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*The Sea Empress Oil Spill*

# THE SEA EMPRESS OIL SPILL

**ARCHAEOLOGICAL ASSESSMENT OF EFFECTS ON INTER-TIDAL  
& SHORELINE FEATURES.**

**PROJECT PRN 35242**

Final Report - June 1997.

Prepared for : Countryside Council for Wales  
Contract No.: FC 73-02-85.

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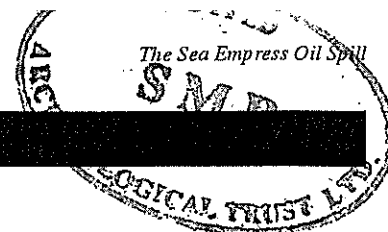


A R C H A E O L O G Y

**CAMBRIA**

A R C H A E O L O G Y

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# 1. EXECUTIVE SUMMARY (ARCHAEOLOGICAL ASSESSMENT)

A comprehensive assessment of the environmental impact of the *Sea Empress* oil-spill and clean-up operations on the coasts of south Pembrokeshire and within Carmarthen Bay needed to look at the historic as well as the natural environment. The Heritage Management section of Cambria Archaeology were commissioned to carry out such an assessment. The principal resource in assembling base-line data on the coastal and maritime archaeology of the area is the regional archaeological *Sites and Monuments Record*. As a result of recent coastal surveys, the record contained sufficient recent information on monuments and features to allow a comparison of pre- and post- oiling and clean-up condition. The record, together with the National Maritime archaeological database maintained by the Royal Commission on Ancient and Historic Monuments in Wales, was however known to be deficient for the underwater heritage of wreck sites. A rapid survey of the coastal archaeology of the Pembrokeshire and west Carmarthenshire coasts, part of Cadw - Welsh Historic Monuments' pan-Wales coastal archaeological survey, was programmed for Autumn 1996. As an additional task, all the survey sites were checked for any damage due to oiling or clean-up. None were found.

A sample was selected for more detailed assessment of the most important examples of coastal and inter-tidal archaeology, in locations known to have been heavily oiled and subject to clean-up. These consisted of lengths of inter-tidal 'submerged forest' off Marros Beach, Carmarthenshire; sand-dune and beach head areas at Bluck's Pool and Frainslake where beach access is gained; a stone and wooden stake fish trap of unknown date exposed between tides at the south end of South Beach Tenby; intertidal shipwreck sites at Pendine, Morfa Bychan and Marros beaches, Carmarthen Bay and Tenby Harbour itself - an historic harbour containing structures of different dates. Cambria Archaeology were also able to request the Nautical Archaeology Society to carry out sample dives on 3 wrecks within Milford Haven and also *HMS Tormentor* off Manorbier as part of a training programme.

At Marros no damage or change in the condition of the submerged forest (a land-surface of c.3000 BC) was found that could be attributed to the beach cleaning procedures of moving beach pebbles to and from the tide line. (details from the AEA Reports). At Bluck's Pool and Frainslake, strict control of beach access had kept vehicles to the established tracks - a procedure principally intended for dune habitat protection that also protected prehistoric flint working floors and burial sites within the dunes and at the beach head. There has been a change in the condition of the Fish Trap at South Beach Tenby since spring 1995 - no wooden stakes are visible and the stone lines are much spread and broken up. But examination of reports from AEA Technology plc on beach cleaning operations and discussion with Jane Hodges, PCNPA, and Stephen Evans, CCW made it clear that there was no heavy plant operating so close to the low water mark. Changes are therefore attributed to wave action, scouring and sand-movements during the severe storms of autumn/winter 1996. It is a tribute to the handling of the clean-up operations within the massively oiled Tenby Harbour that no structural damage resulted from the deployment of so much heavy plant within confined conditions. No oil was observed on wrecks in Milford Haven, but heavy oiling of the seabed and around the remains of *HMS Tormentor* was recorded by NAS divers.

The full report also provides background information on coastal archaeology to ensure that its importance, fragility and locations are better understood.

## 2. PROJECT COMMISSIONING AND COSTS:

The desirability of assessing any impacts on the coastal and maritime archaeological resource as part of the Sea Empress monitoring programme was first raised with CCW by Dyfed Archaeological Trust (now Cambria Archaeology) in March 1996. This followed interest and concern expressed by Valerie Fenwick, representing the national Council for British Archaeology on 'Link', the liaison body for voluntary organisations in the UK, at a special Sea Empress meeting of the Wales Wildlife and Countryside Link at Avon Wildlife Trust offices on

8th March 1996. Due to recent coastal surveys and personal knowledge of the area, and observations during the oil spill and clean-up operation by the author of this Report, it was possible to formulate proposals for an archaeological monitoring programme fairly quickly. Although the monitoring contract from CCW was not formally awarded until 19th November 1996, some of the necessary work was undertaken during the summer and autumn of 1996. A sum of £2000 was allocated for the archaeological assessment and production of Report.

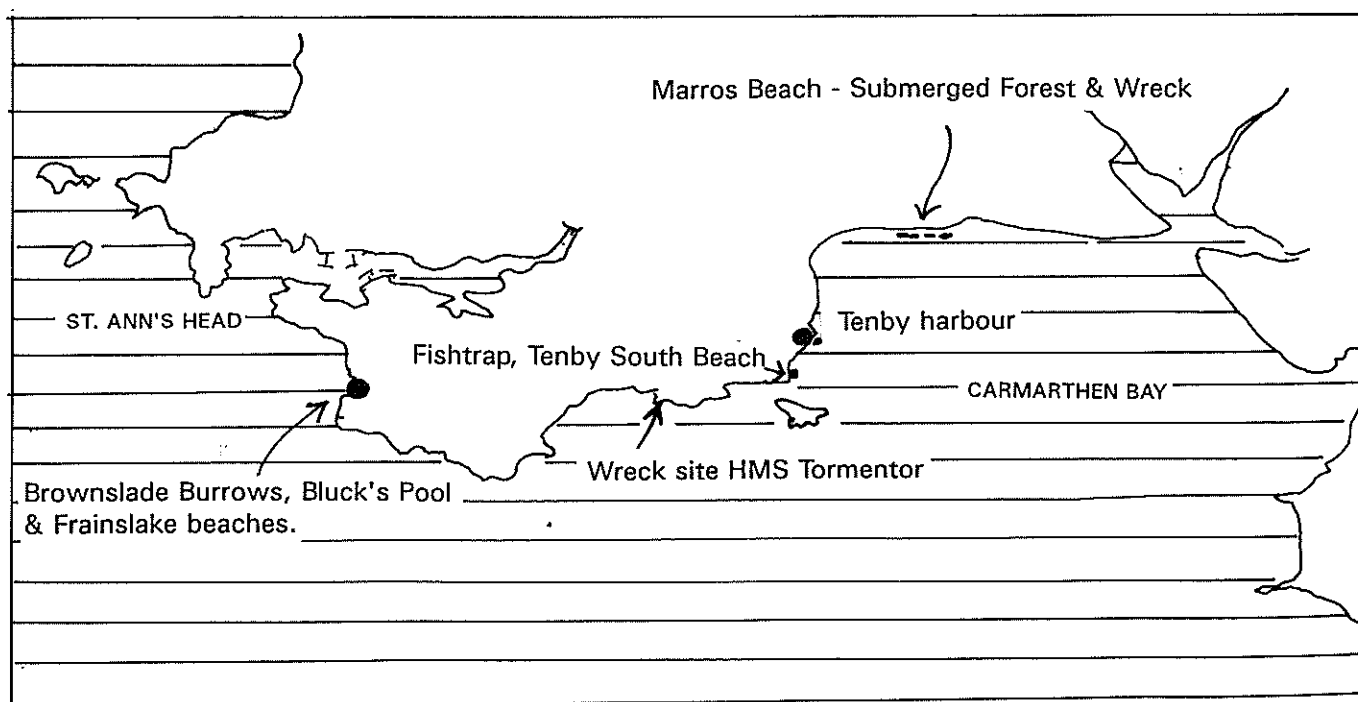


Figure 1: Map of Assessment area with location of sample sites.

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*Figure 1: Map of Assessment area with location of sample sites.*

### 3. PROJECT METHODOLOGY:

#### 3.1 DEFINITION OF AREA OF ASSESSMENT

The first action was to assemble the base line data for all known archaeological sites and features within the impact area. For the purposes of the archaeological assessment, this was taken to comprise all the coastline from Wooltack Point (SM SN754094) to Ginst Point (SN 332079) at the eastern end of Pendine sands. Within Milford Haven, the coastline on the north shore from St. Ann's Head (SN805028) to Hubberston Fort (SN889055) was included and on the south side, Rat Island (SN840026) to Popton Point (SN892. Skomer and Skokholm islands were excluded, but Caldey Island was included. On our calculations this comprises some 147 km. of coastline and foreshore.

#### 3.2 DEFINITION OF COASTAL AND MARITIME ARCHAEOLOGY

Of the highest importance are submerged land surfaces, commonly termed 'submerged forests'. These survive in inter-tidal locations. The good preservation of organic remains allows dating of surfaces, identification of trees and plants and sometimes the recovery of artefacts and structures from early prehistoric date through to more recent times. These are fragile and finite features of great importance in understanding environmental and sea level changes. There are also a whole range of sites, features, structures and artefacts of all periods from remote prehistory to the present relating to human settlement at the coast and exploitation of marine and coastal resources, from shell middens on the foreshore to fish traps and fishweirs, salterns, fish processing sites, to industrial remains, sea and military defences.

Specifically maritime aspects include shipwrecks, below the high water mark as well as wrecks exposed between tides, together with all other material evidence of maritime trade, ship building, shipping places, harbours, docks, cargoes (their export and import) and so on. All structures, past and present relating to navigation, safety and rescue are included from lighthouses down to isolated seamarks.

In addition there are archaeological sites and features entirely characteristic of terrestrial archaeology but now in a coastal location because of shoreline retreat, perhaps subject to erosion. Equally there may be coastal and maritime sites and features now inland through shore line advance. This is less relevant to the Sea Empress assessment except in the

case of sites and features within coastal sand-dunes, in areas traversed to gain access to beaches for clean-up operations.

#### 3.3 BASELINE ARCHAEOLOGICAL DATA

##### 3.3.1 Sites and Monuments Record (SMR)

The principal source for baseline data is the Sites and Monuments' Record (hence SMR) maintained by Cambria Archaeology with grant-in-aid from the Royal Commission on Ancient and Historical Monuments, Wales (hence RCAHMW) and Cadw. This is a computer-based record and index to other records and sources with all known sites marked on paper record maps. The total number of entries for west Wales currently stands at c. 33,000. In 1997, the Pembrokeshire Coast section of the Record was formally adopted by Pembrokeshire Coast National Park Authority as their record for planning purposes; this follows adoption by Carmarthenshire County Council in 1996.

It was a fortunate coincidence in an otherwise serious situation that at least the amount and quality of the baseline data had been sufficiently and recently enhanced and extended to allow comparison of pre- and post-oiling condition of most of the archaeological features.

This enhancement must be seen against the backdrop of a massive increase of interest, research, fieldwork, evaluation and attempts to protect and preserve Britain's maritime, intertidal and coastal resource. Nevertheless, the archaeological community is only too well aware that the coastal archaeological resource is not as well understood or appreciated outside the profession as it should be. Even with maritime archaeology, the popular view is simply concerned with wrecks and treasure, to the exclusion of other aspects. It seems appropriate therefore, for the purposes of this Report and the Sea Empress assessment of environmental impacts as a whole, to broadly characterize coastal and maritime archaeology.

