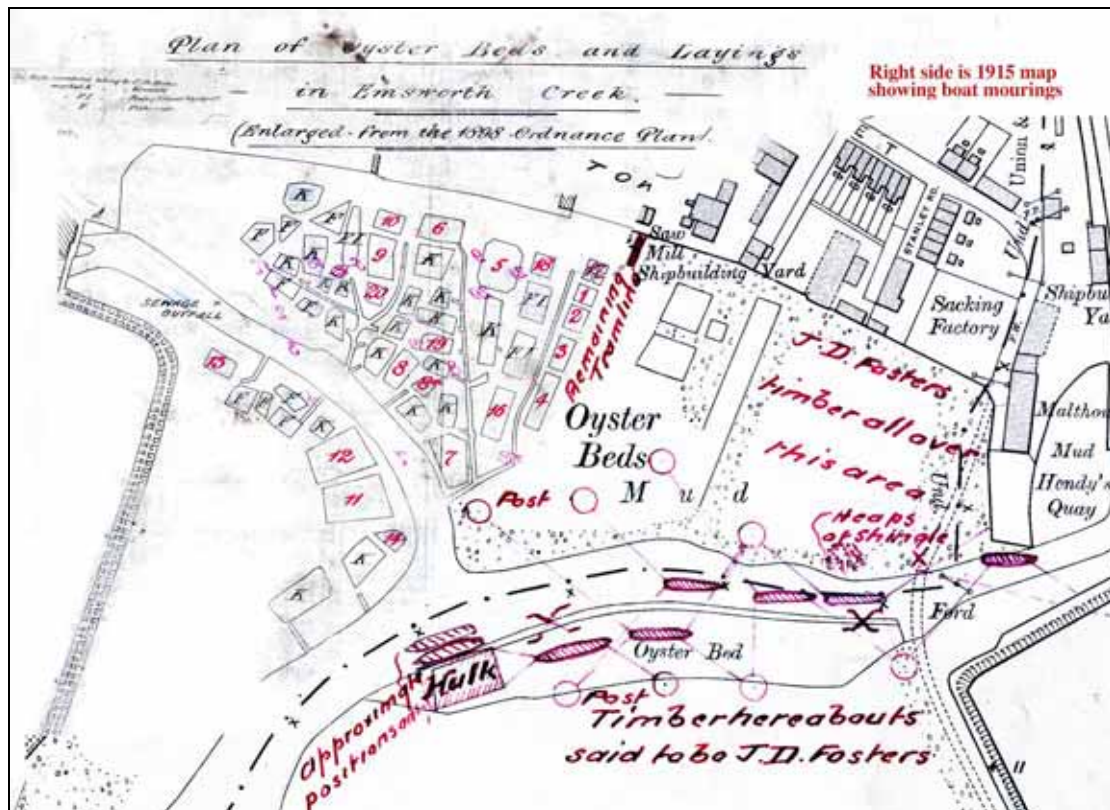


Figure 9: The composite ownership and moorings map based on OS maps from 1898 and 1915.

Epoch 3 Hants 1909

A further three pits at the western edge of the main concentration of pits are not marked on this map suggesting the number of pits in use has further declined. Of the pits lost, two are marked as owned by fishermen and one by Jack Kennett.

As the industry had collapsed following the poisonings of 1902, the loss of these pits may reflect the onset of the decay of the pits. There is an alternative explanation that these pits may be the remains of pits used by other smaller oyster businesses or fishermen that were abandoned prior to this as Foster and Kennet came to dominate the local trade, or possibly some time before this when the pits to the west seem to have fallen out of use.

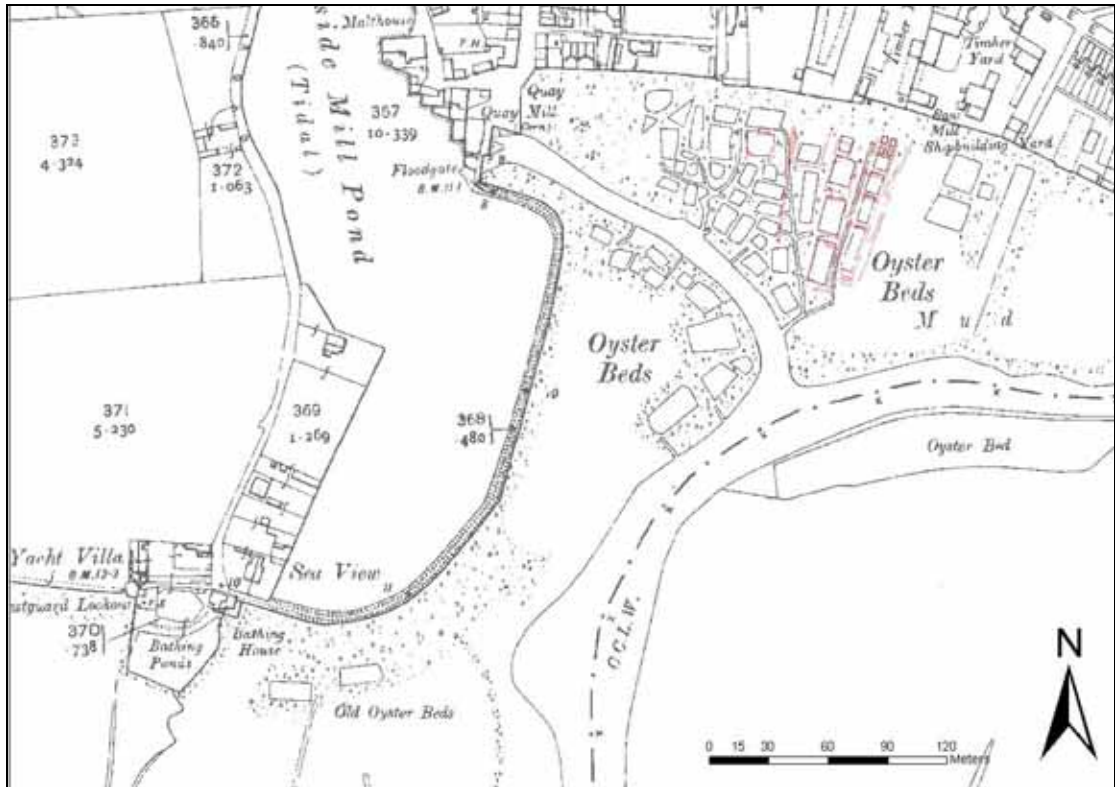


Figure 10: The 1909 map showing the general extent of the oyster pits on the Emsworth Foreshore.

Curiously, the Ark is not shown on this map. The ‘Plan of Oyster Beds and Layings’ described above does include the position of the Ark, but it as this map is a composite put together from the 1898 OS map showing the beds and 1915 OS map showing ‘boat moorings’ [sic]. It seems likely that the drawing of the Ark does not date to 1898, but to the date of the later map of moorings from 1915. The earliest map evidence for the Ark in this position is therefore only from the next map discussed, dating from 1912.

Epoch 3 Sussex 1912

There appear to be no further changes to the number or size of the pits from the previous map dated 1909. The most obvious change is the appearance of the Ark. It is clearly shown in the same position it is in today, but mistakenly marked as an ‘oyster bed’.

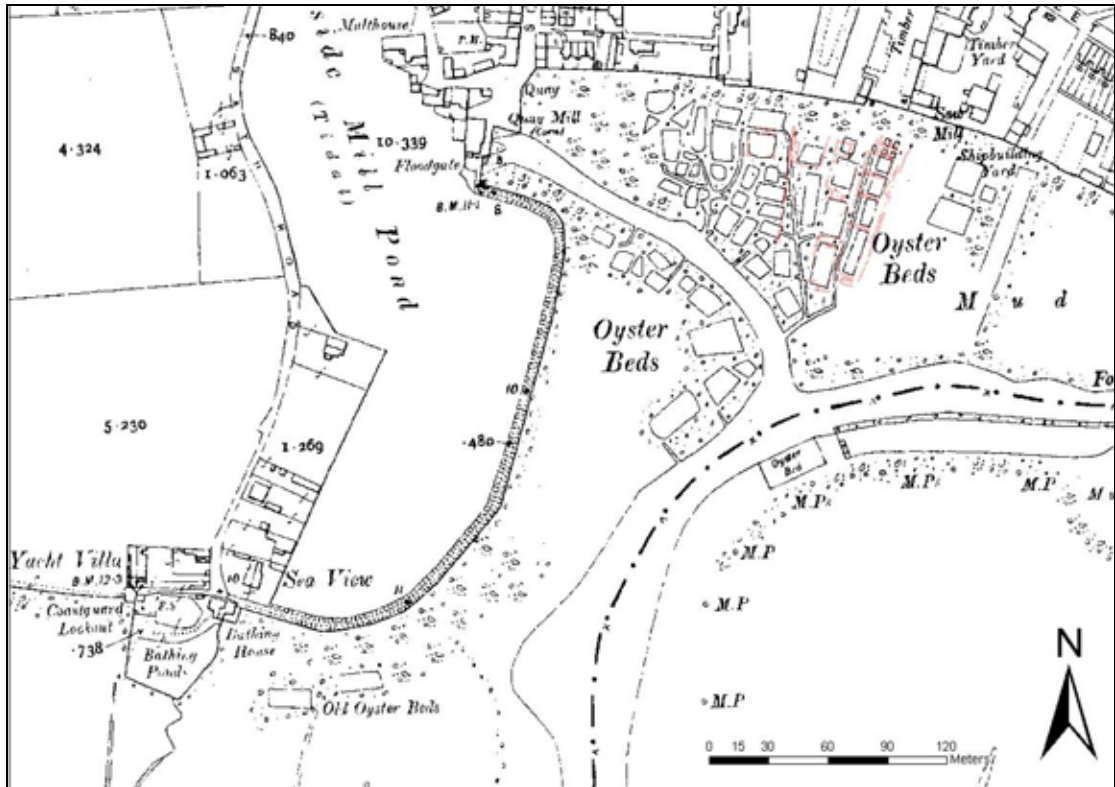


Figure 11: The 1912 map showing the general extent of the oyster pits in the Emsworth foreshore

The appearance of the Ark so late, and after the collapse of the industry, suggests that perhaps it was moved here from another location after the industry had collapsed although Rudkin notes there is documentation confirming the Ark in this position from before 1898 (2004 19). The large bed to the south of the channel has been truncated by the Ark and appears slightly smaller than on previous maps.

Epoch 4 Hants 1932

Twenty years following the previous map the decline of the oyster industry is obvious. All of the remaining pits with the exception of Pit III, IV, V, XI and XV and one pit to the west of the main concentration of pits are drawn with broken lines, probably to indicate a dilapidated state. Also almost all of the offshoots of the main drainage creeks are no longer drawn, possibly indicating they have become filled with shingle and mud without regular use. The main drainage channels are shown, though, and the outline of what is probably Path XVI is shown with an unbroken line, suggesting its remains were still quite clearly defined at this time.

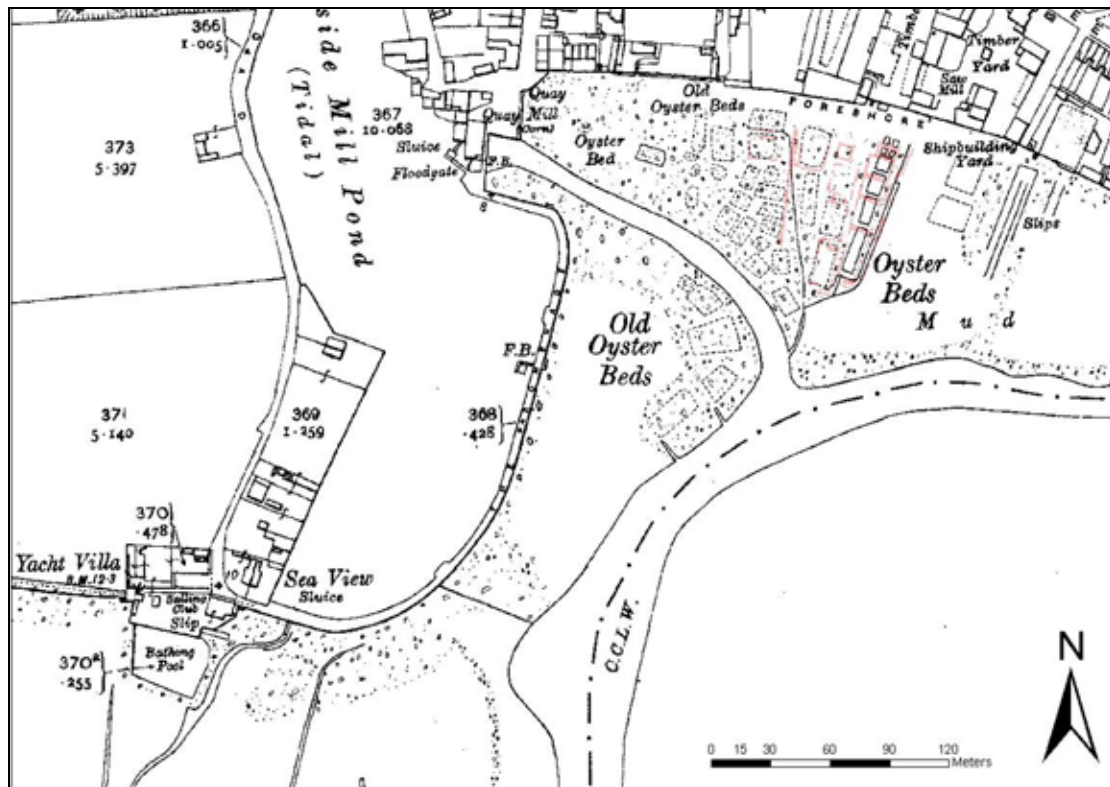


Figure 12: The 1932 map showing the general extent of the oyster pits on the Emsworth foreshore.

Several pits to the west and south of the Mill Pond channel are no longer shown, suggesting they have completely disappeared from view by this time. The majority of the lost pits, seven in all, were owned by fishermen, although of the other four pits lost two each were owned by Kennett and Foster. The two remaining 'old oyster beds' that were shown to the south of the Mill Pond have also completely disappeared by this time.

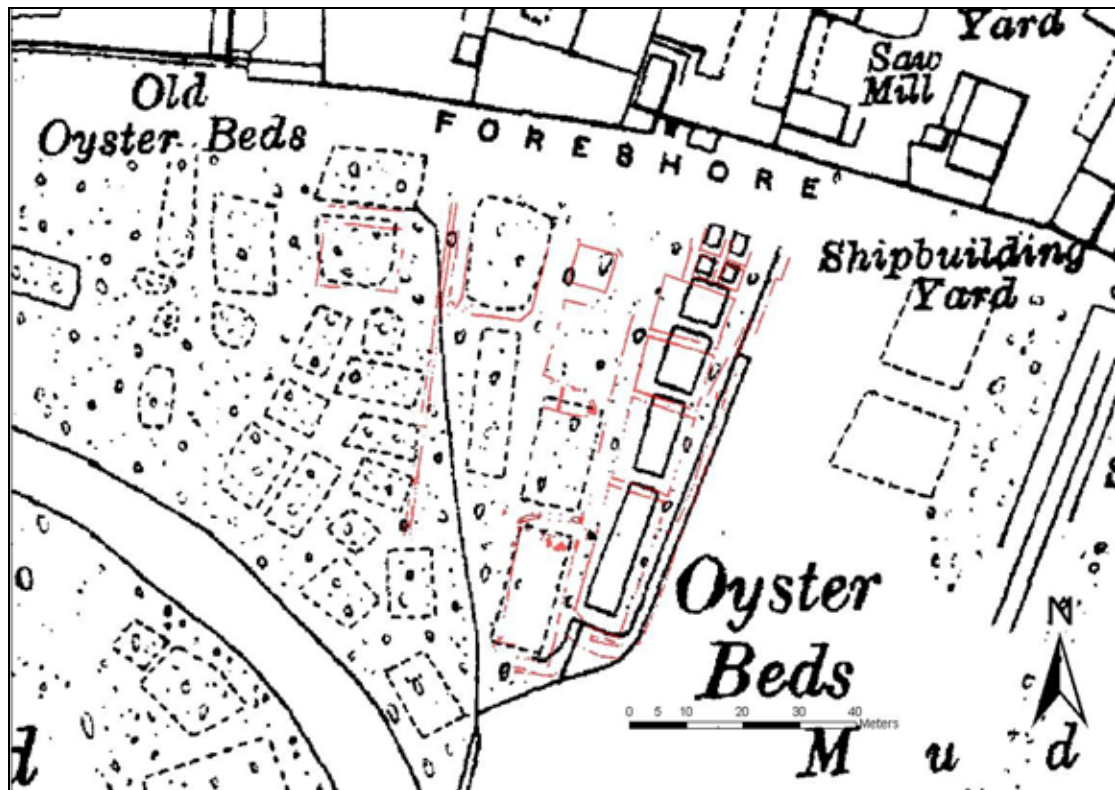


Figure 13: The main cluster of oyster pits from the 1932 map.

