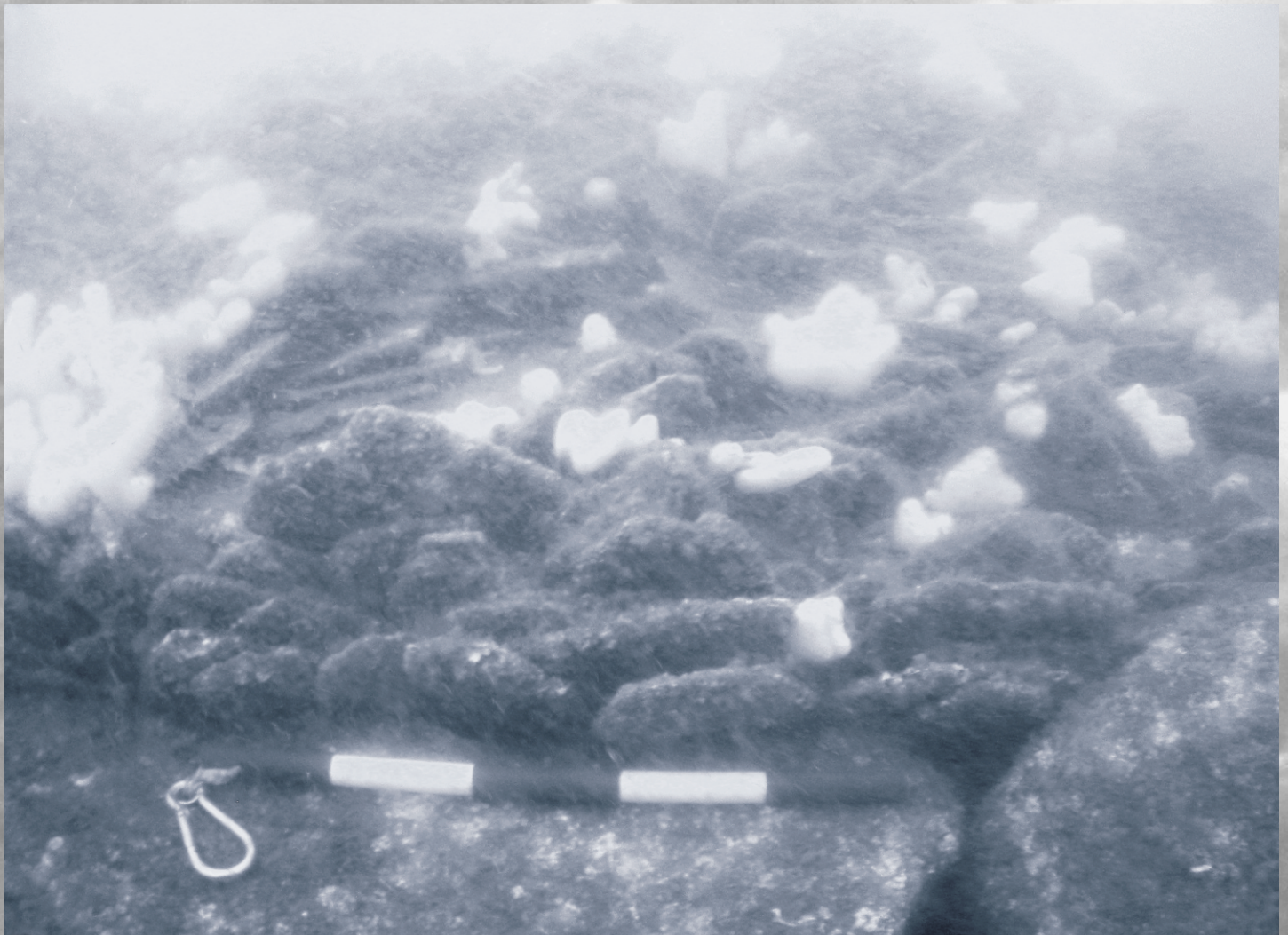




Pwll Fanog Wreck,
Menai Strait, Anglesey

Designated Site Assessment:

Archaeological Report



**ARCHAEOLOGICAL SERVICES IN RELATION TO THE PROTECTION OF WRECKS
ACT (1973)**

PWLL FANOG WRECK, MENAI STRAIT, ANGLESEY

DESIGNATED SITE ASSESSMENT: ARCHAEOLOGICAL REPORT

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PWLL FANOG WRECK, MENAI STRAIT, ANGLESEY

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Summary

Wessex Archaeology was commissioned by Cadw to undertake a designated site assessment of the Pwll Fanog wreck site, situated in the Menai Strait between Wales and Anglesey. The work was undertaken as part of the Contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973).

The overall objective for the site was to conduct an initial site assessment and condition survey of a designated site not previously visited by Wessex Archaeology. Diving operations were conducted between 25th and 27th May 2007.

The main archaeological element of the site is a cargo mound consisting of slate tiles. Ships timbers are preserved below the slate mound. Typological and historical considerations suggested a late medieval/early post-medieval date for the wreck. This has been confirmed by radiocarbon dating.

The site seems to be stable, with the slates well wedged together and further pinned down by boulders that have subsequently rolled down the slope onto the site. A number of slates are scattered around the site and are wedged in between surrounding rocks. Despite a targeted search, no traces of the late 1970s excavation trench were visible. WA recorded more than 30 minutes of video footage of the actual slate mound. A number of stills photographs were taken in order to start a monitoring programme of the site.

A timeline for all work on the site is included within the report. Three main phases of research are discernible. Firstly the discovery in 1976, followed by intense desk based research, the excavation of a trench across the site and the publication of two reports during the late 1970s. Secondly, repeated monitoring visits by the Archaeological Diving Unit between 1981 and 2000 with short accounts delivered to Cadw, and thirdly a resumption of the biological survey work on site from 1999 to 2000, documented by short notes in the archive.

The relevance of the wreck and its cargo can be characterised as very high because of the scarcity of evidence for vessels employed in the late medieval and early post-medieval slate industry and trade in Wales and elsewhere. Even though some research into the slates on site has been conducted, little is currently known about the actual construction of the vessel, one of the oldest designated wrecks within UK waters, and its relation to the early slate trade within the region. A comprehensive assessment of the remains combined with an assessment of the existing site archives would be necessary in order to provide a basis for further research into the site.

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Acknowledgements

This investigation was commissioned by Cadw as part of the Contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973). The assistance provided by Sian Rees of Cadw is gratefully acknowledged.

Wessex Archaeology would also like to thank the former Licensees Owen Roberts and Cecil Jones for their advice, information and interest in the site. Deanna Groom of the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) supplied Wessex Archaeology with valuable archive information.

The fieldwork was carried out by Dietlind Paddenberg, Margaret Christie, Niall Callan and Simon Adey-Davies with the assistance of vessel skipper David Burden. Dietlind Paddenberg supervised the fieldwork and Simon Adey-Davies supervised the diving. The report was compiled by Dietlind Paddenberg. Karen Nichols prepared the illustrations and the project was managed for Wessex Archaeology by Steve Webster.

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PWLL FANOG WRECK, MENAI STRAIT, ANGLESEY

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1. BACKGROUND

1.1. INTRODUCTION

- 1.1.1. This document constitutes a Designated Site Assessment Archaeological Report for a programme of work undertaken as part of the Contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973). The document has been prepared by Wessex Archaeology (WA) for Cadw. It constitutes an assessment of Pwll Fanog: a designated wreck site located in the Menai Strait, Anglesey, Wales (**Figure 1**).
- 1.1.2. The work was conducted in accordance with a Written Scheme of Investigation (WSI) prepared by WA and agreed by Cadw (WA 2007). Diving operations took place between 25th and 27th May 2007. All diving took place from the diving support vessel *Xplorer*.

1.2. DOCUMENT PARAMETERS

- 1.2.1. This document has been produced from diver-generated data and a limited desk based study of readily available sources concerning the history of work on the site. WA considers this to be a working document designed to open up debate on the topic in question. Every attempt has been made to ensure that the facts within the report are correct; however errors arising from the preliminary character of the desk-based study may be present.