### **3.3.2 Recent Coastal Archaeological Surveys and Research**

Specific surveys that have increased the baseline information for the assessment area are field inspections by DAT at low water spring tides in 1993 and 1994 to record the extent and condition of the submerged forest at all known locations around the Dyfed coast. Within the Sea Empress assessment areas, these include Freshwater West, Lydstep, Amroth and Marros beach. (see SMR under specific sites for details).

Also valuable as a record of extent and condition are the detailed studies of submerged forests, especially off Marros Beach, by Martin Lewis, then of St. David's University College, Lampeter, for his Ph.D. thesis (Lewis, 1992).

In 1992 the remit of RCAHMW was extended down to the limit of the territorial seas. A pilot project in maritime recording methods was commissioned from Dyfed Archaeological Trust in 1994/5 and carried out by Alison Gale. Carmarthen Bay was selected as the study area because it combined three characteristics: a known area of maritime activity, containing a flooded prehistoric land surface or surfaces, and with a variety of coastal features from cliffs, to sand dunes, salt marshes and tidal rivers. The large tidal range also allowed inspection of an extensive inter-tidal area. The Report significantly enhanced the regional (SMR) and national (NMR) databases (Gale, 1995).

In 1995, following the production of a pilot study of part of the Gwynedd coastline, by the Gwynedd Archaeological Trust, Cadw-Welsh Historic Monuments provided grant-in-aid to the other three Welsh Archaeological Trusts to carry out similar rapid surveys of the entire Welsh coastline. The project is in response to an increased awareness of the extent and value of the Welsh coastal and maritime archaeological resource, the threats to its survival, principally from coastal erosion, and the need to have standard, up-to-date baseline data for coastal management of all kinds, but especially Shoreline Management Plans. The model developed for categorizing and recording the coastline has now been developed and standardized for the whole of Wales. The coastline was divided into units of varying length within which were 4 categories: coast edge, land edge, foreshore type and erosion class. These in turn were referenced back to the Welsh Office General Level Survey units for the Welsh Coast for coastal defence purposes.

The Cadw Coastal Survey utilized for this Report was produced in February 1997, (Murphy and Allen, 1997) and covered the area from Strumble Head in Pembrokeshire to Ginst Point,

Carmarthenshire. Survey work was carried out in the Autumn of 1996. It has also been possible to consult the survey currently underway for the north and south shores of Milford Haven up to the Cleddau Bridge. (Murphy and Allen, *forth.*) Information for Caldey is derived from the SMR but includes a recently discovered coastal site.

### **3.3.3 Character of coastal and maritime archaeology across the Report area.**

#### *Prehistory:*

Within the survey area, the caves of Caldey Island, principally Nanna's cave (NGR SS14589697, SMR 4894 Primary Record Number hence prn) and Potter's cave (NGR SS14369707 prn 5006) have produced man-made tools and bones of extinct animals from the remote palaeolithic, late glacial period c. 12000 years BP (before present). They are of national importance. These caves have been used if not occupied, over a long period of time - finds from the neolithic (4000 - 2500 BC) through to the Roman and early medieval period have been made. Archaeological explorations and observations by the late Mel Davies of the caves of the Castlemartin Range cliffs (Ogof Morfran R94719377 prn 7395 and Ogof Garreg Hir NGRs prns) have also produced isolated finds of prehistoric date.

There are numerous records of finds of mesolithic date (c. 8500 - 4000 BC) principally worked flints. These come from three main contexts - chance finds, concentrations of flints with 'cores' from which they were worked ('flint-working floors') and excavations. There are few excavation sites. It is increasingly being realized that there was no absolute break between the 'hunter-gatherer' lifestyles of the mesolithic and the 'first farmers' of the neolithic period (4000 BC - 2500 BC), particularly in coastal locations with seasonally available shellfish. Settlement sites of both periods are elusive. Although there are all too few carbon 14 dates from the 'submerged forests', those that we have cluster around 3000 BC - a critical transition between the mesolithic and the neolithic.

Although these finds and sites are in coastal locations, it is important to realise that the coastline at that date was quite different than today, with sea levels being much lower. This has two implications archaeologically: first that the concentrations of flints may be the surface evidence of buried occupation traces, and that there may be inter-tidal or underwater traces remaining. The worked deer antler dredged up in a fishing net from Caldey Sound gives a hint of this unexplored potential (SMR prn 10098).

Evidence for Bronze Age settlement (2500 - 700 BC) is sparse and again finds of worked flint, metal work and ritual and funerary monuments are our main source of evidence. These occur in this coastal environment, but also inland in the same forms. Important archaeological evidence of multi-period prehistoric occupation was recovered from excavations at Stackpole Warren (Benson *et al.* 1990). Another important result of these excavations was the use of archaeological sites and their contemporary (now buried) land surfaces to date periods of sand blow and begin to build up a picture of the development of the extensive sand dune systems along the south Pembrokeshire Coast. At Stackpole Warren sand was beginning to accumulate from the late Bronze Age onwards, burying walls and cultivated surfaces of former fields below sand dunes. The importance therefore of the sand dunes along this area of coastline, as elsewhere, is not just in the finds that have been made within them, but of the possibility of locating the finds within sealed land surfaces. At the easternmost end of the Report area, within Pendine dunes, are shell middens that have produced prehistoric and medieval material. Their precise location is important in indicating where the strand line may have been at the date they were established. Sea levels in the Bronze Age were close to modern levels.

Iron Age (700 BC - c. 100 AD) occupation of the coastal zone is strikingly evident in the coastal promontory forts. These are generally on elevated, prominent cliff edge positions. Many are suffering serious erosion from rock falls and a weathering cliff edge. Too little is known of their contemporary environment, but many seem to have been occupied into the Roman period.

There are some important sites and historical locations within the Report area for the so-called Dark Age (5th-11th centuries AD). Seafaring and sea trading extended as far as the eastern Mediterranean in the 5th and 6th centuries as finds of imported pottery and Byzantine coinage from Caldey, Penally and the Tenby area attest. Coastal Chapel sites are known from historical sources, or as sparse remains and, in the rare and splendid example of St. Govan's Chapel, as complete buildings. Manorbier, well known for its coastal Castle and associations with Gerald of Wales, was undoubtedly an intensively exploited Dark Age multiple estate. Chapels might occupy the sites of early Christian cemeteries, which can be in coastal locations; equally the cemeteries may never have 'developed' into fully fledged mediaeval ecclesiastical sites with oratories or chapels.

From the late medieval period onwards, as coastal trade began to develop and intensify, there are numerous coastal sites recorded within the general categories noted above. Coastal quarries and limekilns for example are the physical evidence of the importance of sea transport for the import and export of bulk cargoes until well into this century. Limestone was one staple, coal another - Saundersfoot Harbour and the adjacent coast eastwards still retain traces of the coal and ironstone trade. The physical remains of off-shore fishing are less obvious but a fish trap off Giltar point and a possible trap at Marros beach are evidence of past inshore fishing practices.

Coastal defence from the 16th to the 20th century and military installations sited on the coast are still of course a dominant feature of the Report area (MoD Ranges of Castlemartin, Manorbier and Penally and Weapons Testing Range at Pendine). Thanks to a recent survey, 20th century military sites of World Wars I and II are now better recorded along the Pembrokeshire coast (Thomas 1994).

#### *Underwater Wreck Sites.*

With the extension of their remit to the limit of the territorial seas in 1992, both the English and the Welsh Royal Commissions were charged with compiling a database of wreck sites. Important wreck sites can be protected by designation as historic wrecks and diving on them must be licensed. To date there is only one designated site in the Bristol Channel - the Viking period wreck off the Smalls Reef. Had there been a comparable programme of designation to that carried out in England, it would have been important to monitor such sites within the Sea Empress impact area. There is, unfortunately, a huge discrepancy in the resources made available for these tasks between England and Wales and little progress has been made in accurately recording the location and known information on Welsh deep water wreck sites. It is known however that there are many wreck sites off south Pembrokeshire and in Carmarthen Bay and information on recorded wrecks has been assembled by Bennet (Bennet 1992). The Nautical Archaeology Society as well as diving clubs have information on wrecks. But it must be said that the baseline information for the archaeological monitoring area is far less complete below the high tide mark than above. (for the current state of the wrecks database, contact Gareth Edwards, RCAHMW and see Recommendations for further work).



### 3.3.4 The importance of the Coastal and Maritime Archaeological Resource

It may be thought unnecessary to have included this general background to the archaeology of the coastal area affected by the Sea Empress Oil spill. But the overview has been presented for three reasons:

- 1) In an assessment which must concentrate on ecological aspects and impacts on the present day economy, the importance and relevance of the historic environment, particularly for coastal and maritime archaeology, may not be self-evident.
- 2) Some idea of the range and nature of the resource is necessary in order to appreciate the sample strategy.
- 3) The baseline studies that constitute further reference for this subject and this area contain an evaluation and ranking of the relative importance (national, regional, local) of sites and features. However they do not give an idea of the historical events and processes that gave rise to these characteristic 'site types'. It is not easy therefore for the non-archaeologist to appreciate the importance of the inter-relationships, both known and potential, between sites and features in specific locations. Some of these relationships have been indicated above - the possibility of buried traces around finds' locations, the group importance of features that may seem individually, insignificant; the often slight and fragile nature of many coastal and maritime archaeological sites and features belie their importance.

### 3.4 SELECTION OF SAMPLE.

Within the parameters of the Cadw coastal survey, a total of 174 sites and features of all periods were identified from the SMR. It was evident at an early stage however that only 10-15% of this total were thought to have been significantly affected by the oil spill itself or the clean-up operations.

It was also soon apparent that the concept of a single, final, 'master map' of oiling and beach operations being available by summer 1996 was over-optimistic. But information received from the JRC, especially from Jane Hodges, gave a good picture of what had taken place where, and when. What are taken to be a definitive series of colour coded maps and annotated OS maps have recently been received from Mathew Somerville of AEA Technology plc, and the archaeological survey and assessment has been checked against these.

### The kind of adverse impacts envisaged were:

- 1) Damage to organic surfaces, wooden and metal structures - submerged forests, wrecks, fish traps etc. - by oil being deposited on them, and possibly, from oil being cleaned off them.
- 2) Damage to sites, features and ground levels by heavy plant moving to and from open beach areas especially across sand-dune areas without hard surfaced roads.
- 3) Damage by heavy plant in moving oil off the beach to collection points.

It was not known at the time to what extent beach-clean up operations could or would (quite understandably) be able to be constrained by any other factors than rapid and efficient access to beaches and affected areas. In 1992, Dyfed Archaeological Trust had supplied marked-up constraint maps to the then Emergency Planning section of Dyfed County Council who were revising plans and procedures for dealing with coastal oil spills. The sensitivity of sand dune areas at the beach heads to unrestricted vehicle access had been highlighted, but DAT had not known whether specifically archaeological constraints had been flagged up in these contingency plans within which (presumably) the massive Sea Empress clean-up operation got underway.

With all these considerations in mind it was decided to carry out detailed assessment on the best example possible of each site type or feature likely to have been affected:

- 1) Submerged forest, and if possible to compare locations of intensive and less intensive clean-up.
- 2) Sand dune areas, close to an affected beach with a known archaeological content and unsurfaced road access.
- 3) Intertidal wood and stone structures - wrecks, fish-traps.
- 4) A harbour where land and sea clean-up operations were on a large scale - obviously Tenby Harbour.
- 5) Request a sample dive on a wreck site or sites from the Nautical Archaeology Society.