Epoch 4 Sussex 1935

The Sussex map does not show anything north of the main Emsworth channel, but it shows the Ark and the large oyster bed to the south of the channel in place and unchanged from the 1932 map.

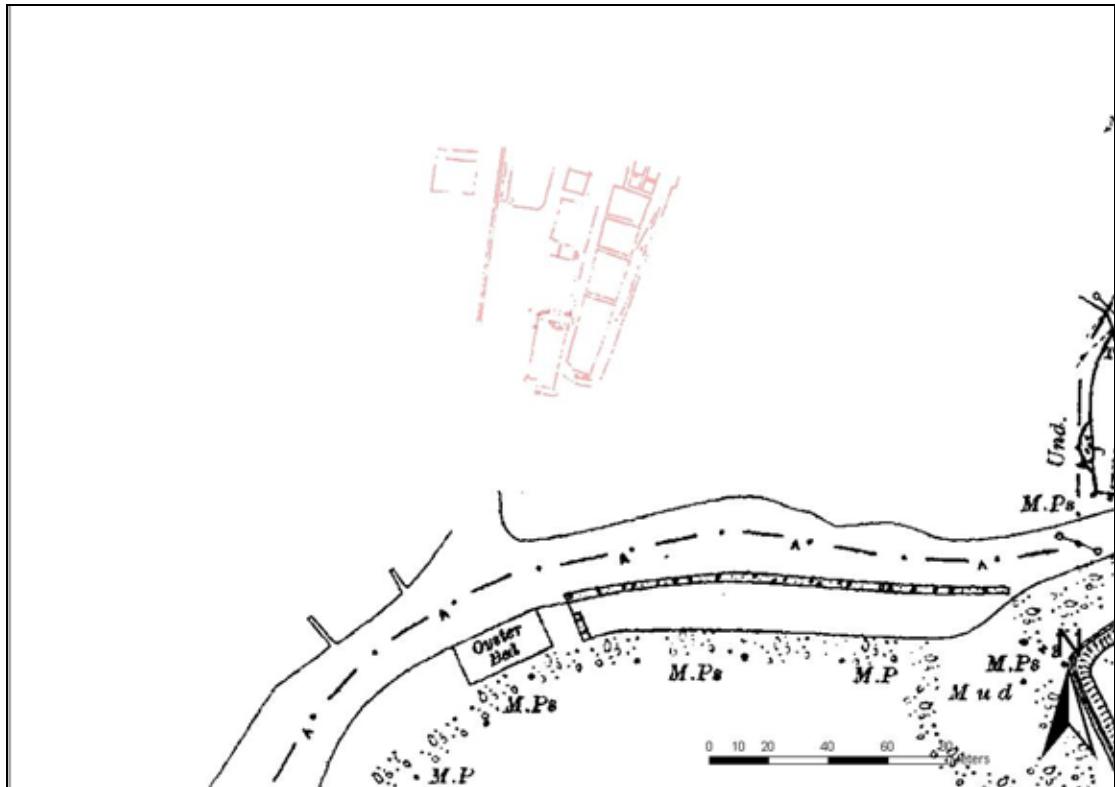


Figure 14: The 1935 map showing the Ark in position and large oyster bed to the south of the main channel.

Epoch 6 Hants and Sussex 1962

There are some small changes to the pits from the 1932 map. Three pits have reappeared at the western side of the main cluster of pits, suggesting they may have been buried during the 1932 map survey, but have been uncovered since, perhaps indicating the natural movement of sediments and material around the harbour.

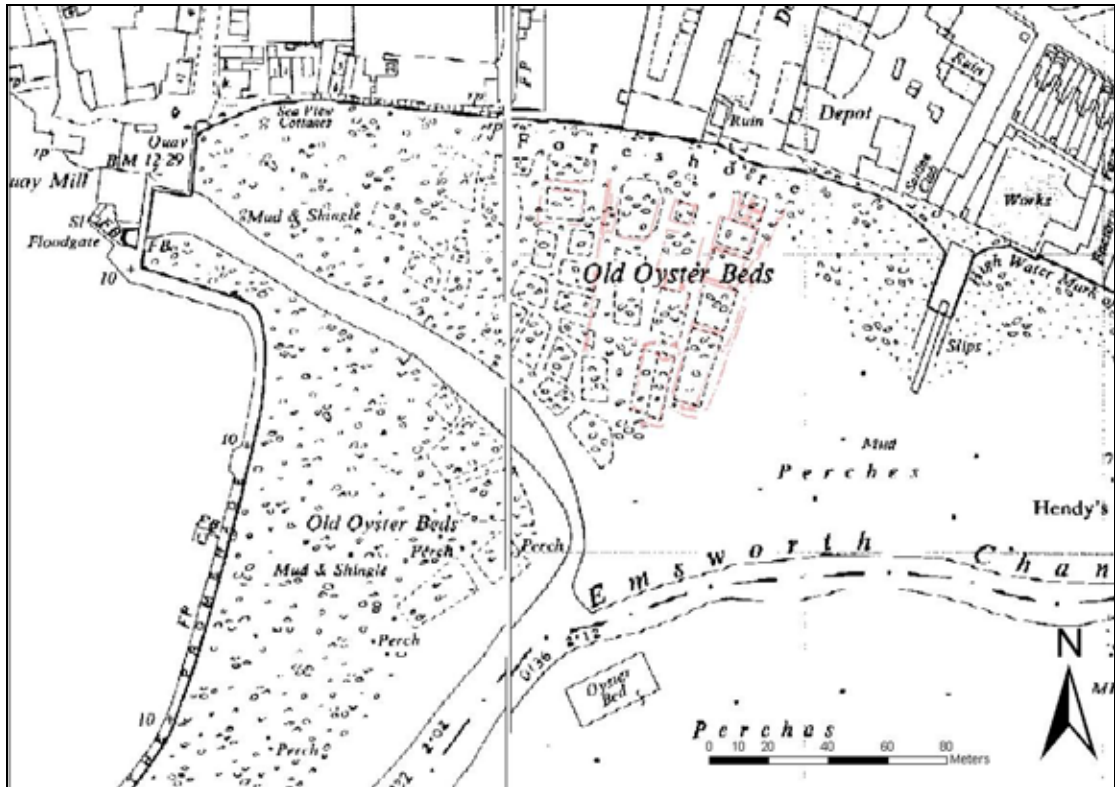


Figure 15: The 1962 map showing the general extent of the oyster pits on the Emsworth foreshore.

The cluster of pits III, IV, V, XI, XV and the solitary pit to the west, still drawn with unbroken lines in the 1932 map are now depicted with broken lines like the other pits, showing these pits had by now also become quite dilapidated. No drainage channels or remains of pathways are shown.

The brick structure XII, known to be in place by 1948 from an aerial photograph is marked as a broken line in Pit XIII in this map, suggesting it too may have been undergoing considerable decay by this time. South of the Channel, the large oyster bed is no longer recorded, but the Ark is clearly marked in the same position as before.

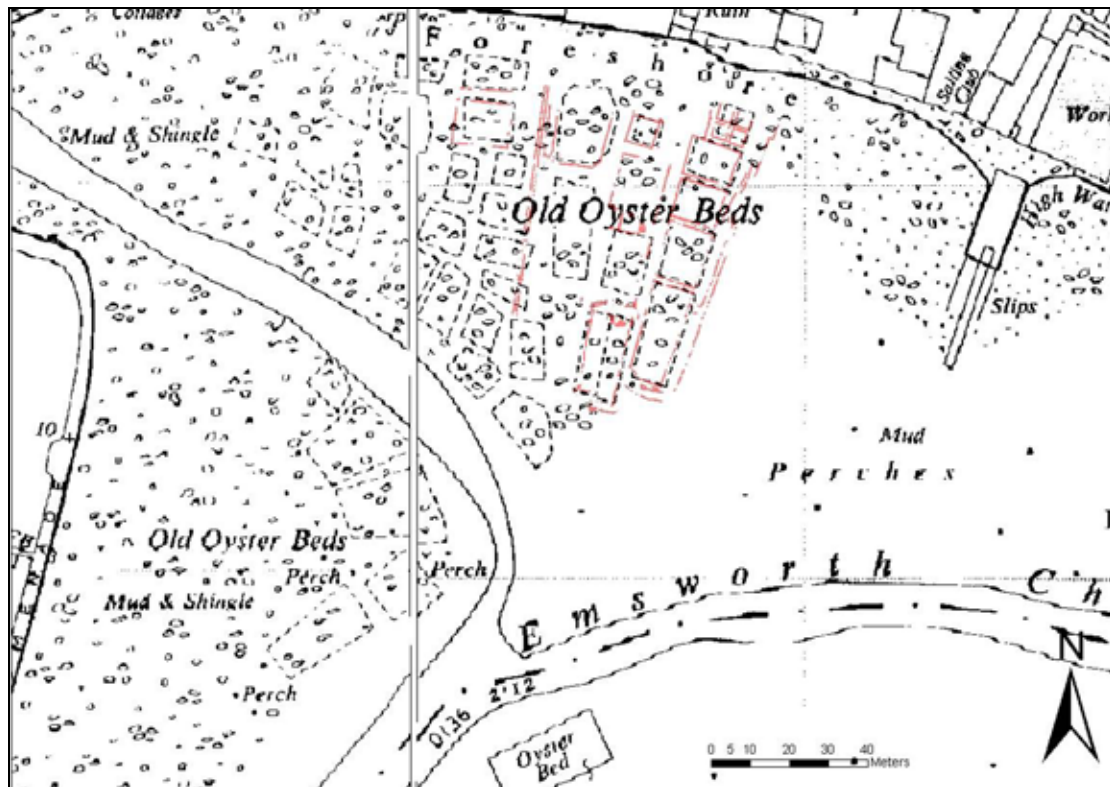


Figure16: The main cluster of pits as shown on the 1962 map.

The square structures, believed to be oyster pits to the east of the main pit cluster near the slipways are no longer visible.

Epoch 7 Hants and Sussex 1969

There are no obvious changes evident from the previous map of 1962.

Epoch 8 Hants and Sussex 1974

It is immediately obvious from this map that by this period a large number of the oyster pits are no longer visible and this probably due to the clearance of the western beds to make way for moorings in the 1960s as reported by John Mant (Tweddell pers. comm.). Based on the map evidence this clearance must have taken place quite late in the 1960s, as many of the pits are still recorded in the 1969 map, although the survey for this map may have taken place some years earlier.

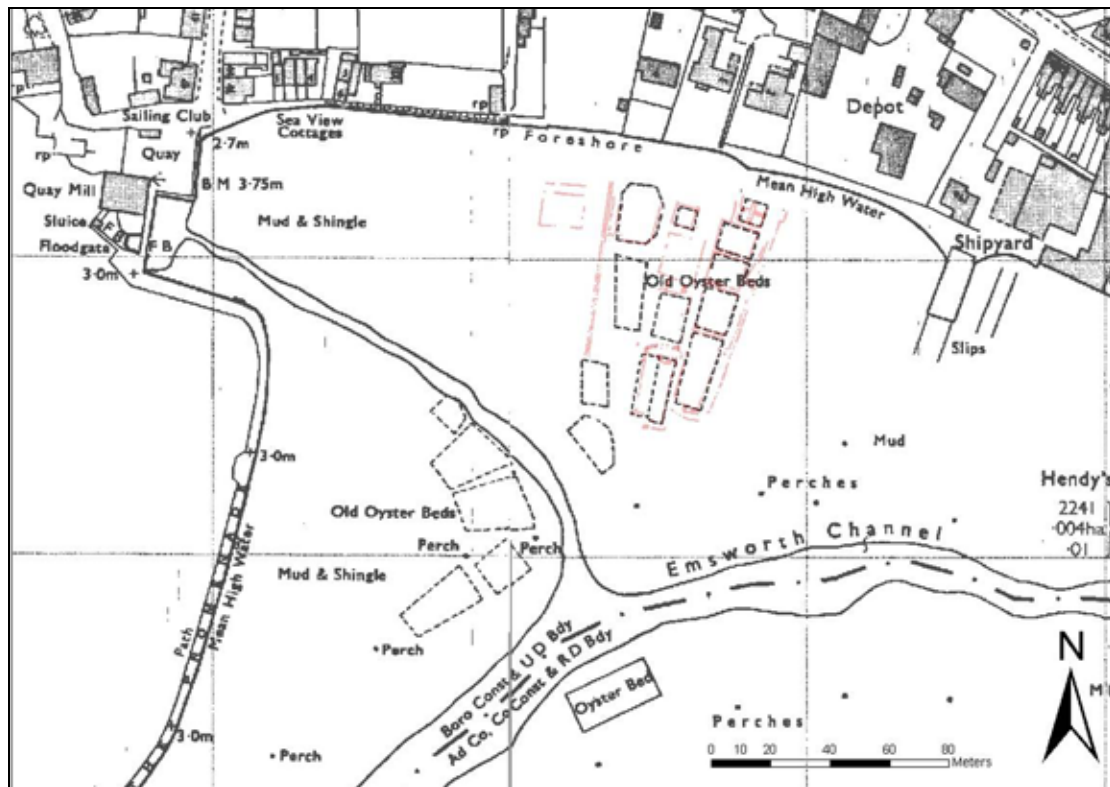


Figure 17: The 1974 map showing the general extent of the oyster pits on the Emsworth Foreshore.

It seems most of the pits to the north and west sides of the harbour in the 20th century were actively removed rather than lost to natural processes of erosion. The main clearance seems to have occurred in the area by the Mill Pond and where several pits to the west of the main cluster of beds are no longer evident. Interestingly, Pits VI / VII and X are not shown, suggesting they may not have been visible at the time of the survey undertaken for this map, but all of the other known surviving pits are shown. The brick structure XII is still well defined in Pit XIII, so it does not appear to have collapsed by this time. The Ark is also clearly shown and appears unchanged.