1.3. SITE HISTORY

- 1.3.1. The site was discovered in 1976 during a marine biological survey by Dr Cecil Jones, Marine Archaeological Research Group, University College of North Wales, Bangor (Jones 1978: 152). After a survey in 1977 (Roberts 1979: 249) the site was designated under the Protection of Wrecks Act (1973) in February 1978.
- 1.3.2. In 1978, a cross-sectional trench was excavated by Owain Roberts, Welsh Institute of Maritime Archaeology and History, University College of North Wales, Bangor, with the aid of the Gwynedd Branch of the BSAC (Roberts 1979: 249). The site was re-designated under the Protection of Wrecks Act (1973) in January 1979. From 1979 to 1981, the site was monitored by a licensed group comprising staff and students at the University College of North Wales, Bangor (ADU 1991).
- 1.3.3. Between 1981 and 2000 the site was dived sporadically by the Archaeological Diving Unit (ADU) on behalf of Cadw (ADU 1981-2000). Licensed activity was very limited until 1999/2000, when further biological sampling took place on site (McElvogue 2000a). The last account, prior to WA's work on site, is from 2001, when the Marine Archaeology Group Wales visited the site in order to check for signs of illegal interference and changes to the site environment (Bowyer 2001).

1.4. AIMS AND OBJECTIVES

- 1.4.1. The overall objective for the site was to conduct an initial site assessment and condition survey of a designated site not previously visited by WA. This was further detailed in the WSI (WA 2007), specifying the fieldwork and post-fieldwork tasks as follows:

Fieldwork

- Produce accurate position fixes for the main elements of the site;
- Track around the slate mound;
- Plot any outlying elements of the wreck by conducting tracked searches of all the area within 10-20m of the known slate mound, preferably in a rectangular box (the extent of the area searched will depend upon the in-water visibility);
- Attempt to identify the location of the late 1970s/early 1980s trenches;
- Produce structured photographic and written records for all, or if there are a lot the main archaeological elements of the site;
- Assess the stability of the site;
- Set out and take a series of monitoring photographs sufficient to start a monitoring programme. If possible this will include a ‘swim-over mosaic’ of the site (note: photography will only be possible if in-water conditions allow).

Post-fieldwork

- Produce a timeline for all work on the site;
- Assess the archaeological potential of the site, including the potential benefits of further work.

1.5. EXISTING SITE DATA

- 1.5.1. The published documents indicate that the wreck site comprises a mound of heavily overgrown slates stacked on a ledge at a depth of 11m. The mound is *c.* 9.9m by 5.5m in size. Remains of a clinker built wooden vessel are preserved below the slate mound. Two iron anchors and isolated barrel hoops (?) were recorded in the vicinity of the wreck site. A late medieval/early post-medieval date was suggested for the wreck and its cargo. (Jones 1978; Roberts 1979).

- 1.5.2. The position of the centre of the designated site as given in the Statutory Instrument (SI) is as follows:

Lat.	53° 12.767' N
Long.	04° 11.717' W
WGS84	

- 1.5.3. The SI number for the site is 1978/199, and from the centre point (as given in the SI above) the designated area consists of a circle with a radius of 150 meters. There is currently no Licensee and no nominated archaeologist.

- 1.5.4. The ADU stated that ‘although the designated area adequately covers the site, it is not exactly centred on it’ (ADU 2000). This was confirmed by WA’s site investigations. The position of the centre of the designated site as given by the ADU (2000) is as follows:

Slate pile 1	Lat.	53° 12.776' N
	Long.	04° 11.795' W
Slate pile 2	Lat.	53° 12.772' N
	Long.	04° 11.790' W
Displaced datum pole	Lat.	53° 12.769' N
	Long.	04° 11.785' W
WGS 84		

- 1.5.5. In 1999, the Licensee replaced a number of datum points and survey lines that had become dislodged. He noted that various individual slates were located up to 25m from the site (ACHWS 1999/2000: 22; 2004: 33). The last account of a Licensee's work on the site is from 2000, when climbing pitons were hammered into two rocks north and south of the site as datum points in order to facilitate biological sampling (McElvogue 2000a).
- 1.5.6. The last monitoring visits on site occurred in 2000 and in 2001. It was stated that the mound of slate overlaying the boat structure was stable and appeared unchanged from previous years. Many of the visible slates were heavily covered by marine growth. The site had a quantity of redundant survey equipment from previous licensed activity scattered across it including concrete weights, datum poles and glow-line (ADU 2000; Bowyer 2001).
- 1.5.7. The documentation listed below was available prior to the assessment:
- The Cadw entry;
 - The RCAHMW record;
 - The ACHWS record of the site (ACHWS 1999/2000:22; 2004:33);
 - A copy of the ADU's site archive (ADU 1981; 1991; 1993; 1995; 1997; 2000);
 - Two site publications (Jones 1978; Roberts 1979) and a published site summary (Fenwick and Gale 2000: 120-121);
 - A personal memoir of marine archaeology in the Menai Street by Cecil Jones (Jones n.d. [II]), including a radiocarbon date of the Pwll Fanog wreck;
 - Site plans produced by Cecil Jones (e.g. **Figure 2**)
 - A schematic diagram of the Pwll Fanog submarine topography by Cecil Jones (**Figure 3**).

2. METHODOLOGY

- 2.1.1. A four-person diving team, using surface supplied diving equipment, was deployed from the diving support vessel *Xplorer*, a 12-metre inshore survey catamaran. Both one- and two-point anchoring systems were used on the site.
- 2.1.2. Digital still photographs were taken using a housed Canon G2 digital camera with a 0.56 wide-angle adapter using natural light only. The plates are digital still images and have been processed using Corel Photo-Paint to remove a green colour cast and to improve contrast. Video images were taken using a hat-mounted single chip Colourwatch Digital Inspection Camera, recording onto miniDV tape.

- 2.1.3. Archaeological features were acoustically positioned during the survey using a Long Baseline (LBL) acoustic tracking system. This produced coordinates projected in Universal Transverse Mercator (UTM) zone 30N. All data acquired during diving operations, other than images, was recorded in real time within an MS Access database linked to the tracking system via ARCmap 9.

3. RESULTS

3.1. DIVING, MOORING AND SURVEYING CONDITIONS

- 3.1.1. Diving, mooring and surveying conditions proved to be difficult. This was, on the one hand, due to general safety issues with regard to diving in a narrow and busy waterway such as the Menai Strait, where constant attention has to be paid to rapidly approaching motor vessels and other water sports activities (for example, a raft race took place in the strait on 27th May). On the other hand, specific in-water issues affected WA's work on site, as amplified in the following.
- 3.1.2. A total of 77 minutes bottom time was achieved over three dives on 26th and 27th May 2007. Following advice from the former Licensees Cecil Jones and Owain Roberts, the first dive was successfully conducted during the slack period c. two hours in advance of low tide. However, diving time was limited because the site is situated on a steep slope and a depth of 22m was reached while descending to the bottom, even though the actual site lies within a depth of 11m to 12m.
- 3.1.3. Previous site investigators had reported difficulties with high tide dives on the site (Cecil Jones pers. comm.). This was confirmed when another dive was attempted during the slack period around high tide the same day. This dive had to be aborted after a short while because the current picked up too rapidly. No more high tide dives were attempted thereafter. However, under favourable wind and hence mooring conditions diving on site is possible around low water slack periods, predominantly up to two hours in advance of low water and possibly again afterwards.
- 3.1.4. Anchoring on the site proved to be problematic. The firm ground around the site made mooring difficult, and the anchor only held when it became lodged amongst rocks.
- 3.1.5. The set-up for the use of the acoustic tracking system was also bound to tidal slack periods, because the calibration of the beacons (which are held up in the water column by a buoy), had to be conducted while they were as upright as possible. It was not possible to attach very short ropes to the beacons because the site is situated on a steep slope, thus comparatively long ropes were needed for the two beacons in deeper water in order to enable sufficient 'communication' between all four beacons.
- 3.1.6. Despite longer ropes on the deep water beacons, communication between the beacons turned out to be limited. Another calibration was conducted, which did not improve the tracking results. The array was not re-deployed as it was felt that the limited slack periods should be used for diving. However, it is suggested for the next survey to set a grid as small as possible around the known site position (which has now been confirmed to be accurate) in order to make the difference in depth as slight as possible.