# Map 26. Amroth to Marros

## Archaeological sites

Bold PRNs = new sites

PRN	NGR	Description	Type	Period	Condition	Importance	Erosion class	Status	Threats	Action
3665	SN19450773	Top Castle hillfort	Earthwork	Iron Age	A	A	4	SAM		
8000	SN177070	Finds + submerged forest	Finds	Prehistoric	U	U	2			
8495	SN17400728	Boundary stone	Monolith	Post Med	C	C	2			
11618	SN1907	Submerged forest	Natural feature	General	C	U	4			Monitor
18819	SN1907	Quarry	Earthwork	Post Med	B	B	4			
30066	SN18860726	Unknown	O.Struct	Unknown	E	D	4			
32828	SN18320728	Bridge	O.Struct	Post Med	A	C	2			

## Coastal units

No.	Length	Coast edge type	Land edge type	Forshore type	Erosional class	WOGLS code
171	1.0km	Man-made wall	Man-made structures	Sand	1-Stable	5335/5340/5345
172	0.1km	Storm beach	Man-made structures	Sand	2-Slight	5355
173	1.2km	Mainly rock	Scrub/heath/rough pasture	Sand	2-Slight	5001
174	1.0km	Mainly rock	Scrub/heath/rough pasture	Boulders	4-Major	5001
175	0.5km	Mainly rock	Scrub/heath/rough pasture	Sand	4-Major	5005

# Map 27. Marros to Pendine

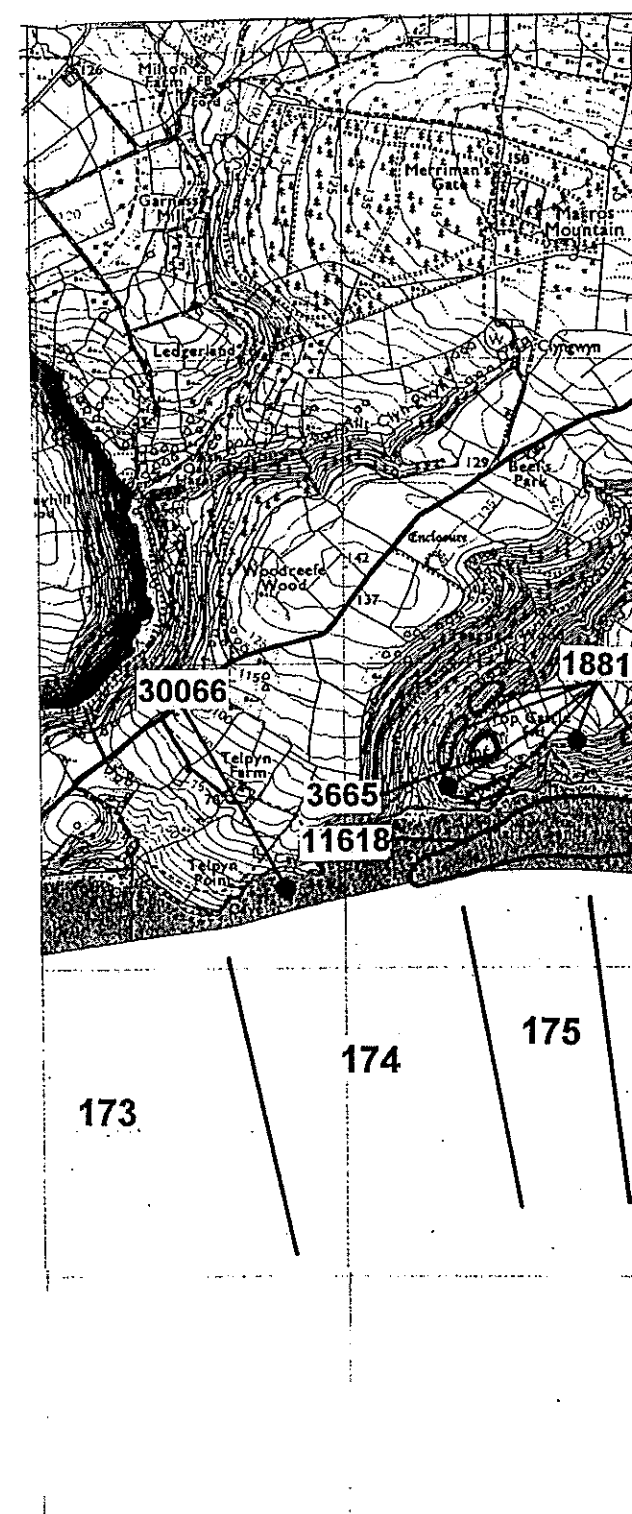
## Archaeological sites

Bold PRNs = new sites

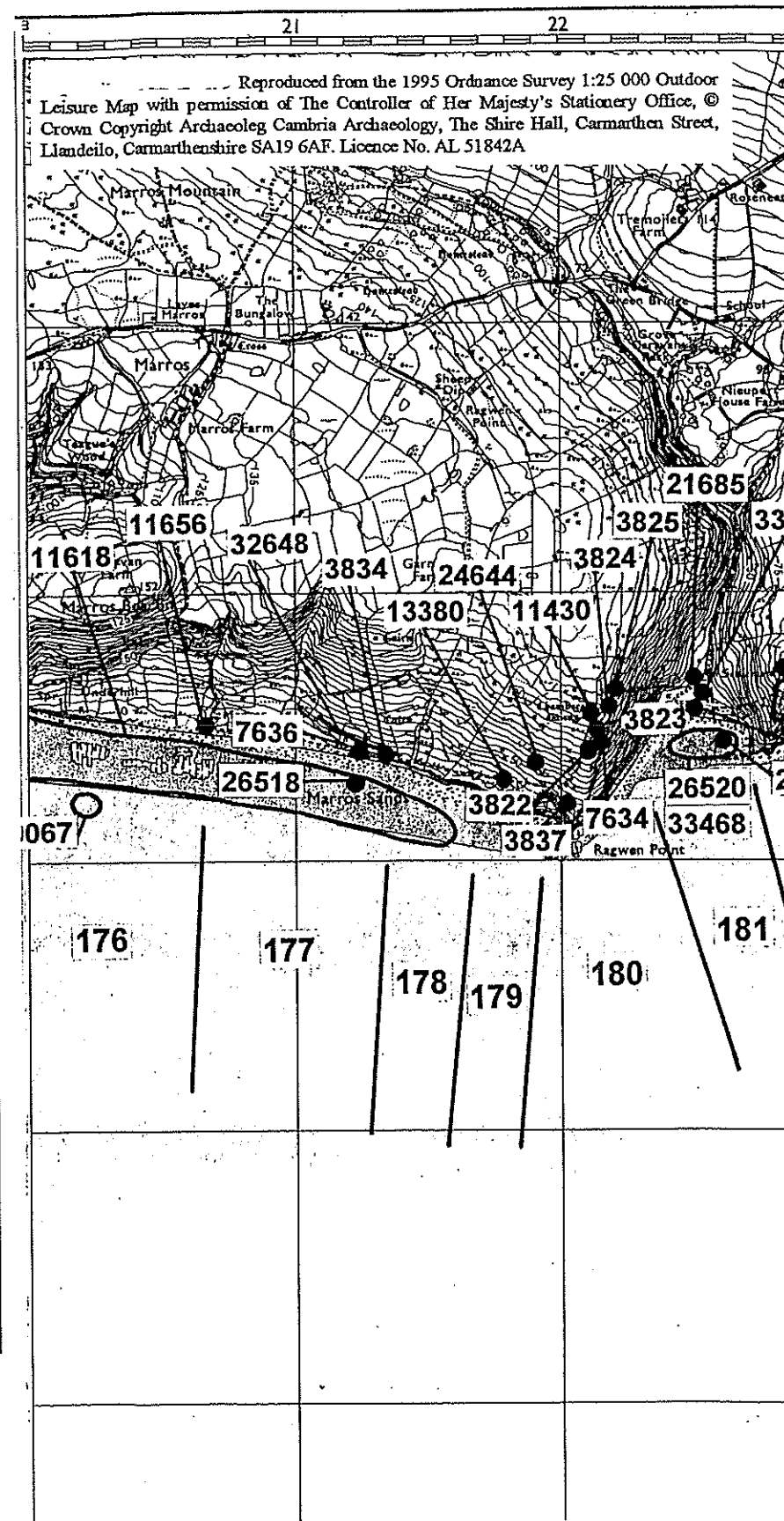
PRN	NGR	Description	Type	Period	Condition	Importance	Erosion class	Status	Threats	Action
3822	SN22130743	Chambered tomb	O.Struct	Neolithic	C	A	2	SAM		Monitor
3823	SN22140748	Chambered tomb	O.Struct	Neolithic	C	A	2	SAM		Monitor
3824	SN22160754	Chambered tomb	O.Struct	Neolithic	C	A	2	SAM		Monitor
3825	SN22160762	Chambered tomb	O.Struct	Neolithic	C	A	2	SAM		Monitor
3827	SN22830765	Napp's Head hillfort	Earthwork	Iron Age	B	A	2	SAM	Tourism	Monitor
3828	SN22820771	Napp's circle - settlement?	O.Struct	B.A./I.A.?	C	U	2			
3834	SN21330736	Burnt mound	Earthwork	Prehistoric	E	D	4			
3837	SN220072	Finds	Finds	Unknown	U	U	2			
7634	SN22150749	Chambered tomb?	Earthwork	Neolithic?	D	A	2			
7636	SN213074	Finds	Finds	Prehistoric	U	U	3			
11430	SN22100755	Long cairn?	Earthwork	Neolithic?	B	A	2			
11618	SN2007	Submerged forest	Natural feature	General	C	U	4			Monitor
11656	SN07700754	Marros mill	Building	Med/P.Med	D	C	4			Monitor
13380	SN21760739	Finds	Finds	Prehistoric	U	U	4			
21685	SN22480766	Cottage	Building	Post Med	C	B	2			
24644	SN21930733	Long hut	Building	Med/P.Med	C	B	2			
26518	SN225074	Wreck	O.Struct	Post Med	C	B	4			
26519	SN212072	Wreck	O.Struct	Post Med	C	B	2			
26520	SN225074	WW2 beach defences	O.Struct	Mod	C	C	2			
30067	SN20300721	Wreck - 2	O.Struct	Unknown	U	U	4			Monitor
32648	SN213075	Minefield	Documents	Mod	D	D	3			
33466	SN22480753	Anti-tank wall?	O.Struct	Mod	A	C	2			
33467	SN22510764	Anti-tank wall?	O.Struct	Mod	D	D	2			
33468	SN225074	Submerged forest	Natural feature	General	C	U	2			Monitor
33469	SN234079	Sea wall + slipways	O.Struct	P.Med/Mod	A	C	1			

## Coastal units

No.	Length	Coast edge type	Land edge type	Forshore type	Erosional class	WOGLS code
176	0.9km	Drift, boulder clay	Improved pasture	Sand + peat	4-Major	5005
177	0.7km	Storm beach	Scrub/heath/rough pasture	Sand + peat	3-Medium	5005
178	0.3km	Rock with drift cover	Scrub/heath/rough pasture	Sand + peat	4-Major	5005
179	0.3km	Mainly rock	Scrub/heath/rough pasture	Sand	4-Major	5010
180	0.6km	Mainly rock	Scrub/heath/rough pasture	Boulders	2-Slight	5010
181	0.5km	Storm beach	Scrub/heath/rough pasture	Sand	2-Slight	5012
182	1.0km	Mainly rock	Scrub/heath/rough pasture	Sand	2-Slight	5015
183	0.3km	Man-made wall	Man-made structures	Sand	1-Stable	5810/5815/5020
184	9.0km	Drift, blown sand	Military - Dunes	Sand	1-Stable	5025