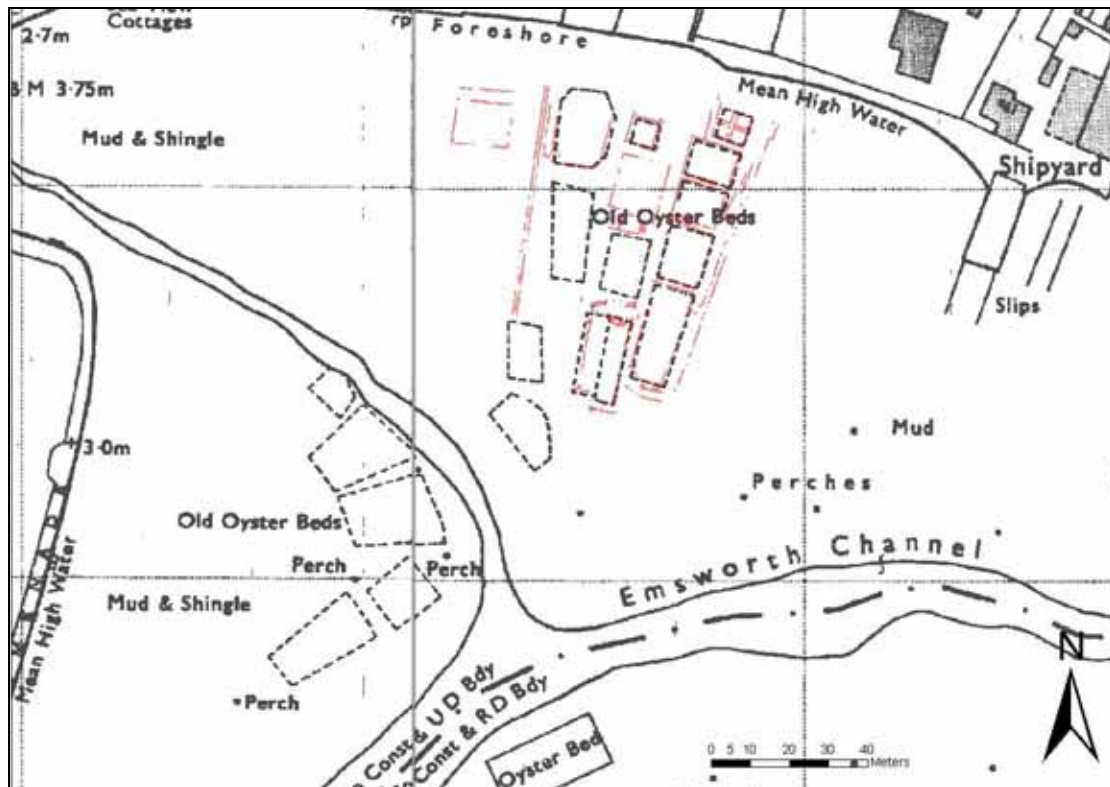


Figure 18: The main cluster of pits as shown on the 1974 map.

There are two additional pits marked to the south west of Pit XIII and there is still an obvious cluster of several irregular pits immediately to the south west across the Mill Pond channel, that may have survived the 1960s clearance. The Ark is still shown unchanged.

2.3 Aerial Photography

Aerial photographic evidence for the pits appears to be limited, which is surprising considering the proximity of the nearby airbase at Thorney Island. However, a small number of aerial photographs have been located from EMHT and the Harbour Conservancy and these are useful in documenting the later changes to the oyster pits and the disappearance of some of the pits.

The aerial photographs available for study do not add any significant detail to our understanding of the development and demise of the oyster pits at present, but they do provide a useful supplement for narrowing down the dates of certain events, for example the appearance of the brick structure XII on the foreshore from a 1948 photograph.

2.4 Historical Photographs

There is a large collection of historic photographs concerning the oyster industry at Emsworth at the Emsworth Museum. The known photographic resource largely concentrates on the oyster dredging vessels and people involved in the industry. Few of the known historic photographs record the oyster pits in use, and generally where the oyster pits are photographed it is indirectly and they are not the main subject of the photograph as can be seen in the **Figure 19** below.



Figure 19: An historical photograph dating to 1898 of the Emsworth oyster pits. The water filled pits are well defined and the rough timber lining of the pits is evident.

The present known historical photographic resource is rather limited for informing any interpretation of the surviving remains in terms of their day to day use, construction or extent. Although the pits are recorded indirectly in such photographs, it is possible to deduce on a wider scale the appearance and size of the oyster pits while they were still in use in the latter part of the 19th and early 20th centuries.

3 Historical Background

Summary History of the Emsworth Oyster Pits

The exploitation of oysters has been long established in Britain and prehistoric shell middens containing oysters are known around the UK. These oysters were collected with other shellfish by groups of hunter gatherers who exploited the rich resources of the coast, and the gathering of oysters for food was probably quite common in coastal areas throughout the prehistoric period. Prehistoric evidence of oyster 'farming' is scarce, however, and the evidence for oyster consumption is limited to shell middens such as those found at West Voe, Shetland dating to the Mesolithic period (Melton and Nicholson 2004). They were probably a subsistence food. Hunter and Ralston (1999) suggest that the coastal zone would have been the most productive area of Mesolithic England due to the relative abundance of food, which would almost certainly have included oysters.

The first reliable historical reference concerning the gathering and large scale collection of oysters in Britain comes from the Romans. Sallust writing in Rome around 50 BC remarked: '*Poor Britons – there is some good in them after all – they produce an oyster*'. Later in 60 AD, Juvenal describes the high repute English oysters held with the Roman elite (Eyton 1858).

Oyster shells have been found in many of the English Roman villas, including Fishbourne and Barton Court Farm (Potter and Johns 1992). One Roman, Sergius Orata, is even credited with being the first to cultivate artificial oyster beds in 97BC (Günther 1897). However, as of yet there is no evidence to suggest anything more than the exploitation of existing natural oyster beds during the Roman occupation. Given the natural occurrence of oysters in the area it seems likely that oyster fishing of some kind took place in this region during the Roman period (Fontana and Fontana 2000, 84)

Again in the Saxon period it is clear that oysters continued to be exploited as a food source. In a passage from the 10th or 11th century dialogue known as *Aelfric's Colloquy*, a teacher questions a fisherman about his trade:

“Teacher: What do you catch in the sea?”

Fisherman: I catch herring, salmon, dolphins, sturgeon, oysters, crabs, mussels, cockles, flatfish, plaice, lobsters and such like.” (Watkins undated)

The Domesday Book records 9 fisheries within the Solent area, and we can probably deduce that some sort of tenure would have been paid for their use. Oyster beds are recorded at Bosham, Birdham, Hayling, Cosham and Porchester in the Eastern harbours, Croften near the Meon estuary, Eling and Dibden on Southampton water and Stanswood in the West Solent. More managed beds are mentioned later in the Medieval period and by the middle of the fourteenth century there are written references to protected or leased, and presumably managed, beds at Emsworth, Hayling Island, Wootton Creek, Newtown Harbour, the Medina estuary and the Beaulieu estuary (Tubbs 1999).

Records begin to supply more detail of the locations and types of fisheries from the Medieval period onwards. During the reign of Henry III (1216 – 1272) the fisheries along the shore (presumed to be oysters) paid 8/8d to the Crown as rent each year (Kennett 1985)

Another account describes 1307 Emsworth oysters were famous for their flavour and sold for one halfpenny per 100 (Kennet 1985). None of these sources give any description of how the oysters were obtained, but it seems likely vessels using rakes or dredges were in use. Little is known about any practice of oyster 'farming' from this period, but a salt water fish pond or 'luck' is recorded at Wootton on the Isle of Wight in 1304, and an enclosed lagoon, with a hurdle structure radiocarbon dated to 690-1020 AD may be associated with oysters (Fulford et al 1997, 145). These could represent evidence for the practice of keeping oysters in pits in the region from at least the medieval period onwards.

The first written evidence describing what may be equipment used in an oyster fishery comes from the 16th century. The will of Philip Hewitt of Emsworth, dated to 1596 records that he owned 'a half share in a boat or dredge' worth 20 shillings (Whitfield 2005, 14). The dredge could well have been used to catch oysters, although other fish could certainly be caught using dredges.

Another later will, this time from 1671, describes William Spriggs of Emsworth as owning a hoy, as well as two other small boats, with fishing tackle including nets and drags. Again, the drags may indicate William Spriggs was involved in the oyster fishery (Whitfield 2005, 14) but there is no reference yet to the use of pits for storing the oysters.

The first references to the use of oyster ponds or pits come from 1667 and 1688. In 1667 a man was fined one shilling by the manorial court for 'digging coaves in his lordship's fishing'. The following year, two Emsworth men agreed to pay the lord '200 large pirl oysters' every year on the Friday following All Saints as rent for the use of oyster pits in the harbour (Whitfield 2005, 14).

The oyster fishery was certainly flourishing in the 18th century. An account from 1788 records that 12 master fishermen dredged 7.035 bushels of oysters from harbour, a catch worth over £1,500 (Whitfield, 2003).

The heavy fishing of oysters took its toll and as more and more boats came from other areas to dredge the beds the beds were no longer able to replenish their natural stocks. Regulations were made to allow the oyster beds time to recover and a closed season was introduced between May and August and a minimum size was also stipulated (Cole 1956, 8). However, the attempts to regulate the fishery were not taken seriously and the depletion of the beds continued. By 1817, Walter Butler wrote:

'The fishermen are deprived of their bread by fishing smacks from the eastern coast which, from their size and superiority of sailing, sweep the bottom of the sea and take away every oyster, and their success encourages them to defy the native fishermen... This unlawful fishing began about twenty years ago.' (Whitfield 2005, 30).

Matters continued to worsen for the Emsworth oystermen and by the 1830s local fishermen were so deprived of income that they had to go 'on the parish'. The Hampshire Telegraph reported in 1833 how large numbers of vessels from the Medway in Kent were stripping the oyster beds with heavy dredges and dredging undersize oysters. Effective regulation capable of stopping this kind of illegal fishing had to wait until the *Sea Fisheries Act* of 1868 was introduced (Fontana and Fontana 2000, 85).

It seems the Emsworth fishermen also infringed on the law during the period of shortages. In 1821, in response to the deterioration in the number of oysters the Russell family sought permission to build a house on an island off

Ware Point, now known as Oyster Island. They set up oyster beds seeded from young oysters bought from the Emsworth fishermen. They soon ran into conflict with the Emsworth fishermen who were even prosecuted for dredging over the Russells' beds, an area the fishermen argued was common ground (Fontana and Fontana 2000, 85).

It seems early on in their use, the oyster pits were privately owned by a large number of fishermen, who either owned a pit or had access to a shared one. By the late 19th century, however, the oyster industry in Emsworth came to be dominated by two merchants – James Duncan Foster and John Kennett. The Fowley Island Oyster Company also kept several beds at Emsworth, although the majority were kept by Foster and Kennett.

A large amount of documentation survives from J. D. Foster's business in particular. In 1874 Foster purchased his first 12 oyster pits from James Cribb, but he did not start to use them until 1878, when he bought out Cribb's oyster merchant business. Cribb had been trading for 6 years, and his business had belonged to his father. Foster purchased the goodwill, the tackle and the rights to the oyster pits and pits on the shore.

Over the next 8 years he purchased another 7 pits from various local fishermen. Some he enlarged, some he joined together and in others he put concrete in the bottom. As his business continued to thrive Foster continued to expand his ownership of the pits and gradually began to amass a fleet of oyster dredging vessels.

Between 1883 and 1900 he purchased 18 pits along the east coast of Hayling Island and used them for storage of oysters either dredged by his boats or bought to mature. He obtained a steam tug, the *S.S. Dora* to transport the oysters between his Hayling pits and the storage pits in Emsworth.

In 1878 he bought 3 ketches for oyster fishing. Between 1885 and 1900 he built 11 oyster fishing smacks, which were considered the most innovative fishing boats built in the country at that time. The largest was *Echo* at 80 tons and 4 of the others were about 60 tons. Their total value was between £17,000 and £18,000 in 1902. These vessels dredged in the North Sea, and the English Channel and even sailed as far as France and to the west to Falmouth.

As well as dredging for oysters he purchased oysters from Portugal, America, Holland and France as well as Falmouth, Whitstable and the other east coast ports. Records indicate that the purchases of Portuguese oysters were often collected from the pits at Île d'Oleron in the Bay of Biscay by Foster's boats. Other purchases of oysters were delivered by train, to be collected by his men and stored in the pits.

A review of Foster's surviving business documents indicate approximately 40% of his business was in bought oysters while the other 60% were dredged by his own oyster smacks.

In order to cut the cost of his oyster smacks, and to make them to the standard he required, Foster developed his own timber business. Half this business in timber was related to the oyster fishing industry. At its peak of his trade the stock of oysters in the pits at any one time was 100,000 to 200,000 and Foster would normally sell 2 – 3 million a year. It is estimated that the value of his oyster business in 1902 was about £23,000.

The success of the business slumped after an incident in November 1902, when oysters from Emsworth were served as the first course at banquets in Winchester and Southampton. Several guests fell ill, including the Dean of Winchester (who had been at both events) and he died. Tests showed that the oysters were the cause and that they had been contaminated with typhoid, which poisoned the guests.

The poisonings led to the Worshipful Company of Fishmongers in London banning the sale of oysters from Emsworth Harbour in January 1903 and the trade collapsed. Oysters were still dredged out to sea, but they could no longer go to Emsworth for storage and so they were taken into Newhaven and sent to market from there.

In 1914 a new sewage system was built in Emsworth which meant that raw sewage was not pumped straight into the Harbour, but the beginning of 1st World War in August of that year meant that the trade did not have any serious opportunity to recover. Manpower was limited, and shipping was restricted.

Between the two World Wars the trade began to pick up again, but not on the same scale as before. The outbreak of the 2nd World War led to another collapse of the industry. The Kennett family were unable to tend their oyster pits at Hayling and lost over 90,000 oysters.

After 2nd World War the industry did not really recover, and was virtually dead by the 1960s. There was an attempt in the 1980s to revive the industry and in 1985 over 33 tons of oysters were dredged from Emsworth Harbour and sold for £56,000. However, the increase of pleasure craft in the harbour meant that pollutants from anti-fouling paint affected the oysters and the trade finally died.

4. Archaeological Investigation

4.1. Fieldwork Survey Methodology

Fieldwork was undertaken by CDAS and EMHT volunteers with advice and cooperation from HWTMA staff. Volunteers were given a day of foreshore fieldwork and survey training by HWTMA and a survey guidance manual was created to assist them in the archaeological survey of the pits.

The first phase of fieldwork required the creation of a series of survey datum points over the foreshore to ensure adequate coverage of the oyster pits and the remains of the Ark. Due to the irregular nature of the foreshore and the need to ensure the survey datum points could be placed in easily accessible

areas, the survey datum points were placed around the visible extents of the surviving oyster pits and around the edges of the remains of the Ark. HWTMA staff working with a team from Southampton University laid down the grid prior to the February survey work.

The survey datum points were placed using a RTK GPS survey system, which provides an accuracy of $\pm 0.01\text{m}$. The RTK GPS system data was then downloaded and the positions of each survey datum were then transferred into the project GIS. The project GIS allowed for the final drawn plans and additional mapping to be displayed for easy reference and analysis.