3.2. SITE ENVIRONMENT

- 3.2.1. The Menai Strait separates the Isle of Anglesey from the mainland. It consists of a narrow channel about 18 miles long, and varies in width from almost four miles in the north-east to about 400m in the south-west. Several theories have been put forward as to how the Menai Strait was formed. Current theory suggests that a melting ice-sheet formed a river which found a route through an existing geological fault (Holden 2003: 113).
- 3.2.2. The Pwll Fanog site is situated to the south-west of the Menai Bridge between Y Felinheli and Bangor, on a ledge approximately halfway down a steep slope which extends from the mainland shoreline to the bottom of the Menai Strait (**Figure 3**). Between the wreck site and the bottom of the Strait there is a c. 4m high cliff. A biological survey showed that the cliff starts to rise from a point about 260m off the Anglesey shore, and that the mainland shore then continues as a slope which increases in steepness as the surface is approached (Jones n.d. [II]: 5).
- 3.2.3. Even though silty deposits are recorded in depressions and gullies close to the site (Jones n.d. [II]: 5), the seabed surrounding the slate mound consists of coarse sand, grit, pebbles, small rocks and boulders. The grit on site testifies to the fact that the site is in a high energy environment, in this case caused by strong tidal currents (Cecil Jones pers. comm.).
- 3.2.4. The slate mound is covered by an abundance of sponges such as dead man's fingers (*alcyonium digitatum*) and breadcrumb sponge (*halichondria panicea*) (**Figure 4**). According to Cecil Jones (pers. comm.), the latter is 'like cement holding the site together'. Among the fauna noted on site were a lobster and a dogfish as well as small fish and crabs. Initial analysis of biological surveys conducted in 1999 and 2000 suggested a noticeable difference between the site and its surrounding area, the site being richer in fauna, flora and mio-fauna (McElvogue 2000a).

3.3. PROGRESS AGAINST OBJECTIVES

- 3.3.1. An initial site inspection showed that the mound is clearly visible with a distinctive 'wall' of slate in the north of the site which is c. 2m high. The mound is built of bunches of tiles (i.e. groups of tiles lying in the same direction) with no evident pattern. An old datum (a pole in a concrete-filled bucket) and broken survey lines were also observed on site.
- 3.3.2. The following progress was made against the fieldwork objectives as outlined in **Section 1.4**:
- The steep slope within the wider area did not allow for accurate acoustic positioning. However, it could be confirmed that the ADU's positions are sufficiently accurate to enable a rapid location of the site underwater;
 - A track around the slate mound and a tracked search were not possible for the same reason. However, it could be established that a number of slates are scattered around the site and are wedged in between surrounding rocks. This has obviously happened some time ago and does not seem to be the result of recent site interference;

- The site seems to be stable, with the slates well wedged together and further pinned down by boulders that have subsequently rolled down the slope onto the site;
- Despite a targeted search, there were no visible traces of the late 1970s excavation trench;
- The main archaeological element of the site is the slate mound. WA recorded more than 30 minutes of video footage of the mound;
- Additionally, a number of stills photographs were taken in order to start a monitoring programme of the site (**Section 3.6**). A ‘swim-over mosaic’ of the site was attempted, but had to be abandoned due to bad visibility. However, the video footage gives a good impression of the site and its condition.

3.3.3. The post-fieldwork objectives as outlined in **Section 1.4** are addressed in the following sections of this report.

3.4. TIMELINE OF PREVIOUS WORK

3.4.1. The following summary timeline has been generated from only those documents available at the time this report was compiled. The documents are listed in the Reference Section of this report.

3.4.2. **1976:** The site was discovered during a marine biological survey by Dr Cecil Jones, Marine Archaeological Research Group, University College of North Wales, Bangor (Jones 1978). Since then, Cecil Jones conducted intense and ongoing research into the site and its features (Cecil Jones pers. comm.; cf. RCAHMW archive).

3.4.3. **1977:** The site was surveyed by J.J. Carroll and P. Bensley (Roberts 1979: 249).

3.4.4. **1978:** The site was designated under the Protection of Wrecks Act 1973 on 14th February 1978. Subsequently, a c. 3m wide cross-sectional trench was excavated by Owain T.P. Roberts, Welsh Institute of Maritime Archaeology and History, University of North Wales, Bangor, with the aid of the Gwynedd Branch of the BSAC. The trench revealed clinkered boat timbers preserved below the slate mound (Roberts 1979). A part of the keel and one or two fragments of planking were recovered, as well as the anchor next to the site (Cecil Jones pers. comm.). **Figure 2** shows two of the site plans drawn up at this time.

3.4.5. **1979:** The site was re-designated under the Protection of Wrecks Act 1973 on 19th January 1979.

3.4.6. **1979-1981:** The site was surveyed and monitored by a licensed group based on staff and students at the University College of North Wales, Bangor (Archaeological Diving Unit 1991). In 1980, a radiocarbon date on a sample of planking was published, placing the sinking ‘sometime between 1570 and 1690’ (Jones 1980). After 1981 licensed work on site was put on hold for several years (Jones n.d. [II]:14).

3.4.7. **1981:** The site was located by the ADU using a sextant to measure horizontal angles between the centre of the Historic Wreck circle and landmarks shown on Admiralty Chart 1464. The trench excavated in 1978 was still visible though partially backfilled with slates in plastic boxes (Archaeological Diving Unit 1981).

- 3.4.8. **1991:** The site was dived by the ADU. The archaeological remains were unchanged compared to 1981. All original survey datum points had moved from their original positions. The site was heavily re-colonised by marine organisms (Archaeological Diving Unit 1991).
- 3.4.9. **1993:** The site was dived by the ADU. No archaeological remains were located due to poor visibility. Cecil Jones held a license to undertake a biological survey (Archaeological Diving Unit 1993).
- 3.4.10. **1995:** The site was dived by the ADU. It was covered by dense sponge and weed growth. Stacked slates and scatters of broken slate were visible. The laying of lobster pots was regarded to be a problem and a possible threat to the site (Archaeological Diving Unit 1995).
- 3.4.11. **1997:** The site was dived by the ADU. The slate cargo was still *in situ* on the seabed, even though some slates were scattered down a boulder slope (Archaeological Diving Unit 1997).
- 3.4.12. **1997-1998:** Limited diving activity took place by the Licensee during this period. A part of the keel which had been recovered in 1978 was subjected to AMS dating at the Research Laboratory for Archaeology and History at Oxford University (Jones 1998). This yielded a date of 395 ± 35 (OxA-7969; courtesy of Cecil Jones), resulting in the following calibrated dates (after Bronk Ramsey 2007 and Reimer *et al.* 2004):

95.4% probability	AD 1437 (67.4%) AD1525
	AD 1558 (28%) AD1632

- 3.4.13. This indicates results that cluster around the period 1470AD with a range (95.4% confidence) between 1430AD and 1530AD, and little likelihood of it being sunk after 1630AD (OxA-7969; Jones n.d. [II]: 15).
- 3.4.14. **1999-2000:** More licensed activity took place during this period, again targeting the biology on site. Systematic sampling on site and off the site was conducted by bagging samples and taking scrapes as well as recording visual details of fauna, flora and mio-fauna from 0.5m quadrats for analysis. Samples were taken from upstream and downstream of the site, as well as on the site. A number of slates were removed from the top layer so as the sediments between the slates could be sampled. All slates were placed back in their original positions (McElvogue 2000a).
- 3.4.15. **2000:** The site was dived by the ADU. The site position was checked with the ADU's acoustic positioning system. This identified that although the designated area covered the site, it was not exactly centred on it. A bathymetric survey revealed a slight mound at the wreck's position. The slate mound was stable and appeared unchanged from previous visits. Many of the visible slates were heavily covered by marine growth. The site had a quantity of redundant survey equipment from previous licensed activity scattered across it including concrete weights, datum poles and glowline (Archaeological Diving Unit 2000).
- 3.4.16. **2001:** The Marine Archaeology Group Wales visited the site in order to check the area for signs of illegal interference and any changes to the site environment. The site was reported to be covered in large amounts of maritime growth, and 'virtually

no evidence of the remains of the wreck were visible, well covered by sand and shale'. A small area of natural scouring was observed some 10m to the north of the mid section of the site. The side appeared to be stable with no signs of erosion (Bowyer 2001).