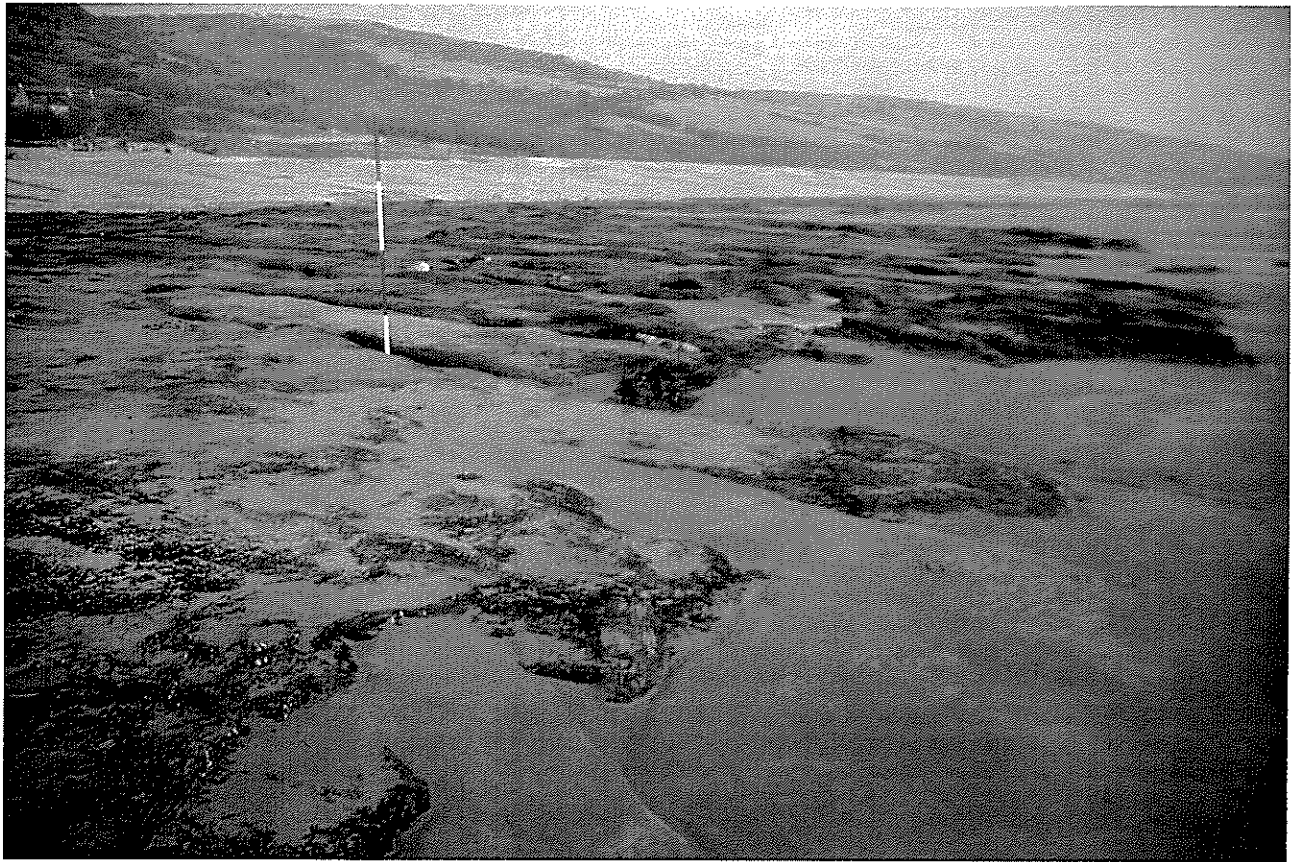


# Coastal Survey 1996-97: Strumble Head to Ginst Point



Map 27. 1:25000 map showing archaeological sites and coastal units

Fig. 2: Marros Beach. Map & list of sites from DAT coastal survey (Murphy and Allen 1995)



*Fig 3(a): Photo(s) of submerged forest, Marros Beach 11th March 1997, general view.*





*Fig 3(b): Submerged forest, Marros Beach, 11th March 1997, detail of tree root.*

## 4. REPORTS ON SAMPLE SITES & LOCATIONS

### 4.1 'SUBMERGED FOREST' AT MARROS AND AMROTH.

#### *Site Location and Description.*

The submerged forest, or peat shelf, off Marros Beach is situated between the high and lower water marks; it is hardly exposed on neap tides and best visible at low water springs. It is the largest area of peat shelf remaining in Carmarthen Bay, but has no protected status. The submerged forest extends for some 2 km. westwards from Ragwen Point (NGR SN219070) to about SN200074 and is, on average 0.25 km. wide. On the landward side the submerged forest is exposed at the base of a steep shingle beach that has accumulated at the foot of low, eroding cliffs of glacial till. It is not known how far inland the deposit extends. The peat itself lies over a uniform deposit of fine blue-grey clay. Within the peat are numerous large stumps and roots of oak trees showing the vegetation to have been oakwood and alder fen carr.

A date range of between 3000 and 2000 BC for the origins, development and submergence of the forest is suggested by radio carbon dates.

The area of peat shelf at Amroth is much smaller and has been subject to active exploitation. Howells records the local practice of digging the 'slime' (the blue clay) to mix with culm or coal dust to make culm balls for the fire - a common practice well into this century. Souvenir hunters have removed much of the wood. Ill-recorded finds of animal bones are said to have come from the peat shelf and Amroth is the recorded find spot of bones of (*bos primigenius*) now in the National Museum of Wales (Howells 1987).

#### *Status of information on pre-oiling condition.*

No detailed survey has been carried out of the Marros submerged forest and no fixed points erected to accurately monitor erosion and/or the periodic sealing and exposure by sand movements. However, close observation was carried out by M. Lewis who was assisted by K. Murphy in taking column samples for radiocarbon dates. The rapid condition survey of submerged forests undertaken by DAT staff on 20.09.93 at low water springs was also carried out by K. Murphy for Marros and Amroth beaches. All this information was available to the author of this Report, who is also familiar with the area.

#### *Survey and Monitoring.*

Three monitoring visits have been made. The first visit was a rapid inspection when no arrangements were in place for a formal archaeological assessment. On 6th April 1996, oil was observed at the head of the beach over the pebbles and shingles. A more systematic visit to Marros was carried out in August 1996 when a video film record was made of the condition of the submerged forest. No oil was observed on the peat shelf itself but there was a sheen on the water over the sand at low tide to

A third visit was made at low water springs on 11th March, 1997, retracing the transect made for the video film record, but this time recording with colour slides.

#### *Extent and impact of oiling and clean up.*

This is understood from the AEA Technology plc reports circulated on 28th May 1997. The clean-up technique used at Marros Beach was 'berm relocation' whereby material was transported down to the surf zone and oil released by wave action. A full record of dates and times for this operation has not been obtained from AEA plc., but it may well be that clean-up during neap tides safeguarded the shoreward edges of the submerged forest.

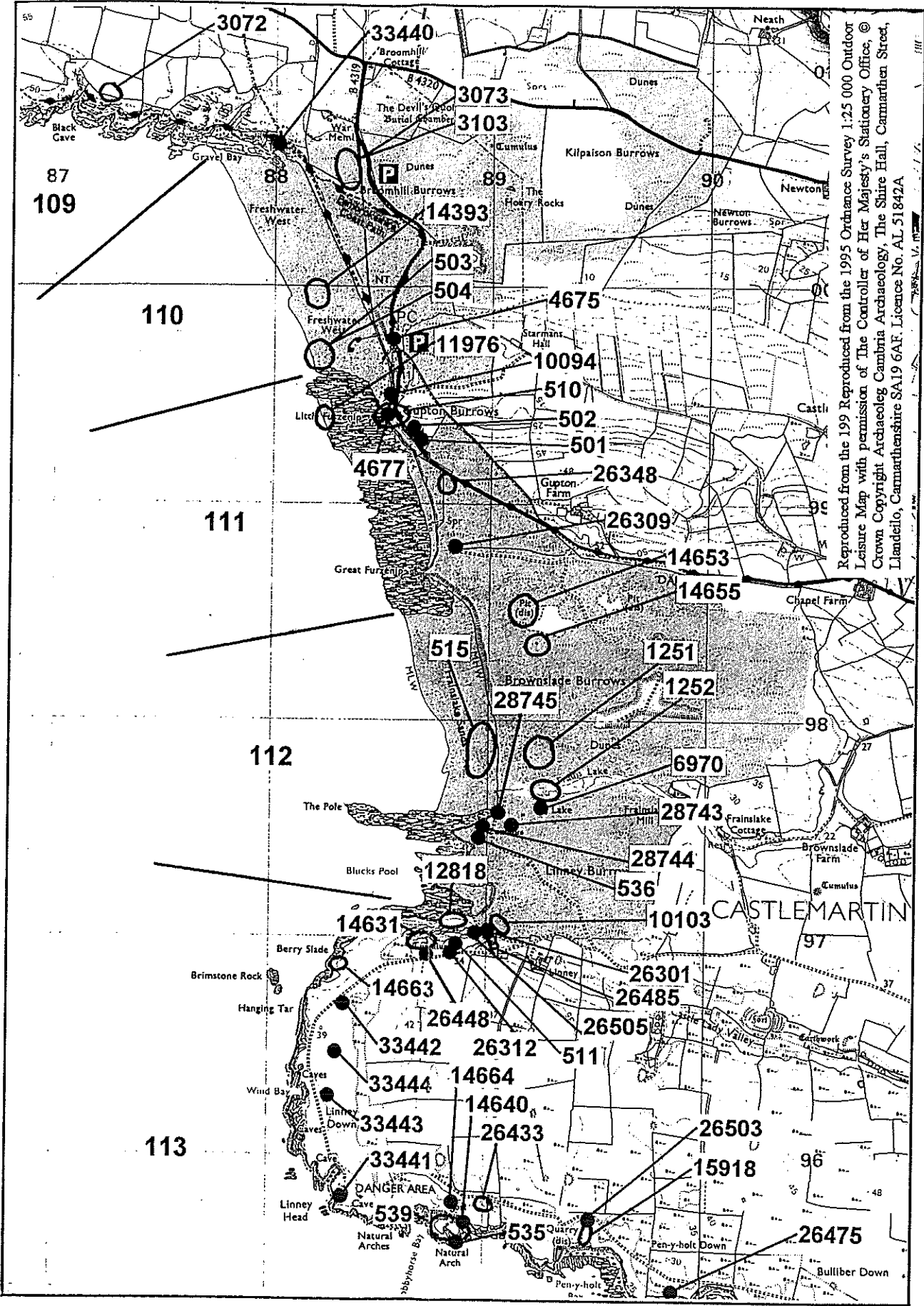
There has been no observable impact or detriment from the oil spill or the clean-up on the submerged forest intertidal exposures at Marros Beach.