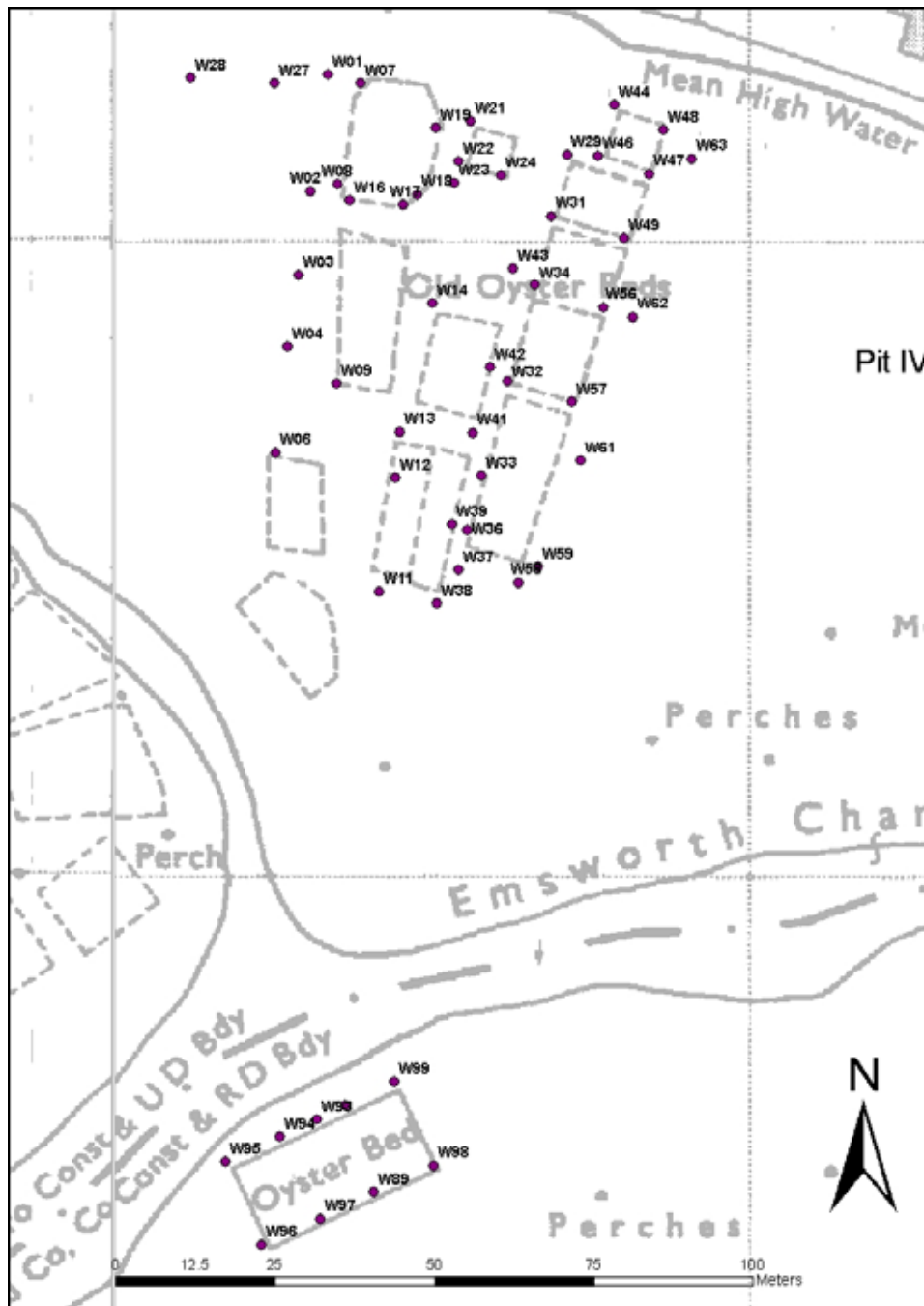


Figure 20: The arrangement of survey datum grid points on the site.

With the datum grid in place survey work was then undertaken by teams of volunteers between the 1st to 4th and 15th to 18th February 2008. CDAS and ENHT volunteers recorded the oyster beds by offset survey measuring only the visible extent of the surviving pits. Due to the proximity of the datum points the offset survey can be considered very accurate. No offset survey baseline was longer than 20m and it is estimated the margin of error of the offset survey is in the region of $\pm 0.5\text{m}$.

During the survey fieldwork, traces of additional surviving pits were noted to the west of the main concentration of pits. As these lay mostly outside the survey grid these were recorded using gridded survey points where possible, but a digital distance recorder (a Leica Dista Mk. V) was also used. Distances were recorded along known bearings to datum points elsewhere in the grid to ensure greater accuracy for this method. Overall the largest margin of error overall for the survey is estimated to be in the order of $\pm 0.2\text{m}$, but is considered more likely to be much lower ($\pm 0.05\text{m}$) due to the extensive grid and large number of datum points available to identify and rectify errors.



Figure 21: CDAS And EMHT volunteers recording the oyster pits on the foreshore at Emsworth.

Due to health and safety concerns about the level of deep mud and debris around the remains of the Ark, an offset survey of this structure could not be undertaken. However, a detailed photographic record of the structure was made in lieu of a measured plan.

The archaeological survey of the pits was limited to the recording of exposed remains, and where it was necessary to clarify certain features only light cleaning was carried out. Any seaweed adhering to exposed elements was

moved to record the structures but care was taken not to physically remove it from the structures.

The plans of the oyster pits were supplemented by context records and photographs made by the volunteers and additional notes made by HWTMA staff. The results of the archaeological survey are presented in detail in **Section 4.2.1.** of this report.

4.2. Fieldwork Assessment Results

4.2.1. Overview

Each feature number (presented in Roman numerals) relates to what has been interpreted as an individual pond or feature, in instances where further investigation has led to uncertainty it will be mentioned specifically in the text.

A general plan view of the surviving visible structures on the foreshore is provided below (**Figure 22**).

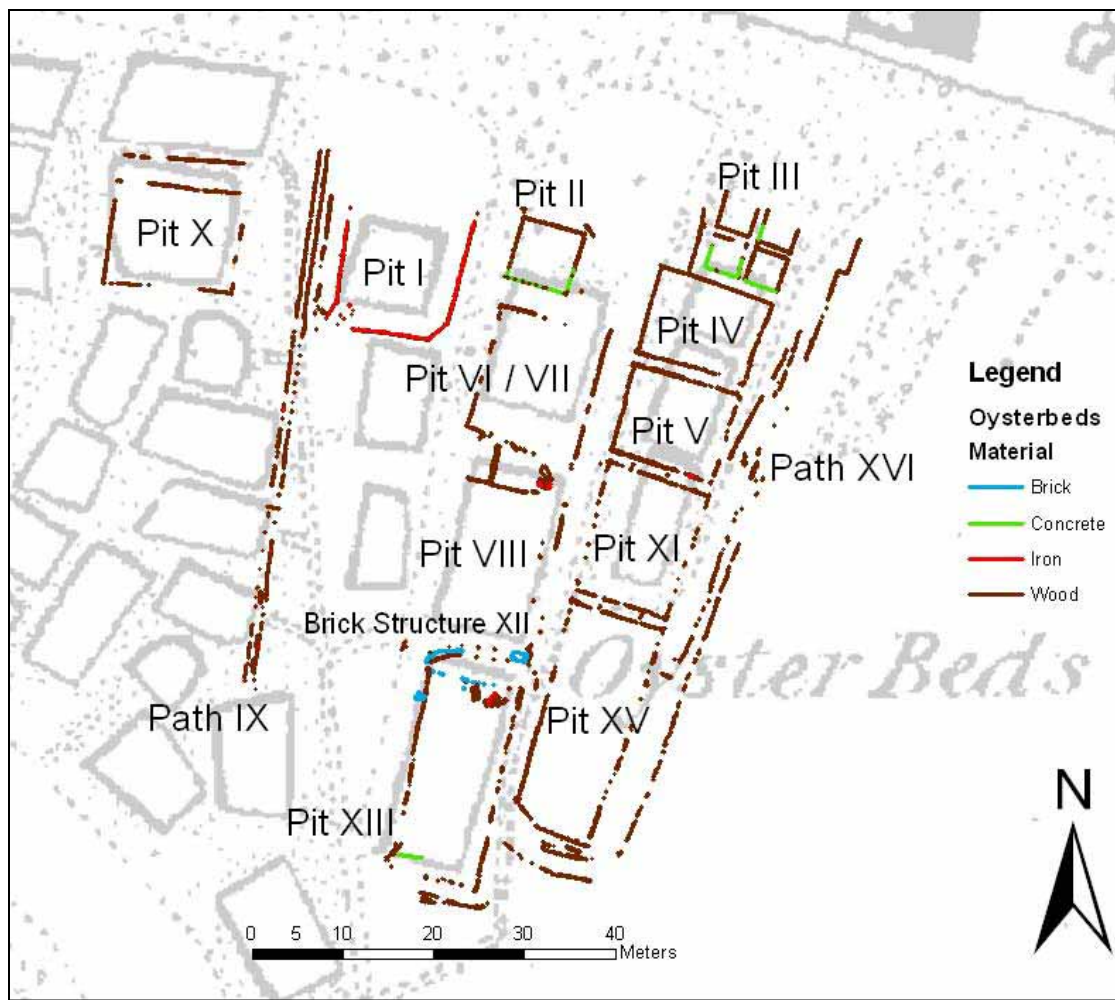


Figure 22: Overall Site Plan showing main exposed features including oyster pits and pathways on the Emsworth foreshore.

The remains have been recorded, through written descriptions, photographs and scale drawings by volunteers from CDAS and EMHT supplemented by notes and observations made by HWTMA staff.

4.2.2. Description of Remains

The following provides a description of the remains of the oyster pits at Emsworth recorded by CDAS and EMHT volunteers with guidance from HWTMA. The descriptions are based on the fieldwork plans, context sheets and additional notes made during the survey fieldwork, supplemented where relevant by other sources such as historical mapping and photographs.

Feature I – Oyster Pit

Pond I is a roughly rectangular structure measuring approximately 12m by 15m. The northern side of the structure is no longer visible, although the timber components of the south and east sides of this pond are quite prominent and upstanding.

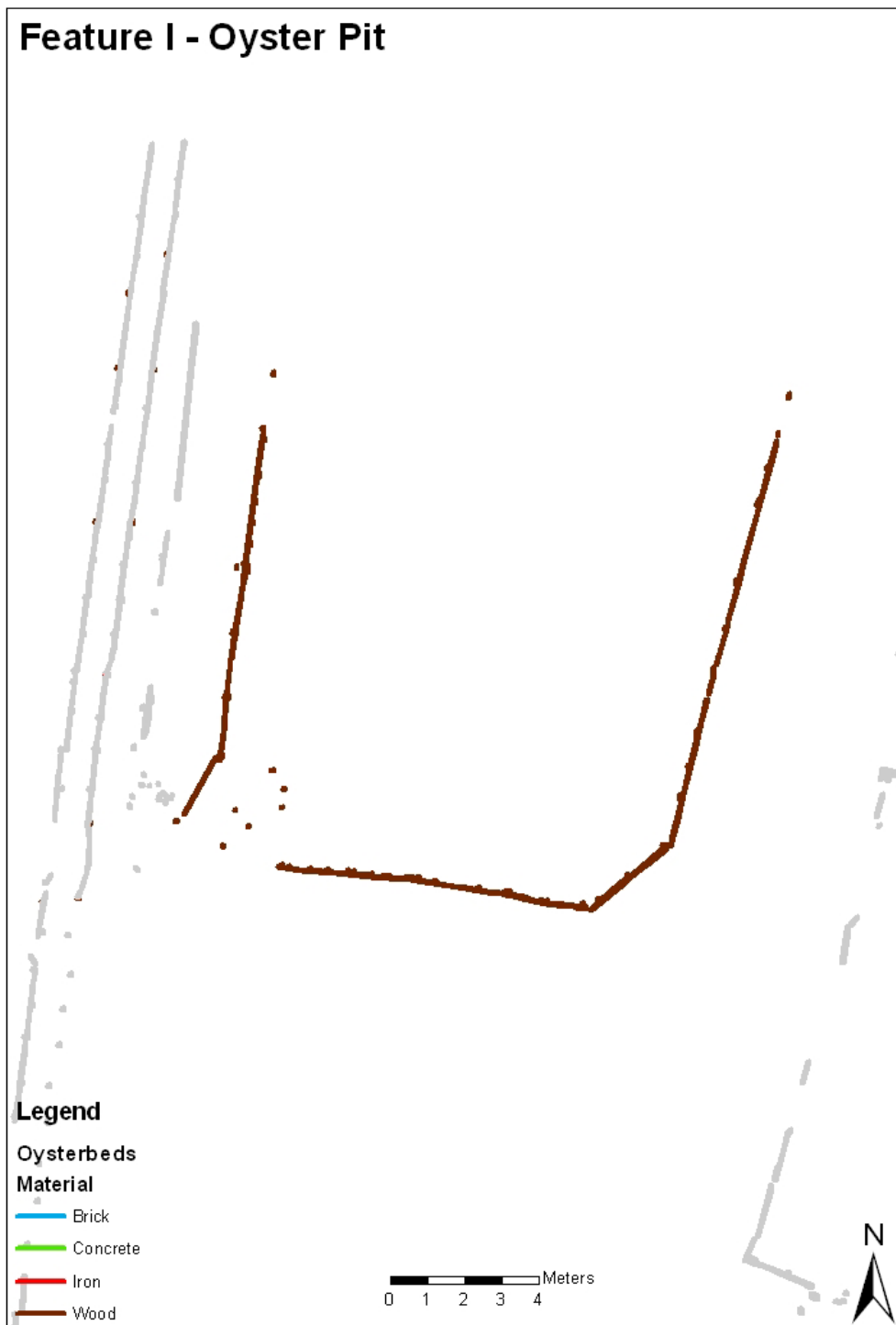


Figure 23: Plan of Feature I, oyster pit.

There appears to be a small channel at the south west corner of this pond, with a cluster of timbers near it that may indicate the remains of a sluice in use on this pond.



Figure 24: Pit I viewed from the south, showing missing structure on its northern side and the possible sluice structure at its south east corner.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 5 owned by J. D Foster.

Feature II – Oyster Pit

Pond II is square in plan measuring approximately 7m by 7m, with elements of the wooden structure surviving on all sides of the pond.

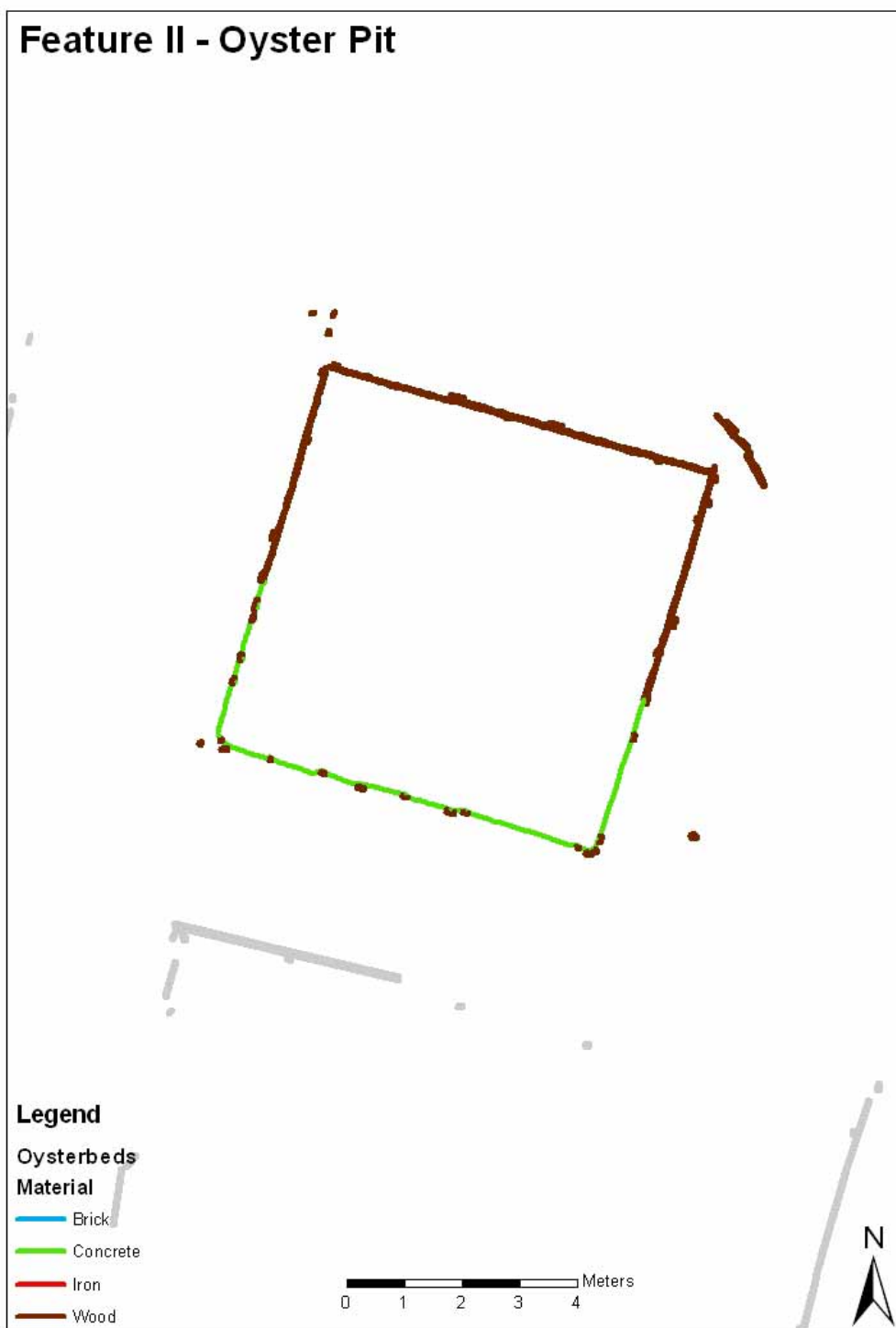


Figure 25: Plan of Feature II, oyster pit.