3.5. HISTORICAL BACKGROUND OF THE WELSH SLATE INDUSTRY

- 3.5.1. The following section gives an account of relevant data regarding the history of the Welsh slate industry found at http://en.wikipedia.org/wiki/Slate_industry_in_Wales, complemented by additional information (Eames 1991; Jenkins 2006; Jones 2001). WA did not have access to selected literature referenced in the text (i.e. Lindsay 1974; Jones 1982; Richards 1995; 1999).
- 3.5.2. Along with Portugal, Fumay in the Ardennes, the east coast of Newfoundland and the Slate Valley of Vermont and New York, specific areas of western Britain constitute the major slate mining regions of the world. These are Wales, Cornwall and the Lake District.
- 3.5.3. The slate deposits of Wales belong to three geological series: Cambrian, Ordovician and Silurian. The Cambrian deposits run south-west from Conwy to near Criccieth; these deposits were quarried in the Penrhyn and Dinorwig quarries and in the Nantlle Valley. There are smaller outcrops elsewhere, for example on Anglesey. The Ordovician deposits run south-west from Betws-y-Coed to Porthmadog; these were the deposits mined at Blaenau Ffestiniog. There is another band of Ordovician slate further south, running from Llangynnog to Aberdyfi, quarried mainly in the Corris area, with a few outcrops in south-west Wales, notably Pembrokeshire. The Silurian deposits are mainly further east in the Dee valley and around Machynlleth (Richards 1995: 10-11).
- 3.5.4. The earliest evidence for the use of slate in Wales is the Roman fort at Segontium, Caernarfon. It was originally roofed with tiles, but the later levels contain numerous slates, used for both roofing and flooring. The nearest deposits are about five miles away in the Cilgwyn area. Slate flagstones were also used at the smaller fort of Caer Llugwy between Capel Curig and the Conwy Valley (Lindsay 1974: 18).
- 3.5.5. During the medieval period, there was small-scale quarrying of slate in several areas. The Cilgwyn quarry in the Nantlle Valley dates from the 12th century, and is thought to be the oldest in Wales (Lindsay 1974: 314). The first record of slate quarrying in the neighbourhood of the later Penrhyn Quarry was in 1413, when a rent-roll of Gwilym ap Griffith records that several of his tenants were paid 10 pence each for working 5,000 slates (Lindsay 1974: 27). Aberllefenni Slate Quarry may have started operating as a slate mine as early as the 14th century. The earliest confirmed date of operating dates from the early 1500s when the local house Plas Aberllefenni was roofed in slates from this quarry (Richards 1995: 13).
- 3.5.6. Transport problems meant that the slate was usually used fairly close to the quarries. There was some transport by sea. A poem by the 15th century poet Guto'r Glyn asks the Dean of Bangor to send him a shipload of slates from Aberogwen, near Bangor, to Rhuddlan to roof a house at Henllan, near Denbigh (Lindsay 1974: 14).

- 3.5.7. By the second half of the 16th century, there was a small export trade of slates to Ireland from ports such as Beaumaris and Caernarfon (Lindsay 1974: 24). Slate exports from the Penrhyn estate are recorded from 1713 when 14 shipments totalling 415,000 slates were sent to Dublin (<http://www.portpenrhyn.co.uk/history.html>). The slates were carried to the ports by pack-horses, and later by carts. This was sometimes done by women, the only female involvement in what was otherwise an exclusively male industry (Richards 1999: 19).
- 3.5.8. Until the late 18th century, slate was extracted from many small pits by small partnerships of local men, who did not own the capital to expand further. The quarrymen usually had to pay a rent or royalty to the landlord (Lindsay 1974: 29-30). Penrhyn introduced larger sizes of slate between 1730 and 1740, and gave these sizes the names which became standard. These ranged from "Duchesses", the largest at 24 inches by 12 inches, through "Countesses", "Ladies" and "Doubles" to the smallest "Singles" (Lindsay 1974: 36-37).
- 3.5.9. From the late 18th century up until the beginning of the First World War, slate quarrying was the main industry of North Wales (cf. Eames 1991: 19-35). For example, slates from Llanberis were exported through Port Dinorwig/Y Felinheli (Jenkins 2006: 20; cf. Jones 2001: 86-87) in close vicinity of the Pwll Fanog wreck site. In fact, Penrhyn and Dinorwig were then the two largest slate quarries in the world (Jones 1981: 72).
- 3.5.10. The decline of the Welsh slate industry started with the outbreak of First World War. The Great Depression and the Second World War led to the closure of many smaller quarries, and competition from other roofing materials, particularly tiles, resulted in the closure of most of the larger quarries in the 1960s and 1970s. Slate production currently continues, but on a much reduced scale.

3.6. MONITORING PHOTOGRAPHS

- 3.6.1. A total of five site features have been selected for the purposes of future monitoring of erosion, deposition, damage and stability (**Figure 4**). The location of the photographer and direction, as well as monitoring photographs 1-5 (**MP1-5**) are shown in **Figure 4**. Two sets of photographs were selected for **MP1 (a-b)**, **MP2 (a-b)** and **MP4 (a-b)** in order to compensate for the bad visibility combined with the scarcity of easily recognisable features on site. It is recommended that the monitoring photographs should be repeated at no greater than annual or biannual intervals.
- 3.6.2. Monitoring photographs **MP1 (a-b)** comprise a general view (**MP1a**) and a close up photograph (**MP1b**) of the slate mound taken from the north (**Figure 4**). The pictures show the slates being stacked in dense, fan-like alignments across this part of the site, and the typical marine growth as described above.
- 3.6.3. Monitoring photographs **MP2 (a-b)** show the upstanding 'wall' of slate that becomes visible when the site is approached from the north, approximately in the middle of the mound (**Figure 4**). In one part, the slates are deposited in horizontal layers (**MP2a**), whereas the other picture shows that an alternating alignment occurs as well (**MP2b**).

- 3.6.4. Monitoring photograph **MP3** is a view from an old datum point (a pole in concrete-filled bucket) in the east towards the slate mound in the west (**Figure 4**). Even though the old datum points have been described as being displaced by up to 1m, it was considered unlikely that future large scale movement (relevant enough to affect the monitoring of changes to the slate mound) is going to take place for this feature. The datum is wedged in between rocks and appeared to be an appropriate monitoring point.
- 3.6.5. Monitoring photographs **MP4 (a-b)** give an impression of the top layer of slates (**Figure 4**). They have been taken from above, approximately in the centre of the cargo mound. **MP4a** as well as **MP4b** show that most slates are standing upright on their long, thin sides, with a number of slates lying on their flat sides in between (especially **MP4a**). The abundance of slates still standing upright on their thin sides demonstrates the density of the packed cargo and the overall stability of the site.
- 3.6.6. Monitoring photograph **MP5** is a view of the south-west side of the slate mound from above (**Figure 4**). The slates in this part of the mound are lying on their flat sides and are neatly stacked in horizontal layers. It is remarkable that no sediment became trapped in between these layers throughout the centuries, underlining the impressive force of the tidal currents in this part of the Menai Strait.