Map 16. Black Cave to Pen-y-Holt

Archaeological site  
Bold PRNs = new sites

PRN	NGR	Description	Type	Period	Condition	Importance	Erosion class	Status	Threats	Action
501	SR88699927	Occupation site	Finds	Mesolithic	B	A	2			
502	SR88689929	Finds	Finds	Neolithic	U	U	2			
503	SR88109970	Occupation site	Finds	Mesolithic	U	U	1			Monitor
504	SR88109970	Finds	Finds	B.A.	U	U	1			Monitor
510	SR88529940	Flintworking floor	Finds	Meso/Neo	U	U	2			
511	SR8869695	Round barrow	Earthwork	B.A.	B	A	2	SAM		
515	SR890979	Occupation site	Finds	Mesolithic	U	U	1			Monitor
535	SR88909552	Flintworking floor	Finds	Mesolithic	U	U	3			
536	SR88979747	Round barrow	Earthwork	B.A.	B	A	2	SAM		
539	SR88859567	Linney Head hillfort	Earthwork	Iron Age	C	A	3	SAM	Military	Survey + excavation
1251	SR89359781	Flintworking floor	Finds	Mesolithic	U	U	1			
1252	SR89389776	Flintworking floor	Finds	Mesolithic	U	U	1			
3072	SM87450075	Flintworking floor	Finds	Meso/Neo	U	U	2			
3073	SM88350060	Finds	Finds	Neolithic	U	U	1			
3103	SM88360057	Flintworking floor	Finds	Meso/Neo	U	U	1			
4675	SR88559977	Bridge	O.Struct	Post Med	A	B	1			
4677	SR88549943	Seaweed drying shed	Building	Post Med	R	B	2			
6970	SR89259760	Deserted farmhouse	Building	Post Med	C	B	1			
10094	SR885995	Finds	Finds	Mesolithic	U	U	2			
10103	SR890970	Finds	Finds	Mesolithic	U	U	2			Monitor
11976	SR882993	Submerged forest	Natural feature	General	U	U	2			
12818	SR888971	Inhumation	Finds	Unknown	U	U	2			Monitor
14393	SR882999	Hoard	Finds	B.A.	U	U	1			
14631	SR887970	Unknown	Earthwork?	Mod?	U	U	2			
14640	SR88909569	Finds	Finds	Prehistoric	U	U	3			
14653	SR89209848	Finds	Finds	Neolithic	U	U	1			
14655	SR89209843	Finds	Finds	Prehistoric	U	U	1			
14663	SR883968	Hillfort?	Earthwork	Iron Age?	D	U	2			Aerial phot
14664	SR88869579	Earthwork - rectangular	Earthwork	Unknown	B	U	2			
15918	SR89589565	Quarry	Earthwork	Post Med	B	C	2			
26301	SR89019700	Limekiln	O.Struct	Post Med	C	C	2			
26309	SR88879880	Quarry	Earthwork	Post Med	C	C	2			
26312	SR88889696	Quarry	Earthwork	Post Med	B	C	2			
26348	SR88809916	Quarry	Documents	Post Med	E	D	2			
26433	SR890957	Quarry	Documents	Post Med	E	D	2			
26448	SR88749693	Cottage	Documents	Post Med	E	D	2			
26475	SR89829538	Quarry	Earthwork	Post Med	B	C	2			
26485	SR89059695	Coast guard station	Building	P.Med/Mod	D	D	2			
26503	SR89509570	Limekiln	Earthwork	Post Med	B	C	2			
26505	SR88999699	Quarry	Earthwork	Post Med	B	C	2			
28743	SR89119756	Defence post	O.Struct	Mod	B	A	2			
28744	SR89009753	Defence post	O.Struct	Mod	B	A	2			
28745	SR89069759	Gun emplacement	O.Struct	Mod	A	A	2			
33440	SM88030064	Defence post	Documents	Mod	E	D	2			
33441	SR88339581	Lookout post	Building	Mod	A	C	2			
33442	SR88359667	Blockhouse	O.Struct	Mod	B	C	2			
33443	SR88289626	Blockhouse	O.Struct	Mod	B	C	2			
33444	SR88319646	Blockhouse	O.Struct	Mod	B	C	2			

Coastal units						
No.	Length	Coast edge type	Land edge type	Forshore type	Erosional class	WOGLS code
109	2.2km	Mainly rock	Scrub/heath/rough pasture	Rock	2-Slight	5110
110	1.3km	Drift, blown sand	Dunes	Sand	1-Stable	5120
111	1.2km	Mainly rock	Scrub/heath/rough pasture	Sand	2-Slight	5125
112	1.7km	Drift, blown sand	Military - Dunes	Sand	1-Stable	5130/5135
113	7.5km	Mainly rock	Military - Heath/scrub	Rock	2-Slight	5135



Map 16. 1:25000 map showing archaeological sites and coastal units

Fig. 4: Brownslade Burrows, Bluck's Pool & Frainslake Beach; Map & list of sites from DAT coastal s (Murphy and Allen 1995).





*Fig 5: Photo of access track to beach, Bluck's Pool, showing no difference in condition between foreground where no clean-up vehicles went, background when all traffic came in.*

#### 4.2 BROWNSLADE BURROWS, BLUCK'S POOL AND FRAINSLAKE BEACH.

##### *Sites' Location and Description*

The map shows the location of a number of sites and find spots within Brownslade Burrows and in the intertidal area. There have been numerous finds of mesolithic flints in different locations within the Burrows (prns 515 SR890079; 1251 & 1252, SR 89359781 & SR 89389776) The most significant in terms of its location is prn 515 where animal bone as well as flint was found, indicating an occupation site. From a much later period of prehistory is the now slight and difficult to identify site prn 511 SR88869695, a round barrow or burial mound. Many of the flint finds were made early this century by A.L. Leach, when the dunes seem to have been more mobile than at present. The beach conditions in terms of depths of sand and shingle beach have been and are changing factors. But the exposed section at the head of Bluck's Pool and Frainslake beaches indicates the archaeological potential. Resting on a raised beach of Ice Age date, itself sitting over the rock platform, are deposits of loess (a soil dating to a dry windy interglacial period). They constitute an old land surface used by hunter-gatherer communities at a time when the sea level was much lower and the areas at both beaches at least were dry land. These sites and find spots are therefore difficult to locate and are not obvious features for non-specialists to recognize. Disturbance of the dunes and changes to beach levels could therefore both reveal and destroy these buried landscapes.

##### *Status of information on pre-oiling conditions*

The sites within the dunes and on the foreshore were inspected by K. Murphy during survey work in 1993, carried out for MoD whilst maintaining an archaeological watching brief on the Castlemartin Range electrification scheme (Murphy, 1993). These sites and areas have been subject to study and published reports by prehistorians since their discovery by A. L. Leach. (full source information available from the SMR).

Archaeological, as well as ecological advice on best management practices in Gupton and Brownslade Sand Burrows has been provided through the Castlemartin Range and Recording Advisory Group of which the author of this report is a member. In general, keeping to established tracks and minimizing fresh disturbance is the best option to preserve - although not of course to reveal or investigate - buried archaeological horizons within the sand dunes

##### *Survey and Monitoring.*

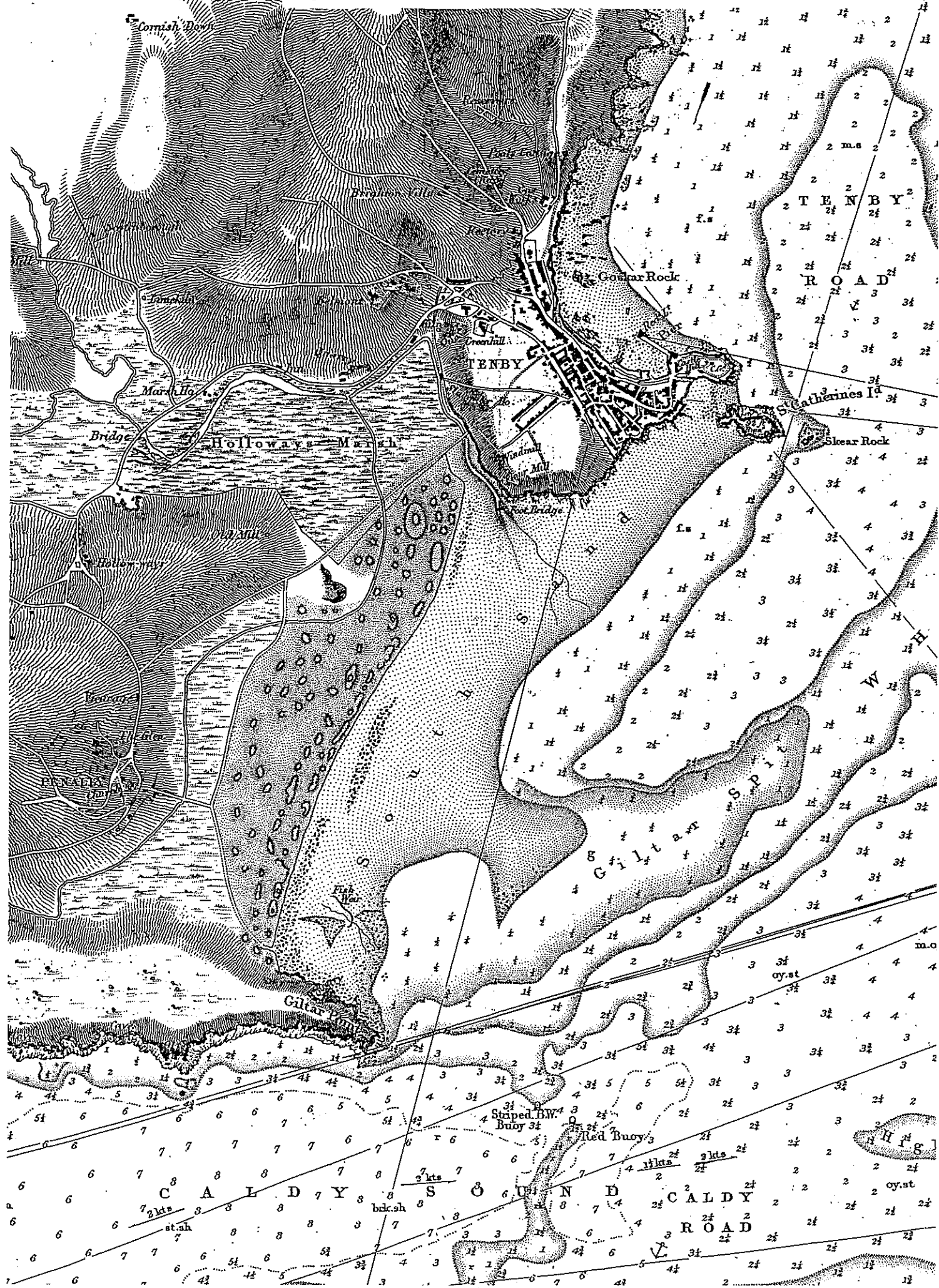
A rapid inspection was carried out by K. Murphy and B. Allen during field work for the Cadw coastal survey in October 1996 and a no-change position from 1993 reported. A field visit was carried out by Heather James on the 30th April 1997 with other members of the Castlemartin Range Advisory Committee; Peter Harts of the JRC was also present. The main archaeological concern then was to check the approach tracks used by the clean-up vehicles for reasons outlined above. Inspection of the beach approaches and the tracks used to access Frainslake, from the Range showed that the strict control had been exercised in 'keeping to the existing tracks'. This is confirmed in a letter from AEA Technology to Cambria Archaeology of 7th May 1997 detailing the briefing and supervision of beach access and cleaning by Col. Portman and the care taken to minimise disturbance. Whilst the sensitivities of the beetle *Nebia complenata* were the main expressed concern, the care taken also protected the archaeological environment.

##### *Extent and impact of oiling and clean up.*

The oiling was severe, but affected material was removed by manual bagging. No detrimental effect on archaeological sites and horizons from oiling or clean-up were identified.



Fig. 6: Part of Alltridge's Chart of Tenby and Caldey Roads, 1856, showing 'fish-weir'.