The surviving timber structure is comprised of horizontal planking supported by wooden posts placed on either side of the planking. The planking appears to have been fastened to the uprights using nails. No nails were visible so it is not clear whether iron or copper nails were used in the construction of this pond.

One post 2.7m from the north east corner of the pond has two planks butted together against it. While no fastenings survive the nail holes used to attach the planks to the posts are clearly visible.



Figure 26: An upright post with two abutting planks with visible nailholes.

This pen has a visible concrete floor, which now stands slightly above the surrounding foreshore ground level. Only the southern portion of the concrete floor is visible, as the northern part of it is buried by shingle, but it seems likely the floor covers the entire base of the pond.



Figure 27: View of Pit II taken from the west.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 18 owned by J. D Foster.

Feature III –Oyster Pit

Pond III appears to be subdivided into four smaller pits (IIIa, b, c and d clockwise from the top left in the plan in **Figure 28** below) with small walkways dividing them. The overall size of the structure is 8.2m by 8.6m, making it just less than square.

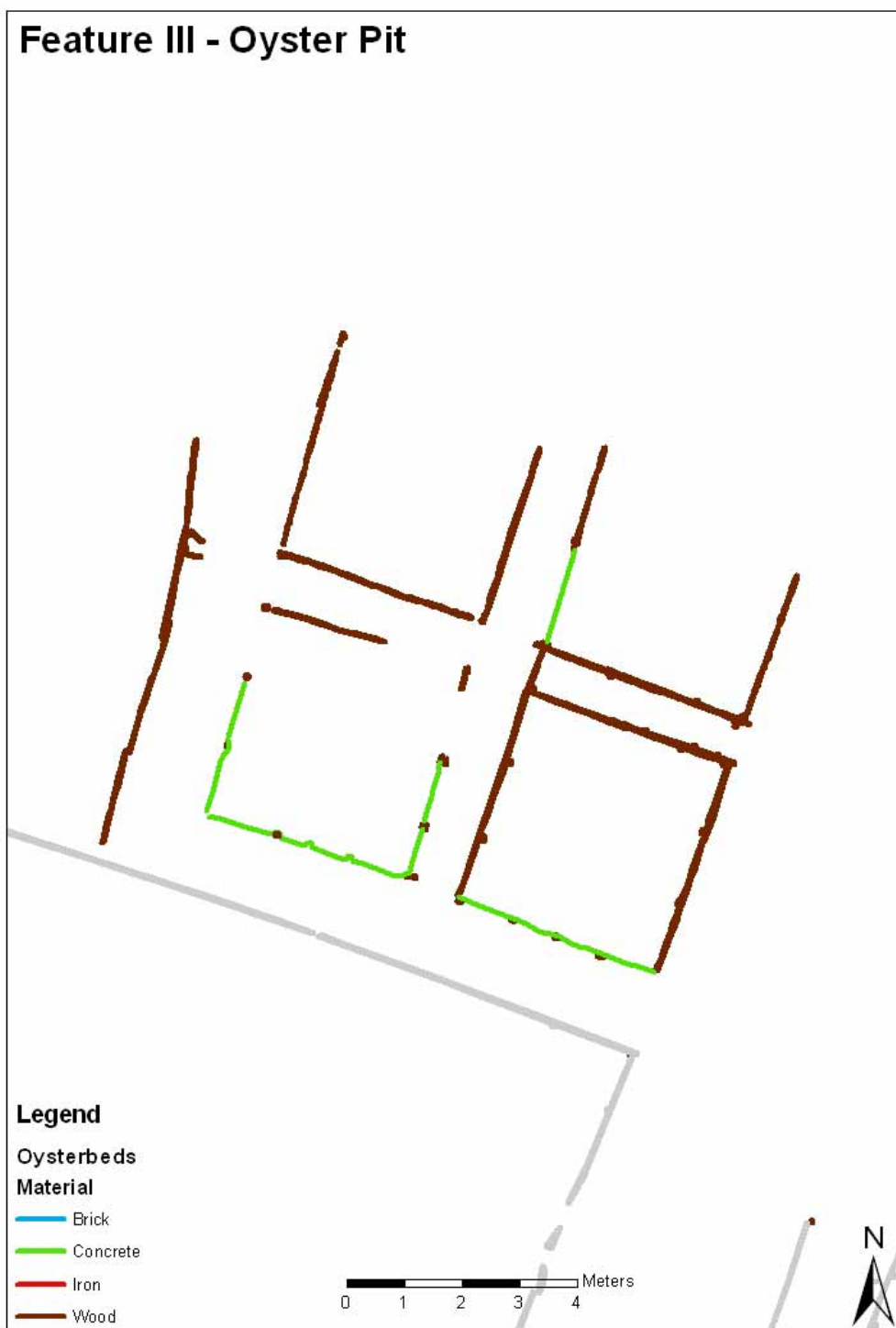


Figure 28: Plan of Feature III, Oyster Pit

The timber elements of these pits are made of horizontal planking supported by regularly spaced posts. The two smaller pits to the north of this structure (IIIa and IIIb) appear to have little surviving timber on their northern sides. All four of the pits have concrete bases, although the IIIa was only partially visible as it was mostly covered by shingle. Of all of these pits IIIc is the best preserved



Figure 29: View of Pit III looking north.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 21 owned by J. D Foster.

Feature IV – Oyster Pit

This pond is reasonably well preserved and measures 13m by 10m. The northern side is constructed with two 0.05m (2-inch) planks, both of which are still in a good condition, and their exposed faces are still flat and showing few signs of abrasion. There are few visible posts along this side aside from posts surviving at each end.

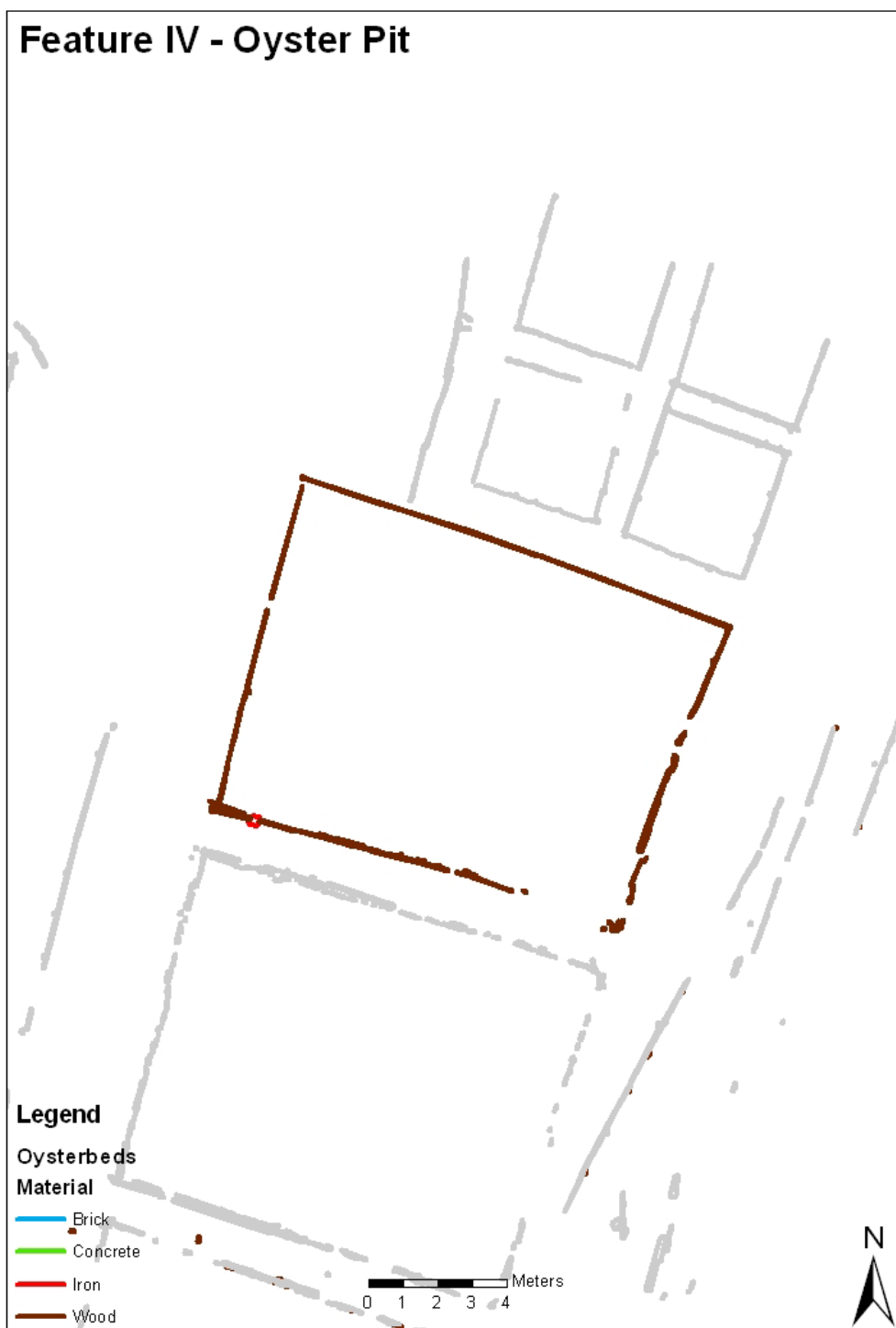


Figure 30: Plan of Feature IV, oyster pit.

The remaining three sides are quite poorly preserved although they are still clearly visible. The pond has an iron fitting with a circular aperture in it that may have been the opening of a sluice inserted into its southern side 1.2m from the south west corner.



Figure 31: View of southern wall of Pit IV containing an iron 'sluice' (in front of the right hand white portion of the photoscale).

Feature V – Oyster Pit

Pit V is a large rectangular pit measuring 12.1m by 9.9m.

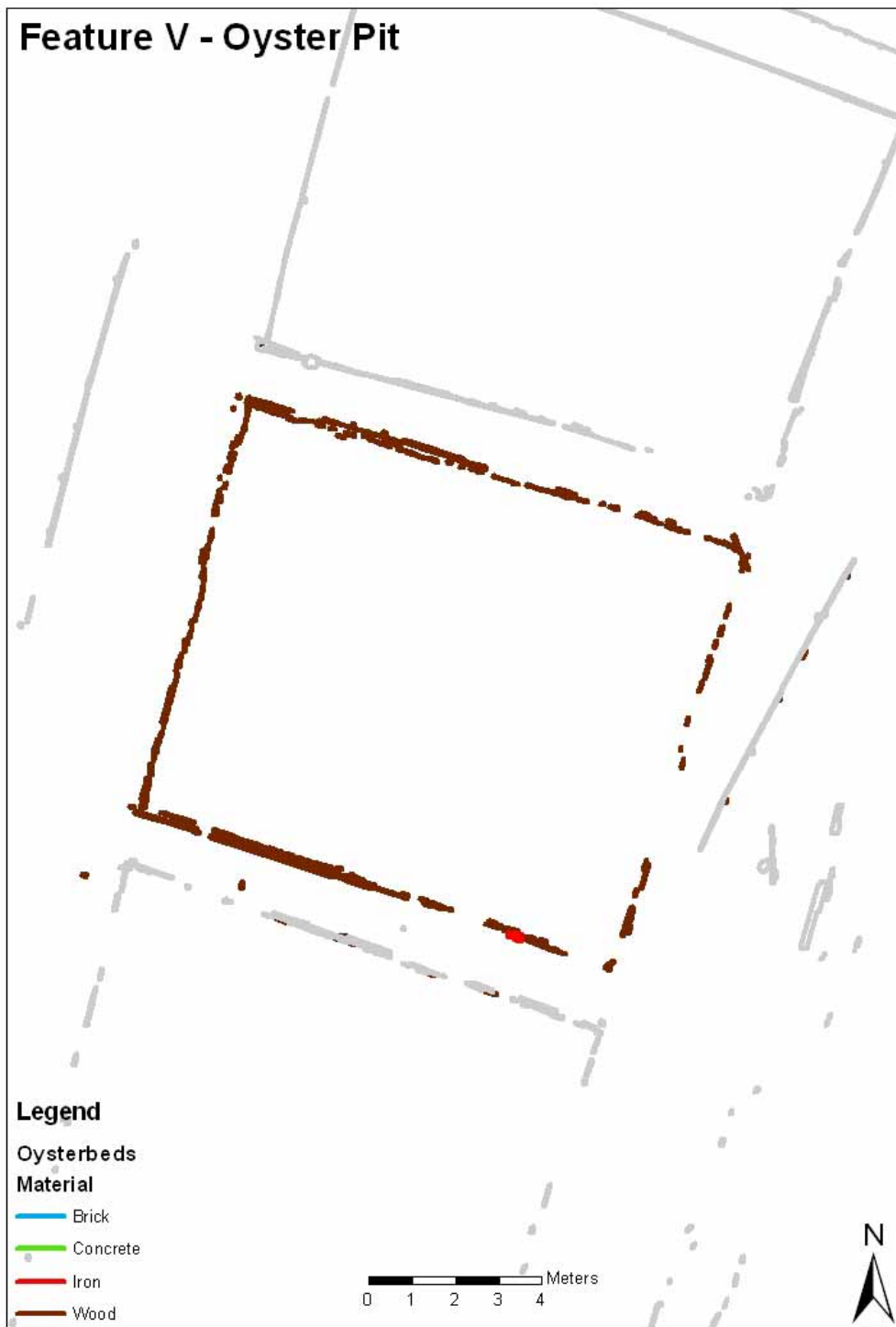


Figure 32: Plan of Feature V, oyster pit.

The construction of this pit appears different to the other exposed pits. It is comprised of an outer line of horizontal planking visible on the foreshore almost all the way around the pit, and within this is another layer of vertical planks.