4. CONCLUSIONS

4.1. SUMMARY OF EVIDENCE

- 4.1.1. The overall character of the Pwll Fanog wreck site according to published (Jones 1978; Roberts 1979) and archive accounts (Jones n.d. [I] and [II]) can be summarised as follows:

Site character and finds distribution	The main site feature is a cargo mound (slate tiles) measuring <i>c.</i> 9.9m x 5.5m. Artefacts (an anchor and barrel hoops(?)) were found <i>c.</i> 10m east of the mound. Slates are scattered at least up to 25m around the mound, predominantly to the west. Another (associated?) anchor was recorded some 100m west of the site. Ship timbers are preserved below the slate mound (last seen during the excavation of a cross-sectional trench in 1978). From the orientation of the lap of scarf joints in two strakes it was concluded that the bow pointed westward.
Description of seabed environment:	The seabed is dominated by a steep slope reaching depths in excess of 20m depending on tides. A cliff with heights of up to 4m is situated north-west of the site, towards the bottom of the slope. The wreck is situated approximately halfway down the slope at a depth of <i>c.</i> 11m, but slates have been found at depths of 26m and at the foot of the cliff. The seabed consists of coarse sand, grit, pebbles, small rocks and boulders.

<p>Character of ship structure:</p>	<p>The excavation trench revealed the remains of a clinker-built vessel, i.e. a keel, the garboard strakes, the second and possibly third clinker strakes, all made of oak. The planks were cleft from tree trunks rather than sawn, and depressions showed the place of iron roves in an offset pattern.</p> <p>Previously, it was suggested that the ship was a barge or balinger type vessel (Jones 1978: 158). Recent reconstruction attempts include a West-Highland galley (Cecil Jones pers. comm.; cf. Rixson 1998).</p>
<p>Depth and character of stratigraphy:</p>	<p>According to the Licensee's reconstruction drawings, which are based on the excavation results, the seabed level at the time of the sinking is c. 1-1.5m below the present day seabed level. Artefacts do seem to survive between and possibly beneath boulders, but as all work undertaken by WA was non-intrusive, to what extent this is true can not be fully qualified.</p>
<p>Volume and quality of artefactual and environmental evidence, including cargo, ordnance, domestic assemblage, etc.:</p>	<p>The main feature of the site is the cargo mound, comprising of some 40,000 slates with a weight of c. 20 tons. The slates can be divided into two main types, so-called 'singles' measuring 10 x 5 inches, and a second type measuring 8.5 x 6 inches, both split with a gauge rather than a broad-bladed chisel, and made of Llanberis blue slate. The excavation revealed that the slates lay on a dunnage or packing of twigs.</p> <p>An anchor and barrel hoops(?) were found at the eastern end of the site at the foot of the cliff. A similar anchor was recorded some 100m west of the site. Apart from another concretion, no iron remains or other finds have been documented.</p> <p>The form of the slates, the tool marks and the fact that even badly marked slates had not been discarded together with the lack of records on the loss and the scarcity of iron concretions indicated a 16th century or earlier date for the wreck and its cargo.</p>

Site formation and transformation processes	<p>The distribution of slates around the site indicates that very little post-depositional movement of the cargo has taken place, thus pointing towards the largely intact preservation of the cargo mound.</p> <p>The timber remains below the cargo mound were covered in a fine silt which may have been trapped around the hull after the sinking; the subsequent collapse of the hull probably pressed the timbers into the silt whose low oxygen content served to protect them (Jones n.d. [I]: 7).</p> <p>Boulders have been rolling down the slope and ended up on top of the slate mound (due to local earthquakes?). It is possible that smaller artefacts survive across a wide area wedged in between and below boulders.</p> <p>The spillage pattern of slates on the site suggests that the current acts strongest from the east and does create an instability in the sloping seabed by washing away sediments from beneath some rocks while filling up crevices between others, thus slowly changing the shape of the moraine (Jones n.d. [I]: 4).</p>
Apparent date of ship's construction and/or loss:	<p>Typological and historical considerations suggested a late medieval/early post-medieval date for the wreck. A 'limited radio-carbon 14 assay on the timber' in the late 1970's yielded 'a date of 1690 plus or minus 100 years' (Jones n.d. [I]: 7). The results of AMS dating in 1999 'clustered around the period 1470AD with a range (95.4% confidence) between 1430AD and 1530AD with little likelihood of it being sunk after 1630AD' (OxA-7969; Jones n.d. [II]: 15).</p> <p>It was suggested that the ship was built in the time of Henry VII and sank after working for <i>c.</i> 60 years around 1530 (Jones n.d. [II]: 15).</p>
Apparent function:	<p>It was suggested that the vessel was about to carry a cargo of Llanberis blue slate to Beaumaris for sale and export (Jones 1978: 158).</p>
Apparent origin:	<p>Probably local or regional, without further specification being possible so far.</p>

4.2. DISCUSSION

- 4.2.1. Against the background of the historical summary above, the relevance of the wreck and its cargo can be characterised as very high because of the scarcity of evidence for the late medieval and early post-medieval slate industry and trade in Wales. Moreover, this evidence seems to consist exclusively of written records and slate preserved in a medieval building. Apart from the Pwll Fanog wreck, no vessel or other means of transport involved in the early British slate trade are preserved, let alone an intact slate cargo.

- 4.2.2. Even though an initial analysis of the slates on site was conducted after they were found in the late 1970s (Jones 1978: 154-158), it is considered necessary to update this evidence with new information and published research that has become available during the past 30 years (cf. Jones 1981; Holmes 1986; Lewis and Williams 1987; Williams 1991; Richards 1994; 1995; 1998; 1999; Jones and Richards 2004).
- 4.2.3. Little is currently known about the actual construction of the vessel, one of the oldest designated wrecks within UK waters, and its relation to the early slate trade within the region. Different types of vessels have been reconstructed from the timbers excavated and published in the late 1970s (cf. Fenwick and Gale 2000: Plate 11). A comprehensive assessment of the remains combined with an assessment of the existing site archives would be necessary in order to provide a basis for further research into the site.

5. ARCHIVE

- 5.1.1. The archaeological archive of the site resides at two main locations. First, Cecil Jones holds the results of his own research, which has extended over decades and presumably includes substantial documentary information as well as unpublished fieldwork details.
- 5.1.2. For example, a keel fragment from the 1978 excavation trench was AMS analysed at Oxford University in 1999. The measurements ‘clustered around the period 1470AD with a range (95.4% confidence) between 1430AD and 1530AD with little likelihood of it being sunk after 1630AD’ (OxA-7969; Jones n.d. [II]: 15).
- 5.1.3. In addition, WA holds copies of publicly available supporting documentary data such as:
- The published accounts (Jones 1978; Roberts 1979; Fenwick and Gale 2000);
 - The RCAHMW record;
 - The Cadw entry;
 - The ADU reports.
- 5.1.4. The PWA project archive generated by WA, consisting of an MS Access database, a GIS work space containing shape files and other data linked to the database and other computer records, together with digital photographs, DV tapes and dive logs are currently stored at WA under project code 53113.