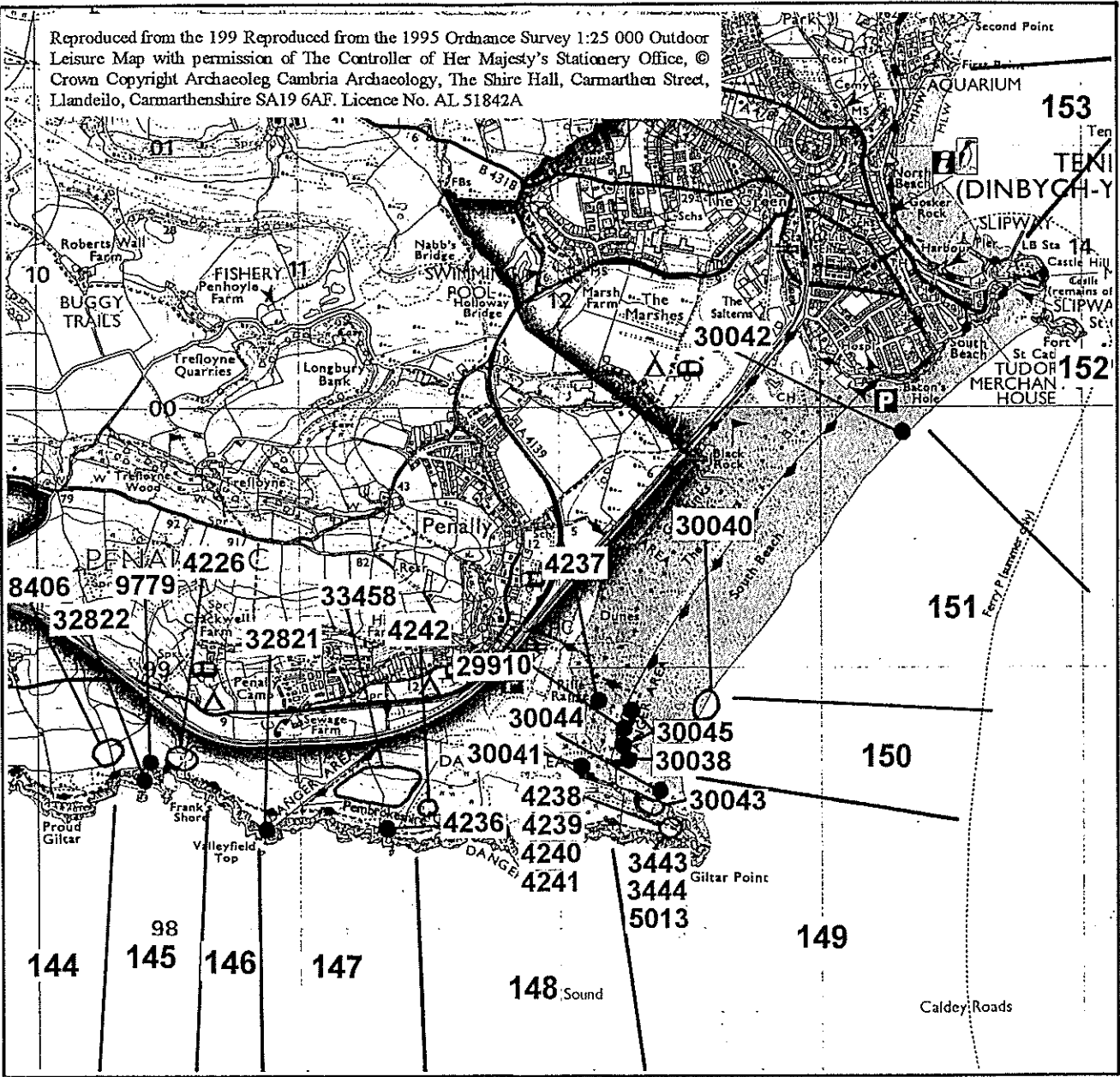
Map 22. Lydstep to Tenby

Archaeological site

Bold PRNs = new sites

PRN	NGR	Description	Type	Period	Condition	Threats	Action
Importance							
Erosion class							
Status							
3443	SS124984	Finds	Finds	Iron Age	U	U	2
3444	SS124984	Finds	Finds	Roman	U	U	2
4226	SS105986	Flintworking floor	Finds	Meso/Neo	U	U	2
4236	SS11449834	Round barrow	Earthwork	B.A.	C	A	2
4237	SS121989	Inhumation	Finds	B.A.	U	A	2
4238	SS12319841	Midden	Finds	Preh/Roma	U	U	2
4239	SS12419840	Midden	Finds	Preh/Roma	U	U	2
4240	SS124984	Settlement?	Finds	Preh/Roma	U	U	2
4241	SS124984	Finds	Finds	Neolithic	U	U	2
4242	SS119984	Flintworking floor	Finds	Meso/Neo	U	U	2
5013	SS124984	Finds	Finds	Neolithic	U	U	2
8406	SS103986	Cropmark	Cropmark	Unknown	U	U	2
9779	SS10379860	Limekiln	O.Struct	Post Med	C	B	2
29910	SS12219870	Limekiln	O.Struct	Post Med	E	D	2
30038	SS12259860	Pipeline	O.Struct	Mod	B	D	2
30040	SS125988	Fish trap	O.Struct	Med/P.Med	C	B	2
30041	SS12149857	Rifle butts	O.Struct	Mod	C	C	2
30042	SS13279984	Pipeline - sewer	O.Struct	Mod	A	D	1
30043	SS12349845	Quarry	Earthwork	Post Med	B	C	2
30044	SS12499863	Landing place	Earthwork	Post Med	C	C	2
30045	SS122196	Groynes - military defence?	O.Struct	Mod	E	D	2
32821	SS10869837	Military boundary stone	Monolith	Mod	A	C	2
32822	SS10389857	Quarry	Earthwork	Post Med	B	C	2
33458	SS112985	WWI practice trenches	Earthwork	Mod	A	A	2

Coastal units						
No.	Length	Coast edge type	Land edge type	Forshore type	Erosional class	WOGLS code
144	0.9km	Mainly rock	Scrub/heath/rough pasture	Rock	2-Slight	5218
145	0.4km	Mainly rock	Scrub heath pasture	Sand	2-Slight	5218
146	0.3km	Mainly rock	Scrub/heath pasture	Rock	2-Slight	5218
147	0.7km	Mainly rock	Military - Scrub/heath	Rock	2-Slight	5218
148	0.8km	Rock with drift cover, blown sand	Military - Scrub/heath	Rock	2-Slight	5218
149	1.0km	Rock with drift cover, blown sand	Military - Dunes	Rock	2-Slight	5218
150	0.3km	Drift, blown sand	Dunes	Sand	4-Major	5220/5221
151	1.4km	Drift, blown sand	Dunes	Sand	1-Stable	5222/5225
152	1.2km	Mainly rock	Man-made structures	Sand	2-Slight	5227/5230/5235/5240/5245/5247
153	1.1km	Man-made wall	Man-made structures	Sand	1-Stable	5248/5250/5256/5258/5260/5264/5268



Map 22. 1:25000 map showing archaeological sites and coastal units

Fig. 7: South Beach, Tenby; Map & list of sites from DAT coastal survey (Murphy and Allen 1995)





*Fig 8: Photos, Fish trap. South Beach Tenby from Giltar Point - top in February 1995, bottom in March 1997*

Sketch of the Fish-trap feature from Giltar point looking north  
at low water springs on 15 April 1995

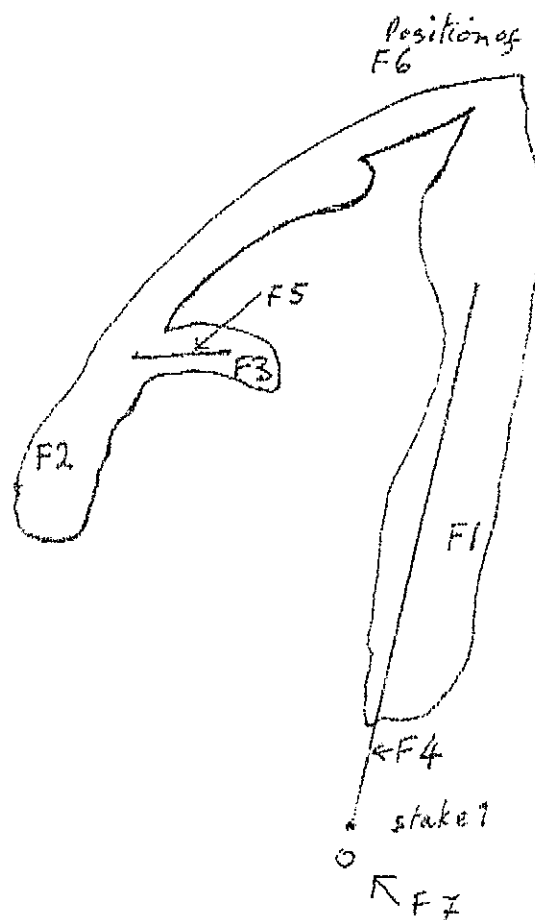
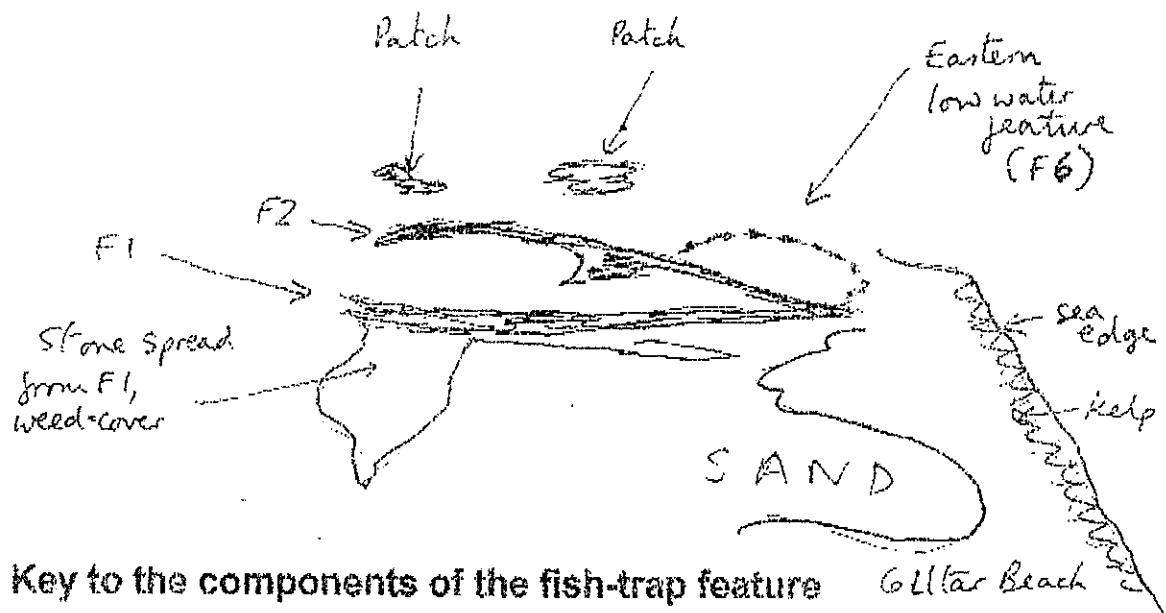


Fig. 9: Sketch Plan of fish trap prn 30040, courtesy of V. Fenwick.

### 4.3 FISH TRAP, SOUTH BEACH TENBY.

#### *Site Location and Description*

This site is located at and near the LWS tide line at the southern end of South Beach Tenby, on the edges of the rocky and stony foreshore below Giltar Point. (NGR SS 125988 ). It was identified as a feature from a marine cartographic source : Captain Aldridge's Chart of Tenby and Caldey Roads, 1856 prn 30040. This is the only cartographic depiction of the fish trap. Subsequently, the fish trap was located on the ground within an extensive stone strewn under the lee of Giltar Point by Alison Gale (Gale, 1995). The fishtrap was planned by Alison Gale and Valerie Fenwick using the infrequent opportunities of LWS in early spring 1995. I am grateful to them for sight of their descriptions, sketch plan and detailed measurements of an excellent survey in difficult conditions.