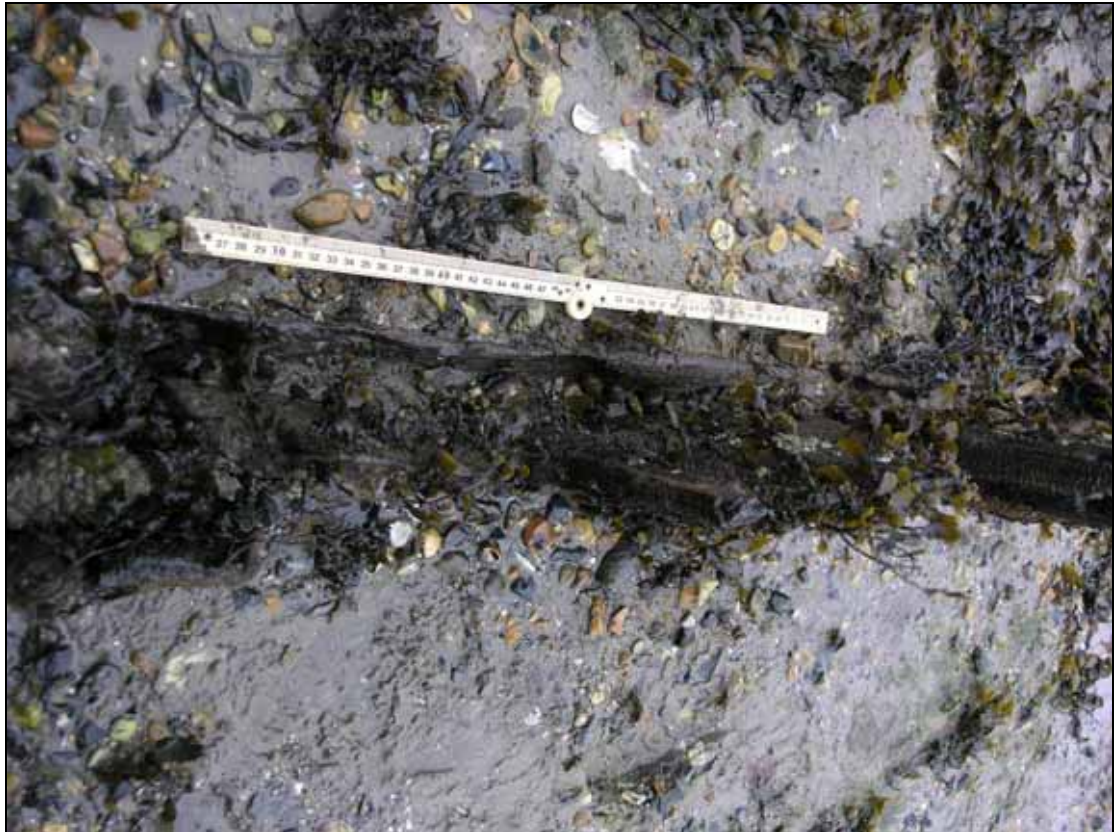


Figure 33: A horizontal plank (beside the scale) with vertical planking inside it visible on Pit V.

The eastern side of this pit is poorly preserved, although the western side has some reasonably well preserved timbers upstanding substantially from the foreshore. On the southern side of this pit 2.3m from the south east corner there is a heavily concreted iron object which may be the remains of a sluice.



Figure 34: View of Pit V taken from the west. Upstanding vertical timbers are clearly visible by the photoscale.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 2 owned by J. D Foster.

Features VI and VII –Oyster Pits

These pits are described together here as it seems they are a single feature rather than two separate pits as previously thought.



Figure 35: Plan of Feature VI / VII, Oyster pit.

The main pit structure measures 15.5m by 12.4m and is constructed of horizontal planking supported by posts. The timber structure of this pit is very poorly preserved. Notably a timber gutter or conduit feature runs to the south of the south side of the pit 4m from the southwestern corner. The gutter seems to have run into pit VIII.



Figure 36: Timber gutter or conduit at southern end of Pit VI/VII looking north.

There were three loose pieces of timber and iron noted 5.5m to the east of the gutter feature, although one of these appeared to be a section of a tree trunk and the others were probably abraded heavy timbers similar to the type of timber used in constructing jetties or landing stages.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as a pit owned by the Fowley Island Oyster Company. Pit VIII to the south of this pit is marked as owned by the same company, which may explain the presence of a conduit to join the pits.

Feature VIII – Oyster Pit

Pit VIII is a large rectangular pit measuring 17.6m by 11.2m. The timber structure of the pit consists of horizontal planking with supporting posts. One section of the timber structure to the northern end of the east side of this pit has a number of horizontal planks lying next to each other.

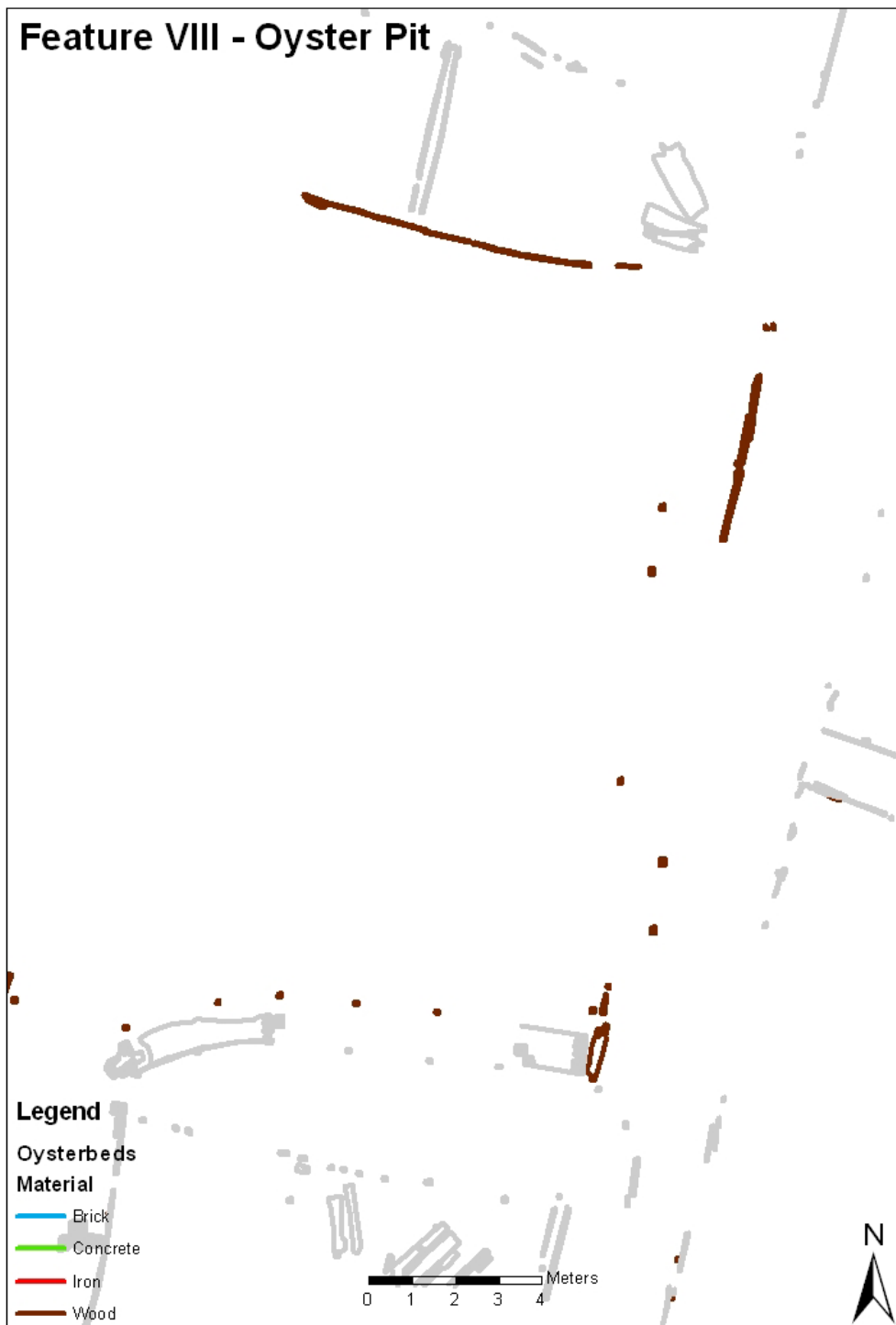


Figure 37: Plan of Feature VIII, oyster pit.

On Pit V where more than one layer of planking was observed there was an alternate layer of horizontal and then vertical planking. As the exposed areas of structure provide a limited amount of material for comparison, it is not clear which technique of construction is more typical. The different use of horizontal and vertical timbers may indicate a repair to the Pit.

The western side of this pen is not visible and the south and east sides are mostly defined by posts with little or no visible planking. A small patch of what may be reed or wickerwork was observed on the western side, this may indicate some method of making the pens watertight, although it seems unlikely they would have required much waterproofing. Alternatively they may be the remains of a basket or similar container, or a means of consolidating the pathway but an insufficient amount of it was exposed to support or confirm either of these possibilities.



Figure 38: Possible exposure of reed work seen by Pit VIII.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as a pit owned by the Fowley Island Oyster Company, along with Pit VI / VII immediately to its north.

Feature IX Path

Pathway IX runs from north to south at the western side of the exposed pits, lying between Pits I and X to the north and XXI and XIV to the south. A raised path, it is comprised of compacted shingle bordered and defined by horizontal planks which are fastened to regularly spaced posts approximately 1m apart. The posts are arranged on alternate sides of the planking along the length of the path. The planking is visible along approximately 80% of the length of the path.

Eight of these posts have evidence of severely corroded iron fastenings on them above the level of the surviving planks, further demonstrating that the level of the pathway and the pits is less than when it was in use. The fastenings appear to have been iron nails that would have been hammered through the planks into the posts.

Each plank bordering the pathway is approximately 2m long and the planks are simply butted together at a post where there is a join. The planking used to contain this pathway is noticeably thinner (15mm) than that used on the pits.

The alignment of this path does not match the historic OS mapping of the oyster pits as well as the pits themselves, and seems to run over the edges of some of the pits on the maps. The use of a different thickness of timber also indicates that this pathway may not be contemporary with the oyster beds, but was put in place some time after.



Figure 39: Feature IX the 1960's mooring access path that cuts across one of former main drainage channel for the pits.

A report from a local man John Mant, identifies the path as an access path to new moorings that were put in after the old boats and Western oyster pits were cleared in the 1960s (Tweddell, pers. comm.)

Feature X- Oyster Pit

This nearly square pit measures 14.2m by 14.4m. This Pit has an additional linear structure to the north of it, the same length as its northern side which appears to be the south side of another pit. The timber structure of Pit X is comprised of horizontal planks supported by posts.

The pit was largely buried and only just visible through the overlying silt and shingle.



Figure 40: Pit X looking south. The wooden structures of the pit were heavily covered by silt and shingle at the time of the survey.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as owned by Jack Kennett, and the pit to its north is marked as pit number 6 owned by J. D. Foster.

Feature XI – Oyster Pit

Pit XI is quite well exposed and measures 11.5m by 14.3m. It is mostly constructed with horizontal planking supported by posts in the same way as the other pits with horizontal planking, although in its north east corner, there is some evidence of a possible repair using vertical planking inside the pit. This north east corner of the pit is supported by a ¼ cut rounded timber.



Figure 41: Plan of Feature XI, oyster pit

Nails used for fastening the planking to the posts are visible on the posts on the south side of this pit, above the surviving level of the planking. The nails are square in section, and show little sign of corrosion. The lack of corrosion suggests the nails may not be iron, but badly stained copper nails, although, the limited exposure of the nails meant detailed observation was limited.



Figure 42: Nail through an eroded upright post showing little sign of corrosion suggesting it is non-ferrous perhaps made of a copper alloy

There is a gap towards the eastern edge of the south side of the pit that appears to correspond with a gap on the north side of Pit XV. A small waterway between the two pits is visible running between the two pits and there are also what seem to be the remnants of a structure to the eastern side of the waterway spanning the distance between the pits. This may be the remains of a structure similar to the conduit or gutter observed running between Pits VI and VIII.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 3 owned by J. D Foster.



Figure 43: The south side of Pit XI looking north with a shallow but discernable “waterway” running through a gap in the side towards the north side of Pit XV.

Feature XII- Unidentified Brick Structure

The collapsed remains of a brick structure were recorded between pits VIII and XIII. Early interpretations considered the possibility that the brickwork may have been reused or dumped building debris used to build up a walkway or the wall of an oyster pit. However, while the brick debris was fallen and broken, it was still lying reasonably intact in large pieces. In addition an aerial photograph from 1948 shows clearly that structure XII is a later brick built structure. The structure is recorded intact on the OS maps as late as 1974.

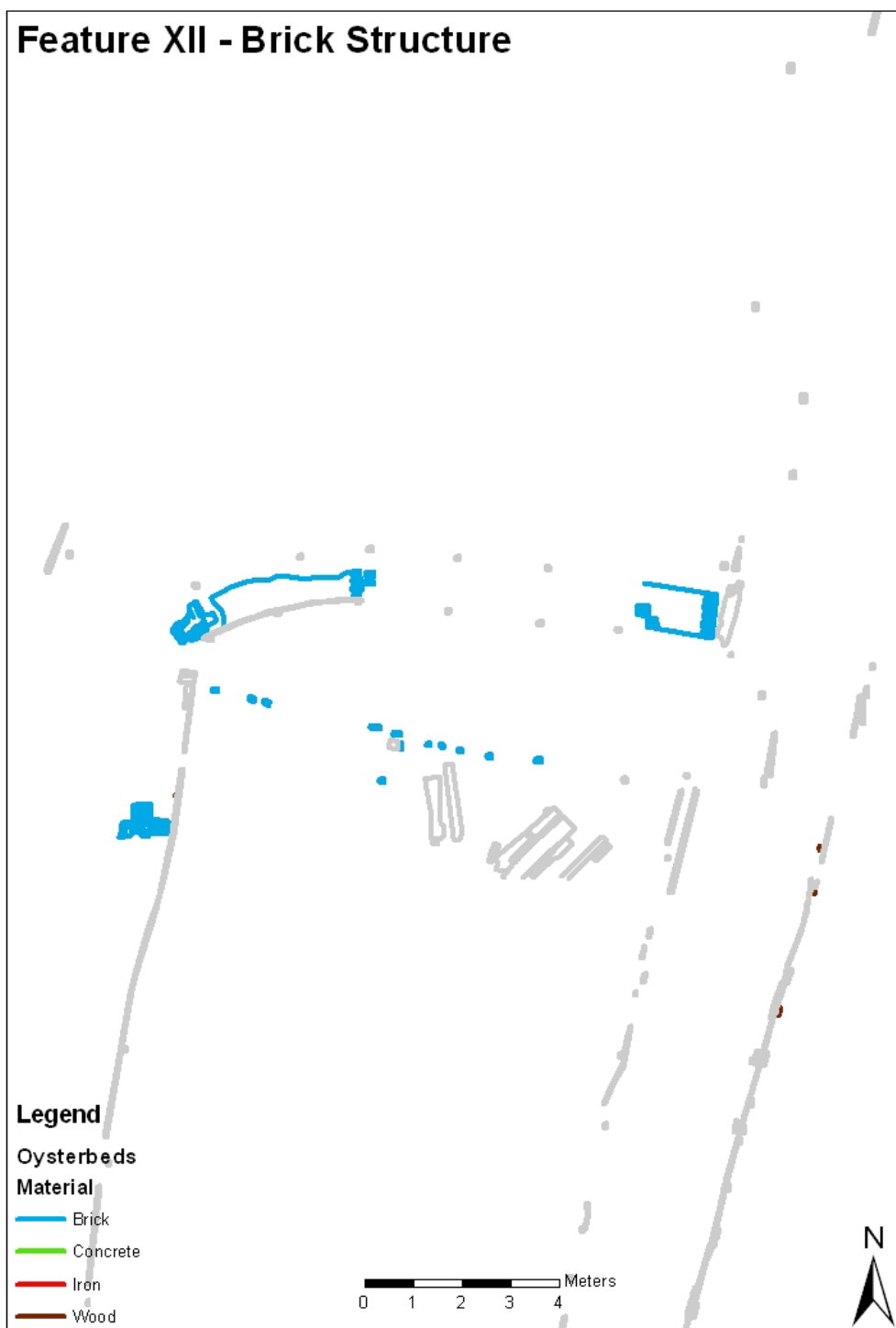


Figure 44: Plan of Feature XII, collapse brick structure.

Originally this was a long, narrow, rectangular structure which ran the whole length of the west side of Pit XIII, and covered approximately half of the area of the pit. Unfortunately, it is not possible to make a reliable estimate of the height of the structure from the photograph. The aerial photograph appears to show the structure was an uncovered cistern or tank of some kind.

Given the demise of the large oyster industry at Emsworth earlier in the 20th century, it is possible this may represent a tank for oyster storage built during one of the smaller scale attempts to revive the fishery during the 20th century. An alternative explanation is it may have been built as some kind of World War Two defensive structure, although the defensive purpose of a structure of this kind on the foreshore is not immediately clear.