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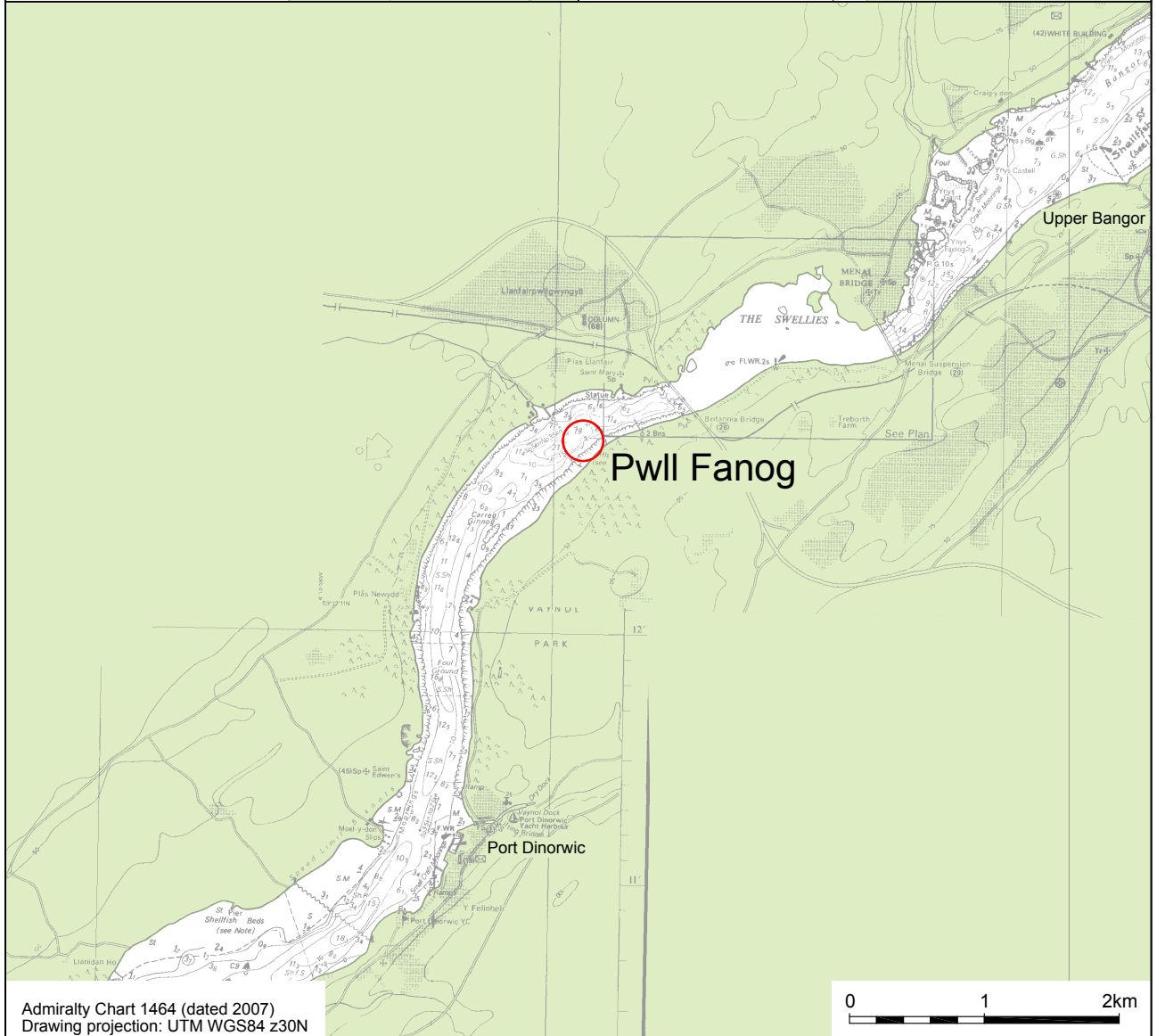
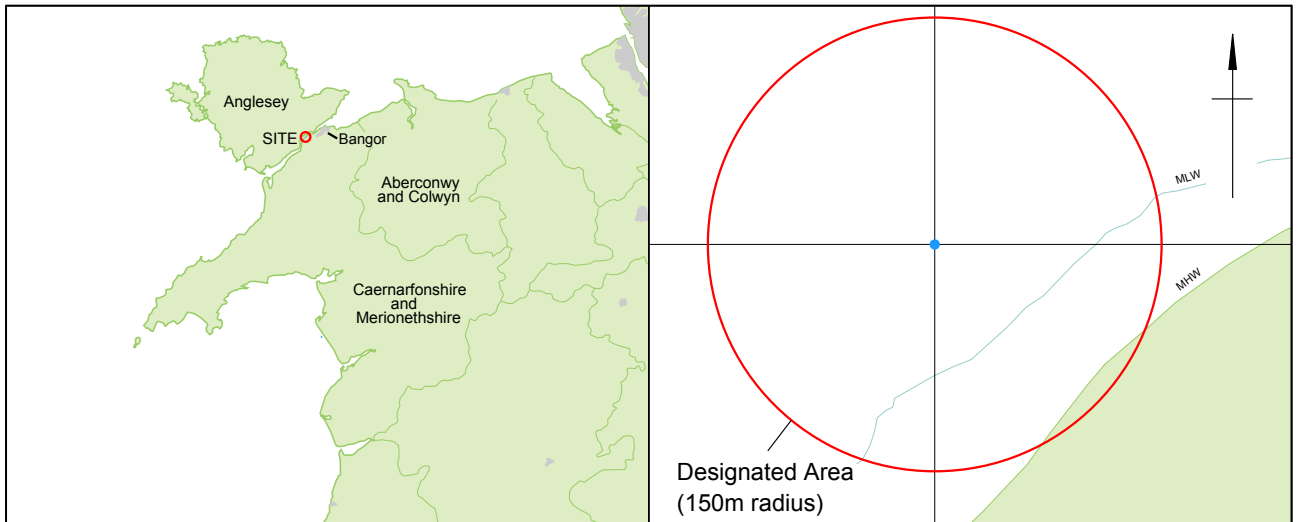
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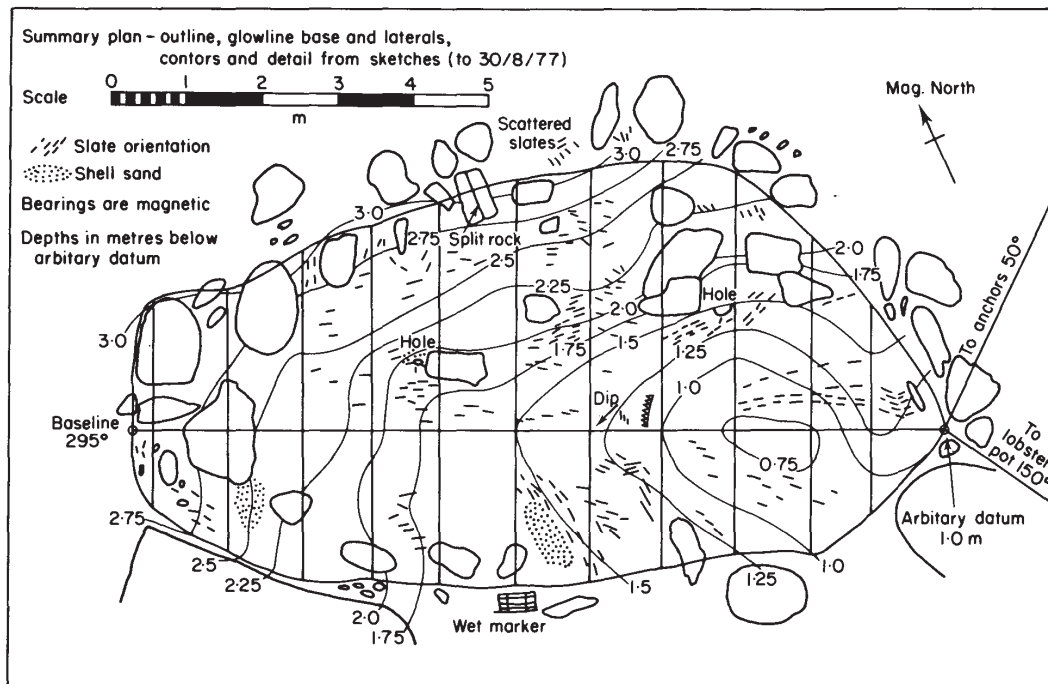
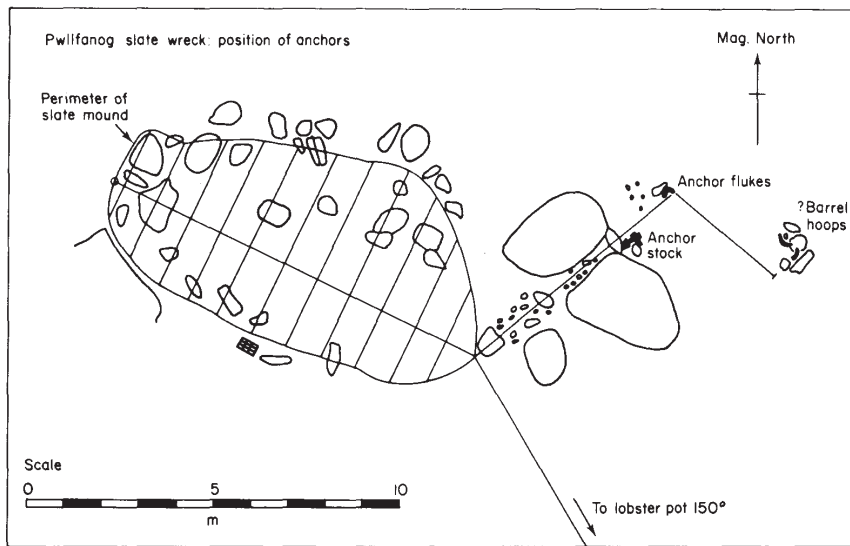
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Pwll Fanog site location