Fish traps are an increasingly recognized feature of inter-tidal archaeology. Among recent studies, Turner and Godbold have demonstrated the antiquity, longevity of use and unaltered technologies of a series of v - shaped stake walled traps and lines of 'leaders' on the line of the Second Severn Crossing off Sudbrook in the Severn estuary yielding radiocarbon and dendrochronological (tree-ring) dates from the 9th to the 18th centuries. Although not occurring in the numbers present in the Severn estuary, field work is beginning to discover traps and weirs in south-west Wales. Fish weirs, or goredi' are more circular in shape, stone walled, with interwoven wattle and set on the walls. These were refurbished on a regular basis, but the stone walls can be very longlasting.

#### *Description taken from notes by Gale and Fenwick*

In February 1995 and 15th/18th April 1995 at low water springs, Gale and Fenwick recorded, planned and photographed a 'V' shaped arrangement formed by worn beach pebbles and boulders with some more angular stones (fig. 9), measuring some 125m. x 47m. overall. On both occasions the mobility of the beach was noted, since material was rearranged and sand both accumulated and was dispersed between tides. The western arm (F1) seemed better preserved than the eastern (F2). This latter feature had a curving line springing from within the 'V' shape (F3). Lines of wooden stakes were noted and recorded and samples taken where possible from F1 and F3.

To date, the Aldridge chart remains the only documentary source for this feature. The fact that it is depicted on the chart suggests that it was in use, with stake walls in the mid 19th century (at a period when vessels were beaching below the point to load

from the limestone quarry at Giltar) and thus constituted a possible hazard to shipping. The development of Penally Burrows and the disappearance of the Ritec as a tidal creek have been described elsewhere (James, 1992) - at present all that can be said is that the fish trap need not necessarily have been built after the full development of Penally burrows - i.e. it could pre-date the 19th century. A stake was withdrawn by G & F and is stored in a deep freeze. A radiocarbon date could be obtained from this sample; VF suggests the timber to be yew, from a preliminary examination.

#### *Status of Information on pre-oiling condition.*

Measured survey and photographs by Gale and Fenwick, spring 1995. The feature was inspected by Murphy and Allen in Autumn of 1996 and was much obscured by sand.

#### *Assessment/Survey and Monitoring.*

The first visit after the *Sea Empress* oil spill was made to the site in poor weather conditions at low water springs, when no stakes in the trap walls were visible, nor any continuous lines of stones discernable. A second visit in clear, calm conditions at low water springs on 9th April 1997 allowed a more extended inspection. This confirmed that the trap was no longer visible in the form recorded by Gale and Fenwick. No stakes were visible and instead of a line of stones there was a line of three low, oval heaps of stone. Colour slides were taken from sea level and from the elevated, though distant position of Giltar Point itself.

#### *Extent and Impact of oiling and clean-up.*

North and South Beach Tenby were both heavily oiled, but the southern end of South Beach not so totally as North Beach. Since the use of heavy plant in moving oily 'mousse' from the strand line to collection sumps had been observed on the beaches by the author of this report in March 1996, it was considered possible that the fish trap might have been disturbed by machine action. However, information from J. Hodges (PCNP) and S. Evans (CCW), subsequently confirmed by the AEA reports recently received confirm that there was no heavy plant operating so distant from the high water mark. It is concluded therefore that the damage to the fish trap is due to wave action and scouring during the severe storm of 8th Oct. 1996. There may have been sand movement to bury the stakes observed by Gale and Fenwick; further monitoring could provide answers (see recommendations)





*Fig.10: Marros Beach wreck. (Treviga) top, in August 1993, bottom, March 1997*

#### 4.4 INTERTIDAL WRECK SITES AT PENDINE, MORFA BYCHAN AND MARROS BEACHES.

##### *Site Location and Description*

Two extant wreck sites in the SMR are recorded from Pendine Beach, although the existence of others is known (prns 30068 & 30069). Due to the mobile sediments of Carmarthen Bar and the sands of Pendine Beach, wrecks can be exposed in storm conditions and covered again rapidly. The first (RCAHMW Maritime database, prn 1001 SN24470771) lies within the MoD controlled area of restricted access right at the top of Pendine Beach. This point is used as a beach access point by MoD vehicles but the wreck tends to be uncovered only after storms and then rapidly recovers with blow sand. An iron-fastened wooden vessel, with the bow pointing inland and buried in the dunes and stern post visible was recorded in 1995. The second wreck of a much-dispersed iron fastened wooden vessel, probably a 19th century brig, about 60 foot long, and recorded by Dyfed Archaeological Trust in 1993 (prn 14364, SN33050768).

At Morfa Bychan, a wreck (26518, SN225074) is exposed between tides, to seaward of what remains of the submerged forest here and of the remains of WWII anti-beaching landing defences. The exposed length of the wreck is some 18 m, and 4 m. in width, with wooden pegs on some joints but with iron fastenings visible elsewhere. She is thought to be the *Treviga*, a Russian schooner, wrecked in 1923, bound for Cardiff from Trinidad with a cargo of pitch.

On Marros beach, the sides and stern of a wooden, iron fastened ship of heavily laid up construction is visible with the bow either broken off or buried pointing towards the beach. The wreck is some 23 m. long and 5.5 m. long. She is said to be the *Rover*, wrecked in the 1870s and is exposed between tides. (prn 26518, SN212072).

##### *Status of information on pre-oiling conditions*

Pendine wreck nprn 1001 has not been measured but there are some record photographs at its last 'appearance' in 1995. The Ginst Point wreck was the subject of a full measured and photographic survey in 1993. The Morfa Bychan wrecks were measured and photographed in 1993. Photographs taken from similar vantage points during the Gale Survey in 1995 give close comparison - there were no major changes in amounts exposed or condition between 1993 and 1995.

##### *Survey and monitoring.*

The wrecks on Pendine beach were not affected by any oiling - nprn 10001 was mainly covered by sand, and the oiling did not extend down the beach as far as Ginst Point. The Beach Master and his team were also briefed by the Pendine Range Officer on the location of the wrecks (ex. inf. from AEA, letter of 7th May 1997). Both Morfa Bychan and Marros beaches were oiled but there was no oil visible on either of the wrecks at the first low tide archaeological inspection on 6th April 1996, when a video camera record was made. A second monitoring visit on 11th March 1997 showed no change. The same density of shellfish (mussel) growth on the Marros wreck was observed before and after oiling.

##### *Extent and Impact of Oiling and Clean-up.*

No damage was identified to the inter-tidal and foreshore wreck sites of Pendine, Morfa Bychan or Marros. (see note for Marros submerged forest on clean-up operations.)

#### 4.5 TENBY HARBOUR.

##### *Site Location and Description - SN 135006*

Tenby Harbour is medieval in origin, one of the very few man-made harbours on the Welsh coast in the middle ages, or indeed the early modern period. The medieval pier had a chapel to St. Julian at its seaward end and the whole work was well recorded before its rebuilding in 1842. Beyond the platform on which the chapel was sited was a circular pier head. The only other medieval work to the harbour was a breakwater directed out into the harbour mouth from the western shore. This was later called 'The Barricades' and shown as a stony line on the large scale first edition 1:2500 OS map of 1880. The 'mayor's slip' now occupies the approximate site. The medieval harbour was reduced in size by the construction of the sluice basin and made ground for wharves etc at the foot of cliffs. It was suggested by Gale, during her survey of Tenby harbour, that the sluice might be of 17th century origin and among her recommendations for further work :

"The survival of the 17th century harbour structures is of note. In ports which expanded through Victorian engineering skills such structures have often been swept away. Therefore detailed recording should be undertaken"

##### *Status of Information on pre-oiling condition*

The Gale survey involved a written and photographic record of the harbour structures. No detailed measured plans and elevations for architectural and archaeological purposes have been made, to our knowledge.

##### *Survey and Monitoring*

A video record was made of our two visits in late February 1995 immediately following the heavy oiling of Tenby. The harbour was inspected at low tide in August 1996 and in April 1997.

##### *Extent and impact of oiling and clean-up*

No <sup>damage</sup> drainage to the harbour due to the clean up operation has been noticed, nor any reported, to our knowledge.