The full extent of the original structure is no longer apparent, and the absence of a large proportion of it suggests the structure may have been deliberately demolished (it may well have presented a hazard) to vessels in the area. The majority of the remaining brickwork lies scattered in a well defined area at the north end of Pit XIII. Generally the brickwork is contained within the surviving timbers of Pit XIII although some lies outside it on the western side of the pit.



Figure 45: A section of the collapsed brickwork in Pit XIII

Feature XIII- Oyster Pit

Pit XIII is a long rectangular pit measuring 9.5m by 22m, with the collapsed brick structure XII lying largely within its timbers. The pit is built using horizontal planks supported by posts, although little remains of the timberwork on the north and south sides of this pit.

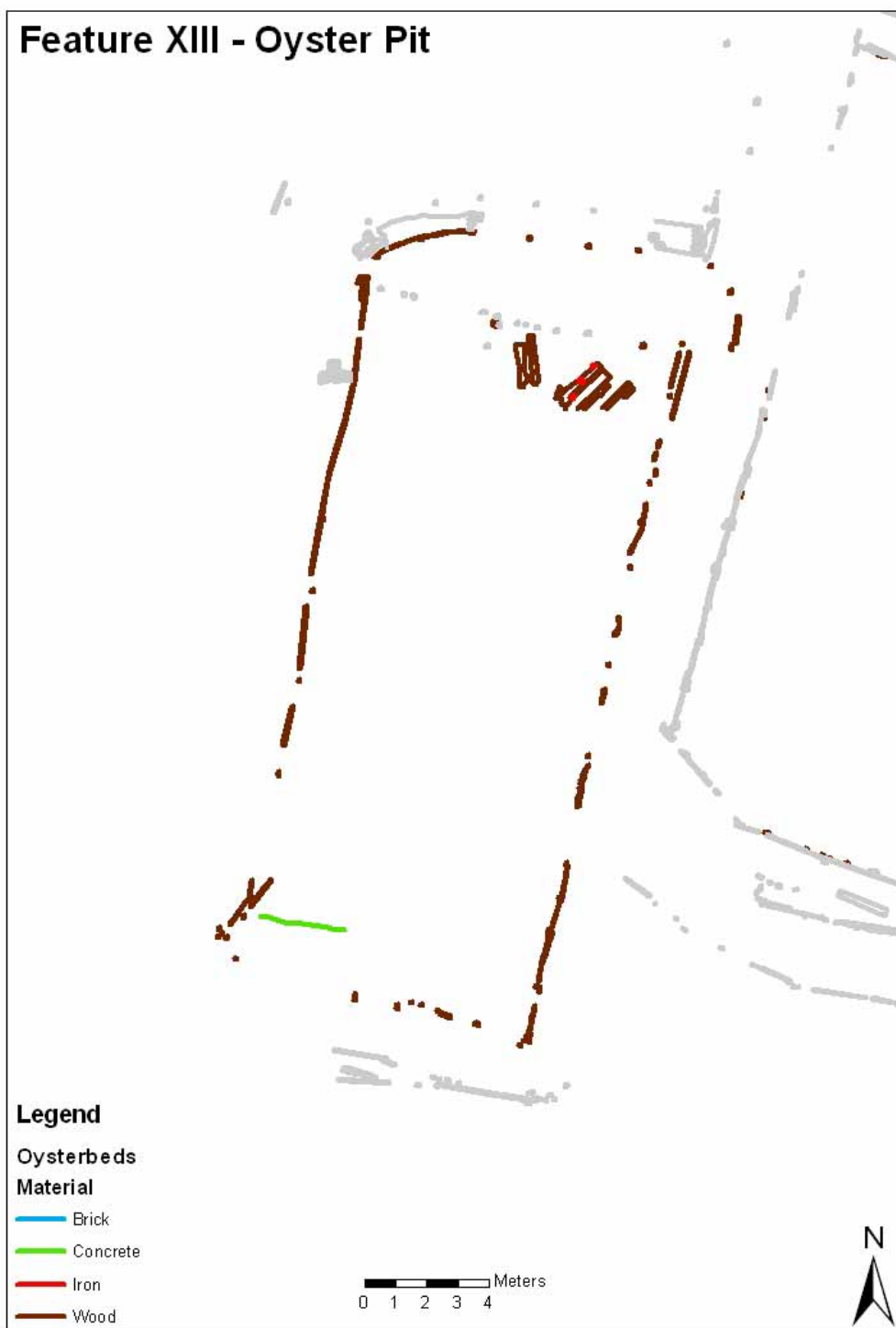


Figure 46: Plan of Feature XIII, oyster pit.

The west side of the timber structure is built using substantial overlapping timbers.



Figure 47: overlapping horizontal timbers used in the structure of Pit XIII

Approximately halfway down the western side of this pit holes between 20-25mm diameter and 15mm deep are located on one of the posts. There do not seem to be any iron fastenings associated with these holes, so it could indicate the use of treenails to fasten planking to the post, although the abraded remains of the timber make this hard to resolve.

Water drains visibly from the south east corner of the pit but there are no obvious surviving remains of a sluice. The OS map of 1898 shows a drainage channel at the south west corner of this pit. It is possible the drainage for the pit may have been altered, or the gap in the south east may represent an area of the pit that has collapsed and given way after the pits fell into disuse.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 16 owned by J. D Foster.



Figure 48: A heavily weed covered Pit XIII looking south west. The gap in the south west corner of the pit is clearly visible with water draining through it towards the main channel.

There is a raised gravel pathway at the south end of this pit and beside it there is a partially exposed area of concrete. However, it is not clear if the concrete base is associated with the original oyster pit or the collapsed brick structure.

Feature XIV – Oyster Pit

This pit is no longer visible, although a single timber at the south west corner of the pit was located and tagged as part of the survey grid. As the tide ebbs, a slight water filled depression is noticeable in the area. Apart from this there is little other evidence for the pit shown here on the historic OS mapping.

Feature XV – Oyster Pit

This is a substantial rectangular pit on to the south east of the site, measuring 10.5m x 25m. The timber structure of the pit is comprised of horizontal timber planking supported by posts. The pit is best preserved at its southern end, and the south east corner of it allows water to drain out of the remains of the pit, but there is no other visible evidence for a sluice there.



Figure 49: Plan of Feature IV, oyster pit

At the north of the pit on the western side, there is a possible repair made with vertical planks. The northwest corner of the pit is supported by a $\frac{1}{2}$ cut log approximately 0.15m in width. The use of a roughly reduced timber here similar to the $\frac{1}{4}$ cut timber in pit XI suggests repairs used very roughly fashioned and finished timber.



Figure 50: A ½ cut log upright at the northwest corner of Pit XV.

In addition in the south east corner of this pit the structure of the pit is different, a larger than usual horizontal timber is used there enclosed by vertical timbers, which may suggest another repair, or it may be the remains of a rough sluice structure.

On the 'Oyster Bed and Layings' map based on the 1898/1915 OS maps, this pit is marked as pit number 4 owned by J. D Foster.



Figure 51: Vertical timbers beside horizontal timbers in Pit XV, possibly representing a repair.

Feature XVI- Path

The path XVI runs north – south along the eastern side of the exposed pits. The path measures 73m long and it between 1m to 1.5m wide along its length. The path runs along the eastern sides of pits III, IV, XI and XV.



Figure 52: Plan of Feature XVI, oyster pit.

There is some irregular placing of the timbers used to contain the path, but these may be down to a fairly rough method of construction, or they may be a result of disturbance and patching to the path made necessary as the pits were repaired or altered. The path is poorly preserved compared to the later path IX, although this is probably due to its greater age and its longer exposure to the foreshore environment.

Feature XVII – The Ark

Due to health and safety concerns a measured plan of the Ark could not be completed during the fieldwork. Instead the remains of this structure were photographed in detail.



Figure 53: The partially exposed remains of the Ark.

The removal of the upstanding remains of the Ark in 1978 are well recorded and the surviving remains represent the base of a much larger floating jetty designed to hold oysters dredged up by the oyster fleet when the tides were not favourable for the vessels to get into Emsworth.

The surviving timber remains look well preserved, but the overall structure is badly broken and much of it is covered by debris and mud, which has obscured much of it and makes detailed description difficult. Additional survey of the Ark may be of benefit provided health and safety concerns can be adequately resolved.



Figure 54: Debris and soft mud covering the site of the Ark.

Feature XVIII- Disproved Feature

Initially recorded as a possible separate pit feature, upon investigation it became clear this “pit” was not a separate structure but part of the larger pits XIII and XV.

Feature XIX- Disproved Feature

Again another feature initially recorded as a possible separate pit feature, but upon investigation found to be part of pit XV.

Feature XX – Sea Wall

The existing brick and concrete sea wall, with a number of public and private access steps visible at intervals along its length. Some of these steps were used as temporary benchmarks for the purposes of recording height data across the site

Feature XXI – Oyster Pit/s

This feature was not drawn at the time of survey, as too little of it was exposed. However traces of it have been observed and this appears to be the position of a single large pit subdivided into three, or three smaller pits, which are visible on the 1948 aerial photograph. Too little of it was observed during the survey to provide a confident interpretation of this overall dimensions and survival, although it is estimated it measures approximately 14m by 20m.

Feature XXII – Gully

Feature XXII is a gully running from the southwest corner of pit I from the possible sluice at the pits southwest corner down to the main Emsworth channel to the south. The gully runs parallel to Pit XIV.

Notably there are no structural elements to define its margins, and this may be a natural drainage feature. It is not possible to establish whether it was an existing natural drainage channel put to use for draining the oyster pits.

A drainage channel seems to be marked on at least one historical OS map, however, it is also visible running from the south end of the now collapsed brick structure XII in the 1948 aerial photograph, so the gully it may be contemporary or have formed as a result of the construction of that feature.

4.2.3 Interpretation of Surviving Remains

The timber structures on the foreshore at Emsworth are the remains of the bases of large timber lined pits used for storing oysters. Documentary research has indicated that similar pits at Hayling and south of the main channel were used for growing oysters, but the pits along the foreshore recorded here were simply for storing oysters ready for market.

Foster's records supply some useful details on how he exploited the convenient location of the Emsworth pits. Upon receiving an order for oysters a foreman would collect the oysters from the pits and despatch them. As the pits could be approached at any time of day and at any state of the tide because they were never covered by more than 4ft (1.2m) of water, an order could be met immediately. The oysters were taken from the pits using special rakes, similar to a large rake headed tongs and transferred into barrels for delivery

As access to the oysters did not depend on the tide, most orders could be dealt with within 3 hours, and the oysters could be despatched by horse and cart to the station in less than 10 minutes, and sent on by train.

The most likely method of construction was by the excavation of shallow pits into the foreshore with the upcast being used to form banks around the pits and paths between them. An alternative method may have been the construction of small banks for material obtained elsewhere although simple excavation of shallow pits would seem to be the simplest method of making such pits.

Once excavated, the pits were lined with timber to prevent the sides from slumping. This served to maintain the pit against slumping from the movement of the tides and also prevented mud and shingle from smothering the oysters to be placed in the pits.

The timber lining in the pits was mostly made of planks laid horizontally around the interior of the pit and this planking was supported by upright posts, although in one case a double lining of an exterior horizontal line of planking and an inner vertical lining was observed (Pit V). Some of the pits appear to

have had concrete bases laid in them. The concrete base would have provided a firm surface that would have aided the maintenance and periodic cleaning of the pits.

The timber lining of these pits although heavily buried and quite abraded in many cases appear to have been made quite simply and fastened to their supporting posts with nails. The use of some half round and quarter rounded timbers in some of the pits indicate that the timber used clearly did not need to be particularly well dressed, and it seems likely low grade timber including off cuts and old timber from the nearby timber yards could easily have been used to construct the linings of the pits. The possible identification of additional fastening holes in one or two of the planks suggests some of these planks may have been reused from vessels or other sources.

There was little evidence of caulking on the timbers, although the poor overall preservation of the exposed remains, means that this may not have been preserved. Some reed work or woven thin twigs were observed in Pit VIII and it may be possible that this indicates a waterproofing layer to the pits. This is highly speculative as the timber lined banks may not have required much waterproofing as the pits were most likely cut into the contemporary level of the foreshore and would probably have retained water for at least the duration of low tide.

Without the concrete base and timber lining an unsupported pit would probably have become filled in more quickly than it could have been cleaned, the oysters could not have been contained and they would have been smothered by the mud and shingle falling into the pit.

The pathways were constructed in a similar fashion with horizontal planks and posts used to stop the raised paths from slumping outwards and disappearing. It is possible that the reed or wickerwork observed may be material used to consolidate the pathway on the site although this is not clear.

It is possible that some of the pits may have been linked between the dividing shingle banks by rough timber lined conduits. The timber guttering noted to the south of Pit VI and apparently running to Pit VIII, may be an example of such a feature. This feature may have been used to control the water levels in the pits, or alternatively it may have been used as a passage through which oysters could have been raked from one pen to another as required or as a pit needed cleaning and maintenance. The two pits VI / VII and VIII have the remains of a likely conduit between them although none is shown on OS maps. It is known that these two pits were owned by the Fowley Island Oyster Company, so the evidence of a physical link between the pits is supported by their common ownership.

The presence of iron fittings on some pits, have been interpreted as sluice openings. The iron features appear to be heavily corroded, but large apertures are still apparent in at least one (Pit IV), and it may have been used as a sluice to control the water level in a pit to allow easier access to the pit or raking, or even to drain it as the pit required cleaning and maintenance.

The remains of the Ark could not be safely surveyed, but from the photographs taken of it, it is clear that there are still substantial remains of the structure surviving. Rudkin mentions that at Emsworth the popular opinion was that the Ark was meant to be towed to Mill Rythe where oyster smacks could tie up to it at all states of the tide (Rudkin 2004, 19).

Rudkin describes how the Ark was designed by J.D. Foster to be used as a landing stage for oyster smacks, with the bottom half being used as storage tanks for scallops. It was planned that it would be used as assorting point for catches from the smacks capable of operating regardless of the tide (2004, 19). Smaller vessels could then take the sorted oysters to the Hayling Island pits to mature or to Emsworth for storage. The floor half way up had hatches where the scallops could be dropped when unloading. There were three openings in each side, and one at each end to allow easy access for working.

The use of the Ark may merit some more investigation. Rudkin states that there is documentary evidence for the Ark in its present position before 1898 although it is not clear to what sources he refers. As the earliest map evidence seen for this study only indicates the Ark resting in its present location from 1912, after the industry had collapsed, further research is need to confirm Rudkin's statement.

The function of the collapsed brick structure XII is still unclear. It is known to be in place by 1948 from an aerial photograph, and it is not shown on the 1932 map. This places its origin between 1932 and 1948, which does suggest it may have been built as a defensive structure for World War II, but its shape and size and its position on the foreshore where it would be flooded by high tides is curious. Anti-landing structures were often devised to lie on the foreshore or just above it, but it is not clear if this structure was part of such a system nor why it seems to have been built in isolation.

5. Assessment of Archaeological Significance

Drawing on desk based research of established knowledge and the fieldwork results a preliminary assessment of the archaeological potential and significance of the Emsworth Oyster Pits has been made. This assessment has been structured using characterisation criteria adopted from English Heritage.

Period

Based on the earliest reliable map evidence available, the date of the existing remains of the oyster pits appears to be sometime in the 19th century. As noted above, the pits seem well established and quite extensive by the time of the 1866 OS map, and this suggests that these pits may have been in existence on this area of the foreshore for some time before they were recorded.