Figure 1



Reproduced from Jones 1978: 153 Figure 1&2

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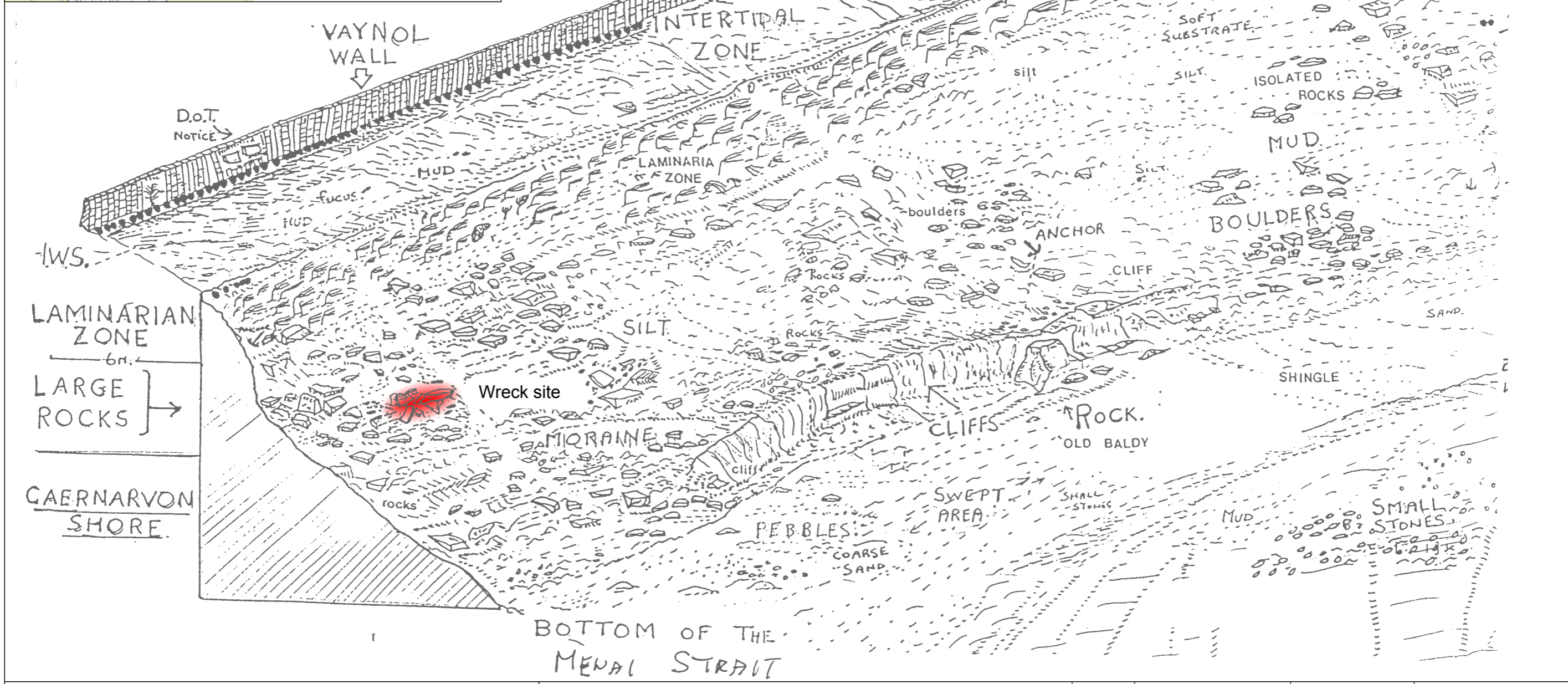
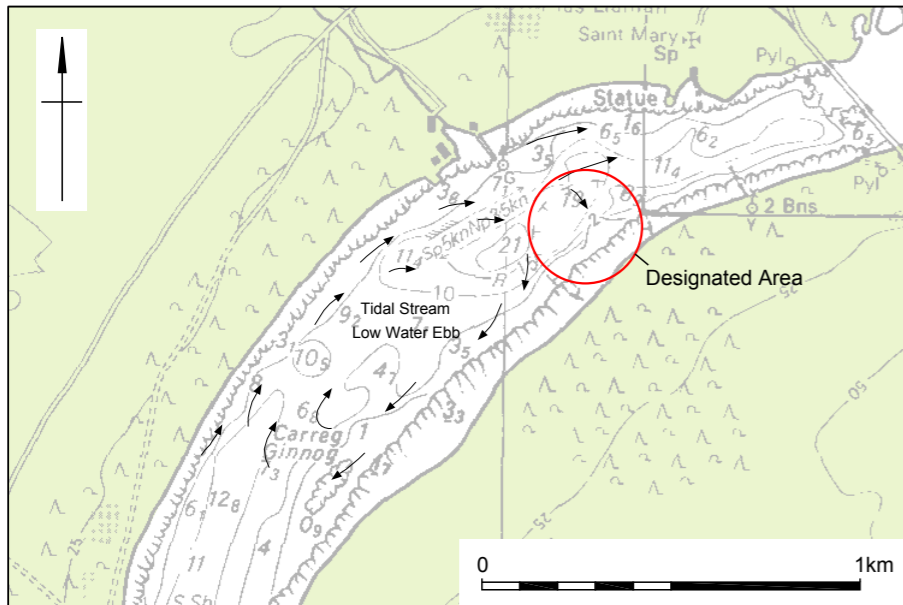
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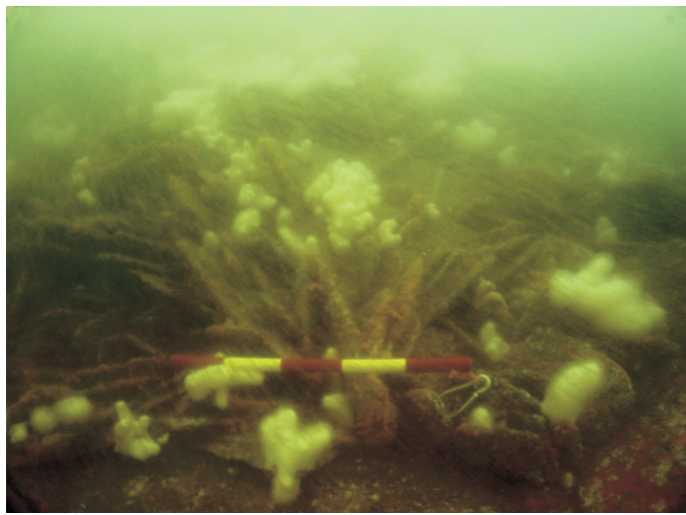