While there appears to be good documentary evidence for an "oyster fishery" in existence around Emsworth from as far back as the Medieval period, it is not clear from these documentary records whether the industry made use of

oyster pits of the kind surviving on the foreshore. The fishery may have been based on oyster dredging or raking from natural and man made beds using fishing vessels until the use of pits is first recorded in the 17th century although an earlier origin for the pits is possible

Rarity

There are a number of known and further suspected oyster pond sites in Chichester Harbour and elsewhere in England, notably in Essex (Fulford et al 1997, 87-88) and Kent (Wessex Archaeology, 2005) where rapid coastal zone assessment surveys have recorded a number of these sites and oyster industries are well documented. However, the lack of any significant study of these sites means that it is difficult to estimate reliably the number of pits surviving around the UK coast at present.

When considering the likely survival of oyster pits across the UK there is an additional difficulty that while there may be many pits that have been accurately identified there are others that may be unrecorded or have been mistakenly identified as oyster pits. The creation of pits for salt making, marling and other purposes is documented and where the preservation of structures devised for these different uses is poor, it may be difficult to identify their origin without some study.

As such it is difficult to appraise the rarity of the Emsworth Oyster Pits. However, the oyster pits at Emsworth were clearly quite extensive and represent a highly developed and large industry. It may be that while the pits are not rare as a type of feature, pits of the size and extent of those seen at Emsworth may be more unusual than those in use in more common and widespread smaller oyster industries. The extensive pits noted in the 2006 foreshore survey of Chichester Harbour however, indicate at least one other local site with extensive surviving pit structures, and the number and size of the structures observed during the survey indicate that the oyster fishery was important to the local economy and quite widespread locally (Maritime Archaeology 2007, 70).

Documentation

There is a large amount of documentation relating to the Emsworth oyster industry. While a great deal of the records for J. D. Foster's oyster business have reportedly been lost with the demise of his trade, it seems a large amount of documentation still survives, particularly those records used when J. D. Foster challenged the refusal of the Worshipful to accepting his oysters.

Prior to the later 19th and 20th centuries however, there are a limited number of documentary references to the oyster fishery at Emsworth dating back to the Medieval period. In addition, the inclusion of pits on maps before the 1800s is not clear. Prior to this project there has been limited archaeological investigation of the oyster pits, although a foreshore survey of Chichester Harbour carried out in 2006, identified other oyster pits and beds in the area (MA Ltd. 2007, 70). The survey work undertaken and described in this report has contributed further to this archive.

Group value

There are examples of other possible oyster pits in the Portsmouth region. Hayling Island has the potential for group association with a reasonably well documented oyster fishery there, further increasing its archaeological significance.

A foreshore survey undertaken in Chichester harbour in 2006 identified a number of other oyster pits, at Birdham, Prinsted and Bosham. These pits with one exception occurred as multiple structures similar to the collection of surviving structures at Emsworth (Maritime Archaeology 2007, 70).

In addition, further oyster pond sites are recorded Oyster beds are recorded a, Cosham and Porchester in the Eastern harbours, Croften near the Meon Estuary, Eling and Dibden on Southampton Water and Stanswood in the West Solent (Tubbs 1999) suggesting this was a widespread industry, increasing the overall group value of the Emsworth pits as part of a local and regional group.

Survival and condition

As the archaeological survey was limited to the recording of exposed remains the state of survival and condition of sub-surface deposits and structural elements of the oyster pits is currently unknown. However, from surface observations and it is clear that there is a large area of reasonably well preserved beds surviving on the north part of the Emsworth foreshore.

A significant number of pits are no longer visible. A local source, John Mant, reported that the pits to the west of the harbour were cleared in the 1960s (J. Tweddell, pers. comm.). The full extent of the removal is unclear so there is a possibility that some remains of these pits may survive buried in the sediment.

However, anecdotal evidence appears to suggest that the level of sediment and material on the foreshore has dropped significantly in the last few decades, which could mean that the beds to the west, south and south west of the exposed pits no longer survive.

The visible remains lie in a water-logged intertidal environment, so provided further exposure of the timber structures is limited the pits may survive for some time. Intrusive investigation, to determine the amount of timber structure surviving below the present foreshore ground level would be required in order to fully assess the condition and potential of the remains.

A foreshore survey of Chichester harbour undertaken in 2006 found that the Emsworth pits were noteworthy for the amount of timber surviving in them compared with the remains of pits at Bosham where no timber was visible (Maritime Archaeology 2007, 70).

Fragility/ Vulnerability

As the site lies in the intertidal zone it is exposed to the dynamic regime of the tidal cycle. The site appears to be suffering from erosion, as demonstrated from the loss of a number of structures recorded on OS maps that are no

longer visible. As the foreshore in this area has been and continues to be used to moor boats it is likely that the surviving remains either exposed or buried could be damaged by vessels resting on the foreshore at low water.

Potential

From the evidence outlined above it can be concluded that the archaeological potential of the oyster pits is high. However, further investigations are required in order to answer significant questions that remain concerning the earliest date, construction and preservation of the structures. These investigations have the potential to make a further contribution to our understanding of the development of the oyster fishery in the harbour area. Further archaeological investigations of the site have the potential to inform regional studies of the Post medieval and possibly even Medieval fisheries of the region.

Summary

The lack of many other studies of oyster pits and their use in the wider oyster industry makes it difficult to establish the wider significance of the Emsworth oyster pits beyond their clear regional significance.

There is a large body of recorded archaeological evidence for oyster consumption around the UK including the study of prehistoric shell middens containing oysters as well as other mollusc species. While more developed oyster fisheries are likely to have been in place from at least Roman times the origin of an organised industry where natural and artificial beds were cleaned and maintained by fishermen and in some case moved to more conveniently located and specially constructed growing pits is unclear.

There are several similar sites feature of this scale known locally (the Hayling Island beds at Langstone Harbour) and in the wider Solent area and their potential to be linked to similar unstudied industries and similar structures in other areas such as Hayling Island and the Hamble means the Emsworth oyster pits can probably be considered of high regional archaeological and historical significance.

On a wider scale the lack of any clear evidence of the earliest origins of these features, and a lack of any well studied directly comparative structures indicates that while there may well be a national significance to these features it cannot be confirmed with our present state of knowledge. The existence of oyster fisheries elsewhere in Britain are known to us, generally from documentary sources. For example there are clear records of a prosperous oyster fishery in existence in Essex in the 14th century (Kenyon 1934, 434).

The existence of other large scale oyster farming enterprises is well documented in southern England, and there were large oyster fisheries at Whitstable in Kent, as well as Brightlingsea in Essex that have survived to the present day. Whitstable and Brightlingsea were notable as the chief oyster grounds of British fisheries in the early 20th century just after the Emsworth industry collapsed (Jones 1926, 82). These industries survive in a substantially reduced form and the industry no longer makes use of pits of the kind used at Emsworth.

These fisheries did not have a similar disaster to the poisonings that destroyed the Emsworth industry and so have continued despite damage to the industry from earlier over-exploitation, the lack of access brought by the World Wars, a series of unusually cold winters in the 1930s and 1940s and disease and exotic pests affecting the native oyster stocks (Lang et al 2005, 15) The surviving industries around the south coast now generally fish oysters commercially from natural beds, mainly from the Solent but also in some Cornish estuaries and from the Thames and Essex Estuaries (Lang et al, 2005, 67). As a large Post medieval oyster industry then, Emsworth was by no means unique.

Intrusive investigations at the site should help confirm the level of preservation below the present foreshore ground level. Further weight is added to the need for investigation due to the threat from the erosion of the sediment that presently bury and protect the site and from any unintentional damage from boat mooring or other foreshore activities.

6. Recommendations for Future Work

Intrusive Archaeological Investigation

The oyster pits are clearly under threat from erosion and while the survey of the exposed remains of the beds has provided a great deal of information about their methods of construction and use, it may be beneficial to undertake very small scale intrusive evaluation work on selected pits to establish the amount of timber structure that may survive under the present foreshore ground level. This may help to determine how much structure survives buried over the full extent of the pits.

Dendrochronological sampling of the surviving timbers of the Emsworth pits is not considered viable as a possible dating tool at this point as the exposed timbers are too small and badly abraded to supply sufficient ring data for this technique. In addition it seems unlikely that an adequate sample could be recovered for the dating to be considered reliable.

Further Survey

It is clear that the oyster pits represent an important part of the story of Emsworth and Chichester Harbour. Additional survey of the similar sites at Bosham, Birdham and Prinsted would provide useful baseline data for comparison with the Emsworth pits to establish whether pits for growing differ in any significant way from the pits used for storage of mature oysters at Emsworth.

While the Emsworth pits were noted from a previous survey (MA Ltd. 2007) as having the best preserved structure, it would probably still be beneficial to examine the other pits to establish whether any evidence of earlier phases of pit construction can be seen. In addition, Rudkin (2004, 31) notes that the oyster pits owned by the short lived Fowley Island Oyster Company were lined with special tiles or slabs to encourage spat to collect on them, further

survey or archaeological work may uncover more details about the use of such materials in the pits and beds.

Further Documentary Research

While the surviving pits appear to date at least from the 19th century additional research of early map sources or other records may provide earlier dating evidence for the construction of the pits.

7 Conclusions

Completion of Project Aims

Including the production of this report, the five main aims of the project have been successfully met, although health and safety concerns did curtail some aspects of the survey, notably on the Ark.

The project recorded the exposed remains of the oyster pits using a team of specially trained volunteers and the survey work was completed and processed in time for the survey results to be incorporated into the Emsworth Museum display on the oyster industry.

In addition, the construction and use of the pits is now better understood and is outlined in this report. The significance of the oyster pits as a heritage resource is also described here in terms of their possible local, regional and national significance.

Origins of the Oyster Pits

The earliest confirmed origin for the existence of oyster pits on the foreshore Emsworth is demonstrated by historical mapping of the area, where a number of pits are shown on the foreshore in the middle of the 19th century. The extensive number of pits already in place at the time and earlier references to pits in the area from the 17th century suggest that pits may have been in use on the foreshore at Emsworth for a considerable time before this although the survey of the visible remains on the foreshore have provided limited evidence of structures earlier than those seen on the 19th century mapping.

Use of the Oyster Pits

The use of the oyster beds is only generally understood before the later 19th century when documentary evidence from the business records of Kennett and Foster provide significant detail on the use of the pits as storage for mature oysters.

In the later 19th century at least the use of the pits on the foreshore at Emsworth is now well understood in considerable detail. The oyster pits were the final stage in a system of natural and artificial beds and pits used to seed, sort and grow oysters. The industry was substantial and comprised a fleet of dredging vessels to collect oysters from natural and artificial beds as well as from sources abroad.

There were also intermediate oyster growing pits at Hayling Island and south of the main channel at Emsworth in addition to the surviving array of storage

pits on the Emsworth foreshore. It seems the Ark was also part of this system of sorting and storage although it never reached its intended destination as a drop off and pick up point for the catch at Mill Rythe and had to operate as a storage facility until the oyster industry collapsed. By the time of its demolition in 1978, it had long been out of use.

General Conclusions

The survey and research projects have collated a substantial body of archaeological and documentary material which is a valuable resource for the understanding of this aspect of the fishing industry within Chichester Harbour. As a project concerning the coastal zone the survey and research work represents a significant advance in our knowledge of the archaeology of oyster cultivation in southern England.

The lack of any systematic investigation into the archaeology of coastal fishing and oyster fishing have been identified in the past as serious omissions and a weakness in the archaeological record (Fulford et al 1997; 103, 124), and this project provides a useful baseline of data to address this gap in knowledge.

The limited nature of this investigation has raised further questions concerning the nature, organisation and extent of the oyster fishery at Emsworth before its well documented industry of the 18th and 19th centuries. No structural remains predating the Post medieval oyster pits were identified although documentary evidence for the oyster fishery extends back to the Medieval period. In addition, the favourable conditions for native oysters in the harbour and the long settlement history of the area hint that the fishery may have existed in some form in the area for a considerable time before the first documentary reference to the industry at Emsworth.

The survey and research have provided a useful baseline for the study of similar Post medieval oyster farming structures both within Chichester Harbour, regionally and even nationally. Further archaeological work and broader research of similar sites may provide additional information on the possible use of such in the Medieval period and possibly earlier.

References

Allen, M., and Satchell, J., 2000, *Our Changing Coast: A survey of the intertidal archaeology of Langstone Harbour, Hampshire*. CBA Research Report 124. Council for British Archaeology

Cole, H. A., 1956, *Oyster Cultivation in Britain. A manual of current practice*. London HMSO.

Eyton. T. C. 1858, *A History of the Oyster and the Oyster Fisheries*

Fontana V. and Fontana, D., 2000, 'A brief historical survey'. In Allen, M., and Satchell, J., *Our Changing Coast: A survey of the intertidal archaeology of Langstone Harbour, Hampshire*. CBA Research Report 124. Council for British Archaeology

Fulford, M., Champion, T., Long, A. (eds), 1997. *England's Coastal Heritage: A Survey for English Heritage and the RCHME*. RCHME/EH Archaeological Report 15.

Günther, R. T. 1897, 'The Oyster Culture of the Ancient Romans'. *Journal of Marine and Biological Association* 4:360-5

Hampshire and Wight Trust for Maritime Archaeology, 2008, *Emsworth Oyster Beds Volunteer Fieldwork Guidance Manual*.

Hunter, J. and Ralston, I., 1999, *The Archaeology of Britain*.

Jones, R., 1926, 'The British Fisheries', *Economic Geography*. Vol. 2 No. 1

Kenyon, N., 1934, Labour Conditions in Essex in the Reign of Richard II. *The Economic History Review*, Vol. 4, No. 4.

Maritime Archaeology Ltd., 2007, *Chichester Harbour Survey of Foreshore Structures*. Unpublished report Ref MA Ltd No 1752 Final Report Version 3

Melton, N. D. and R. A. Nicholson 2004. 'Hunter-gatherers in Shetland: archaeological investigations at West Voe, Sumburgh'. *The New Shetlander* 229: 31-33.

Potter, T. W., and Johns, C. 1992, *Roman Britain*

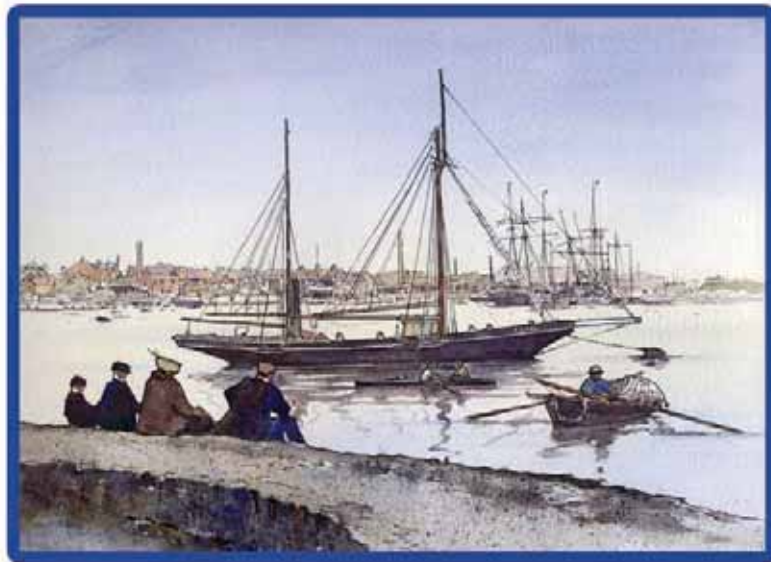
Rudkin, D. J., 2004, *The Emsworth Oyster Fleet; Industry and Shipping*.

Tubbs, C., 1999, *Ecology, conservation and history of the Solent*

Watkins, A. E., Undated, *Aelfric's Colloquy, Translated from the Latin*. Kent Archaeology Society Paper No. 016

Wessex Archaeology, 2005, *North Kent Coast Rapid Coastal Zone Assessment Survey. Phase II Field Assessment Year One Report*. Unpublished report ref. 56750.02

Whitfield, R., 2005, *Emsworth: A History*



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