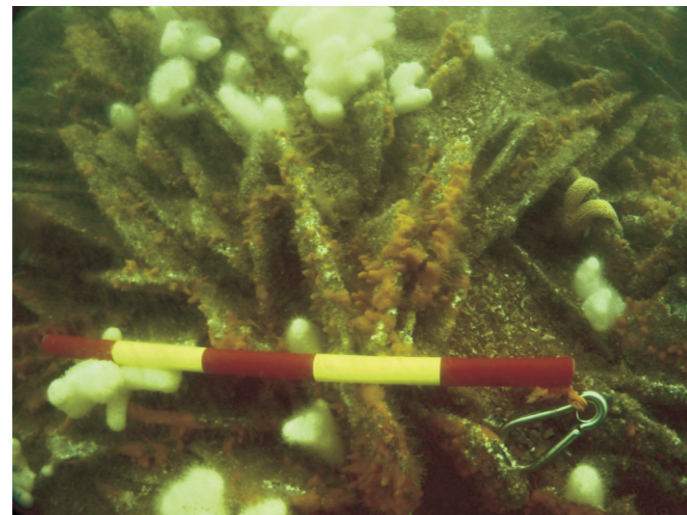
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Schematic diagram of the submarine topography surrounding the wreck site

Figure 3



MP1a - Mound from north looking roughly south



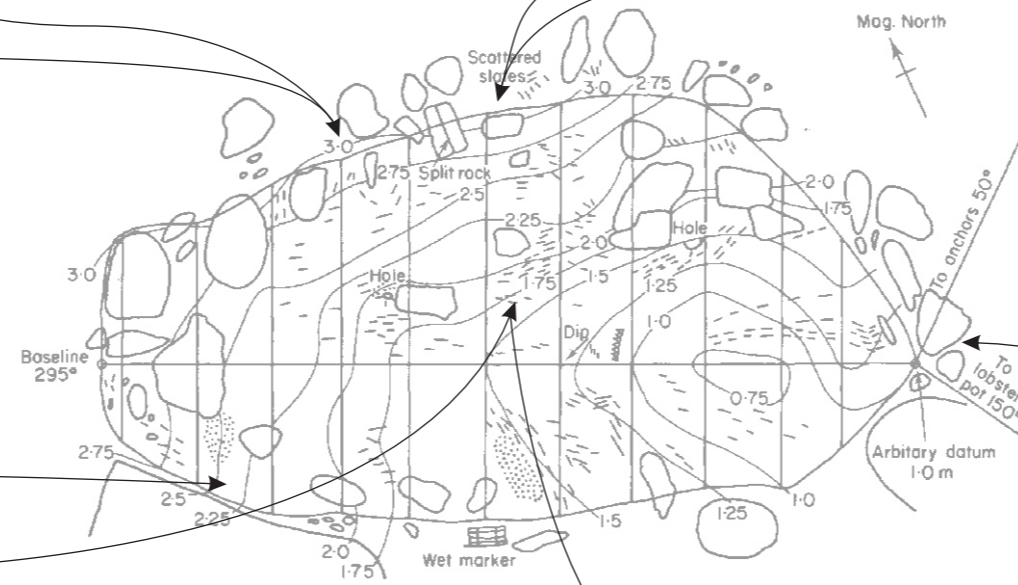
MP1b - Mound from north looking roughly south



MP2a - 'Wall' from north looking roughly south



MP2b - 'Wall' from north looking roughly south

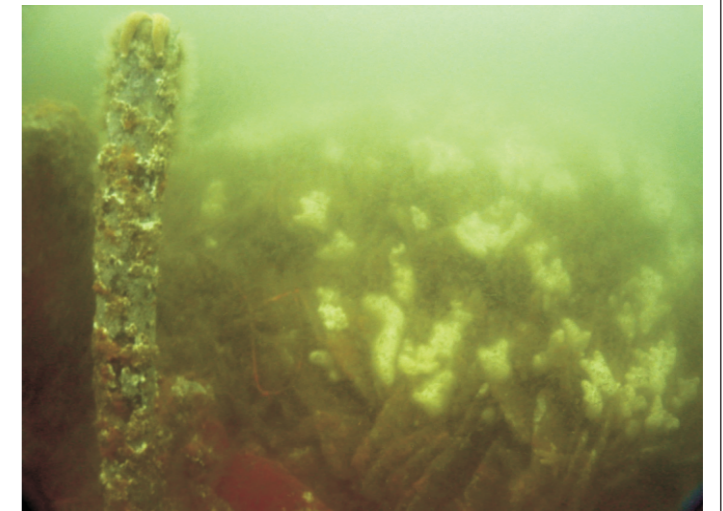
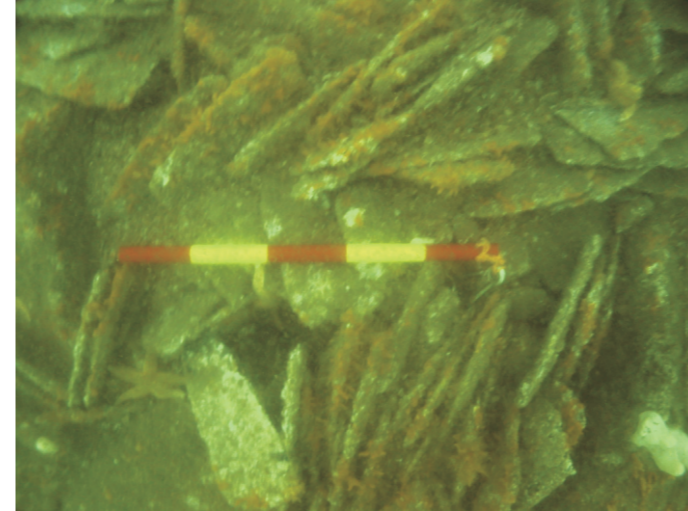
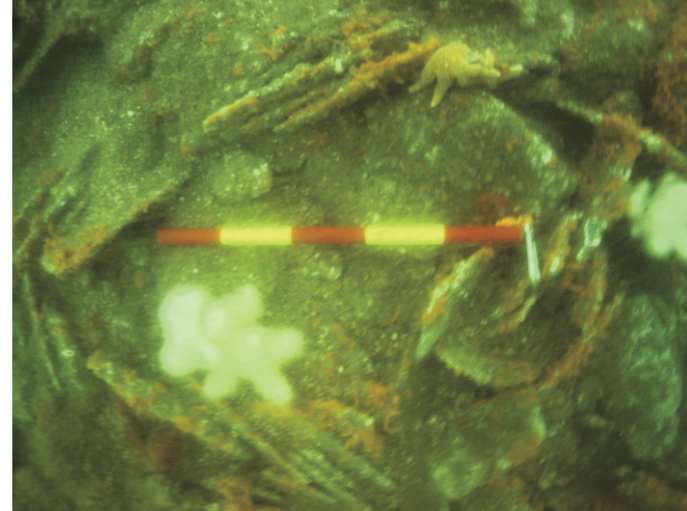
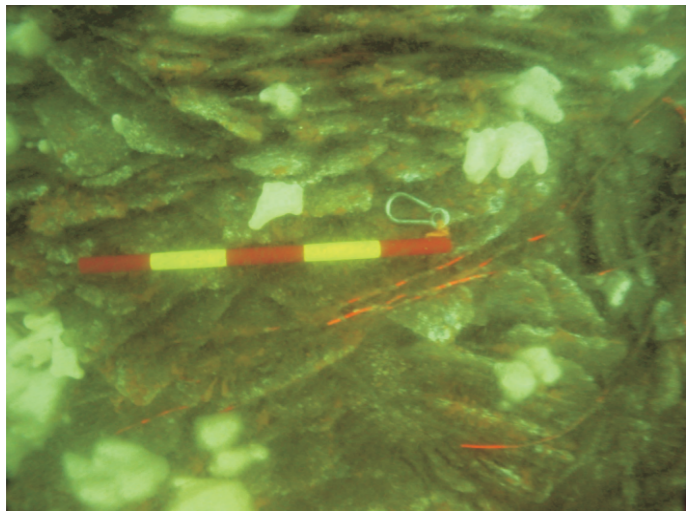


MP5 - In roughly south-west of site from above

MP4b - Slates roughly in centre of mound from above

MP4a - Slates roughly in centre of mound from above

MP3 - Old datum from east looking roughly west



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