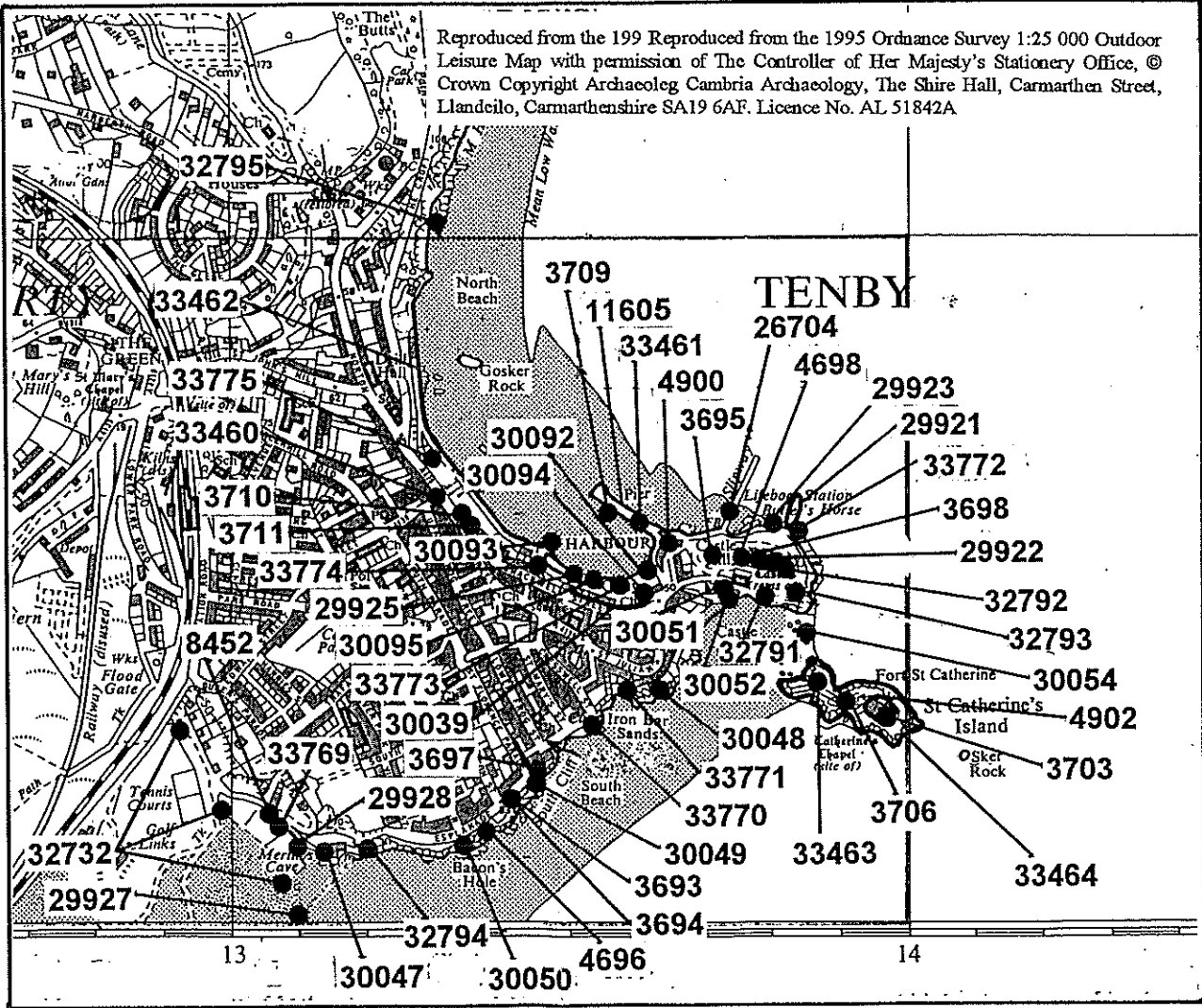


Map 23. Tenby

Archaeological sites

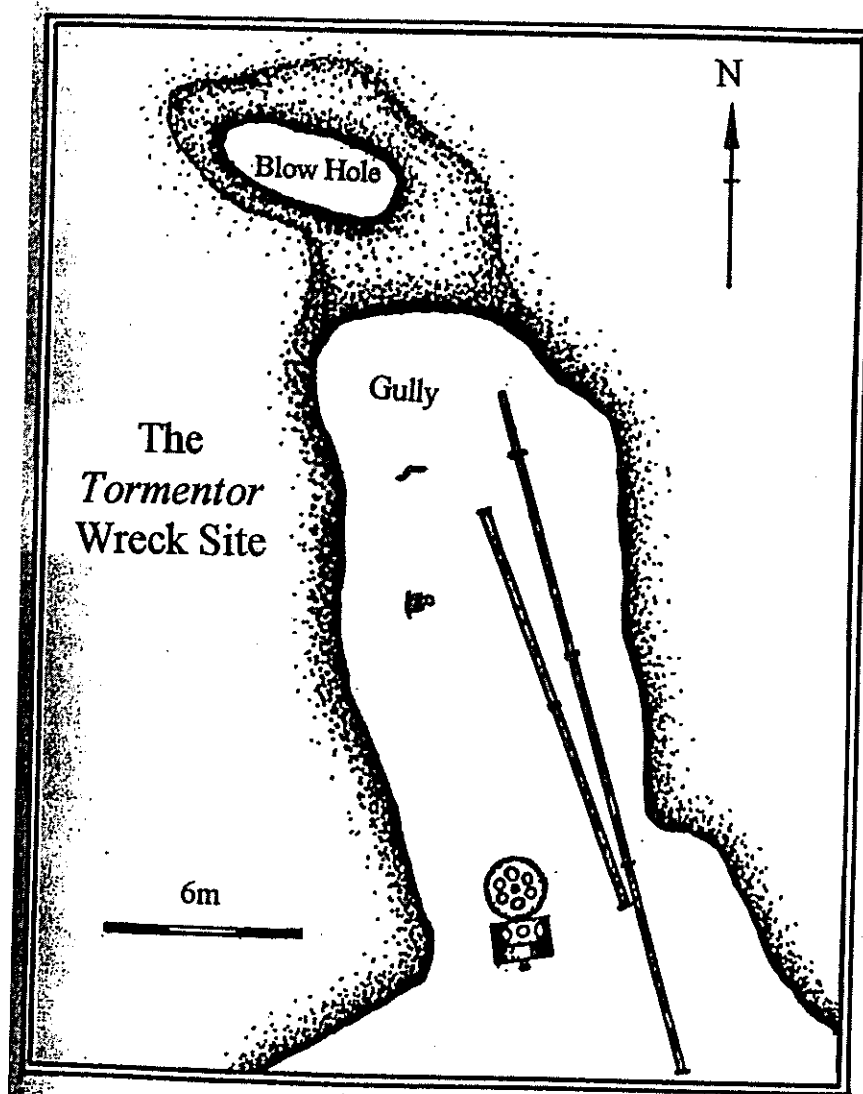
Bold PRNs = new sites

PRN	NGR	Description	Type	Period	Condition			Threats	Action	
					Importance					
					Erosion class					
					Status					
3693	SN133001	Finds	Finds	Roman	U	U	2	SAM SAM +LB2	Tourism	Survey
3694	SN133001	Finds	Finds	Unknown	U	U	2			
3695	SN137005	Finds	Finds	Roman	U	U	2			
3697	SN13450020	Town wall	O.Struct	Medieval	B	A	2			
3698	SN13700053	Tenby Castle	Building	Medieval	C	A	2			
3703	SN13970029	St. Catherine's Chapel	Documents	Medieval	E	D	2	LB2 LB2 SAM +LB2		
3706	SN139003	Finds	Finds	Roman	U	U	2			
3709	SN13560059	St. Julian's Chapel	Documents	Medieval	E	D	1			
3710	SN13330049	Conduit	Documents	Medieval	E	D	1			
3711	SN13330049	Cross	Documents	Medieval	E	D	1			
4696	SN133001	Finds	Finds	Medieval	U	U	2			
4698	SN13780053	Statue - Prince Albert	O.Struct	Post Med	A	A	2			
4900	SN13650056	Bath house	Building	Post Med	R	A	1			
4902	SN139003	Fort St Catherine	Building	Post Med	B	A	2			
8452	SN30500015	South Beach Pavilion	Building	P.Med/Mod	R	B	2			
11605	SN13680059	Tenby pier	O.Struct	Med/P.Med	A	A	1			
26704	SN13730058	Tenby lifeboat house	Building	Post Med	A	A	2			
29921	SN13810056	Royal Vistoria Pier	Documents	Post Med	E	D	2			
29922	SN13800052	Coastguard station	Building	Post Med	A	B	2			
29923	SN13810057	Slipway	Documents	Post Med	E	D	2			
29925	SN13520050	Sluice dock/dry dock	O.Struct	Post Med	B	A	1			
29927	SN131000	Culvert	Documents	Post Med	U	C	2			
29928	SN13101	Shaft	Documents	Post Med	E	D	2			
30039	SN135004	Paxton's Promenade	O.Struct	Post Med	B	A	1			
30047	SN13150011	Cave	Natural feature	General	U	C	2			
30048	SN13550030	Beach access	O.Struct	P.Med/Mod	A	D	2			
30049	SN13460022	Beach access	O.Struct	P.Med/Mod	A	D	2			
30050	SN13360012	Beach access	O.Struct	P.Med/Mod	A	D	2			
30051	SN13730047	Tenby 2nd lifeboat house	Building	Post Med	A	B	2			
30052	SN13730046	Slipway	O.Struct	Post Med	A	C	2			
30054	SN138004	Bridge	Documents	Post Med	E	D	2			
30092	SN13640049	Tenby 1st lifeboat house	Documents	Post Med	E	D	1			
30093	SN13470056	Slipway	O.Struct	Post Med	A	C	1			
30094	SN13600047	St. Julian's Chapel	Building	Post Med	A	A	1			
30095	SN13540049	Warehouse	Building	Post Med	A	A	1			
32732	SN130001	Air shafts	Documents	Post Med	E	D	2			
32791	SN13790046	Beach access	O.Struct	Mod	A	D	2			
32792	SN13820051	Six 17th century canon	O.Struct	Post Med	A	A	2			
32793	SN13860045	Bandstand	O.Struct	Mod	A	C	2			
32794	SN13200010	Beach access	O.Struct	Mod	A	D	2			
32795	SN13310101	Beach access	O.Struct	Mod	A	D	1			
33460	SN13310062	North Gate - part of walls 3697	Documents	Medieval	D	U	1			
33461	SN13610058	Storehouse - military	Building	Mod	A	C	1			
33462	SN133007	Promenade	O.Struct	Mod	A	C	1			
33463	SN13870034	Military building	Building	Mod	B	C	1			
33464	SN13890029	Military building	Building	Mod	B	C	1			
33769	SN13050012	Corn mill	Documents	Post Med	E	D	2			
33770	SN13230028	Gun battery	Documents	Post Med	E	D	2			Survey
33771	SN13270033	Turret - part of town walls 3697	Building	Medieval	B	A	2			
33772	SN13820057	Beach access	O.Struct	Mod	A	D	2			
33773	SN13590049	Quay	O.Struct	Post Med	R	A	1			
33774	SN13440052	Fish market	Documents	Post Med	E	D	1			
33775	SN13300066	Beach access	O.Struct	Mod	A	D	1			



Map 23. 1:10000 map showing archaeological sites

Fig. 11: Tenby harbour; Map & list of sites from DAT coastal survey (Murphy and Allen 199



*Fig 12: Plan of HMS Tormentor wreck site, courtesy of the Nautical Archaeology Society.*

#### 4.6 SAMPLE DIVE ON HMS *TORMENTOR* & OTHER WRECKS IN MILFORD HAVEN.

The resources made available for the archaeological assessment did not permit special commissioning of a diving programme. Cambria Archaeology is therefore very grateful to Garry Momber and his colleagues of the Nautical Archaeology Society for organizing dives in both the Haven and in Manorbier Bay where sea-bed oiling was known to have occurred. The information below is reproduced directly from Mr. Momber's Report.

##### *Site Locations and Description*

Off Manorbier (NGR SS062970)

HMS *Tormentor* was built in 1916 and wrecked in 1923 on the cliffs near Manorbier. Today she is very broken and scattered in several adjacent gullies at the foot of the cliffs. Reproduced here is the NAS plan of the gully where many artefacts remain. Two large fly wheels are evident with a number of brass flanges and casings protruding from beneath the sand. Two propeller shafts lie along the gully, terminating near the entrance to a cave, where a number of items still remain. Much of the site however has been salvaged and many artefacts have been raised. The gully shown in the plan is some 20 m. long and 7-8 m. wide. The water depth is only a few metres at low water, but this is enough to cover the walls of the gully making it almost invisible from the surface.

Within Milford Haven:

The *Lochshiel* was an 1218 ton fully rigged iron sailing vessel. She ran aground on Thorne Island in Milford Haven in 1894 SM 847-039. All 33 crew were saved from the ship and the island. Today the wreck is badly broken although a length of her keel with rows of iron ribs remain. Sections of iron plate and superstructure are evident towards the stern of the vessel. The wreck measures some 40 m. in length, 10.7 m. wide and 3.4 m. high; shallowest LW depths over the wreck are 0.4.5 m and deepest 10.5 m.

Submarine HMS E 39 foundered on her way to the breakers on 13th September 1922. She is currently lying at the south end of Watwick Bay in Milford Haven on a sandy bottom, but badly broken SM 818-038. After discovery in the late 1960s, she was blasted and heavily salvaged. Today the main wreckage forms a cohesive structure although there are large scattered fragments nearby. She measures 38.2 m. in length, 7.2 m. in width, 2 m. high and a scatter over 17 m.

SS *Dakotian* was a World War II 'Liberty' ship, 6,426 tons, sunk by enemy action off Dale

Roads in November 1940 SM 8205. She was built in Glasgow in 1922 and measured 400 foot in length. She was carrying a cargo of tinplates, cable, bicycles and Christmas puddings, and was salvaged with explosives in 1979. Today much of the structure is still evident, although many of the metal plates have become damaged and twisted. She is resting upright on the sea-bed, her stern visible, but she is more broken up amidships.

##### *Status of information on pre-oiling condition.*

As in descriptions above, gathered by the NAS from information available to divers.

##### *Survey and Monitoring*

Milford Haven.

On 26 August 1996 three dives were carried out on the three wreck locations described above. During the visual assessments, inspections were made for any oil residue. Nothing was visible, but thorough investigation within the *Dakotian* was not appropriate due to time and safety.

off Manorbier.

On 15th September 1996 two dives were performed on HMS *Tormentor*. The aims of the dive were twofold. First the site was inspected for any signs of pollution resulting from the Sea Empress oil spill. Secondly a limited survey was conducted and a number of measurements were recorded. From this, a scaled plan was possible of an area within the wreck site. A number of photographs were taken to give an impression of site conditions and the preservation of artefacts therein. An inspection within the cave revealed a black deposit on the sea-bed, covering an area almost 2 m. square. Photographs were taken and a sample was retrieved for analysis\*

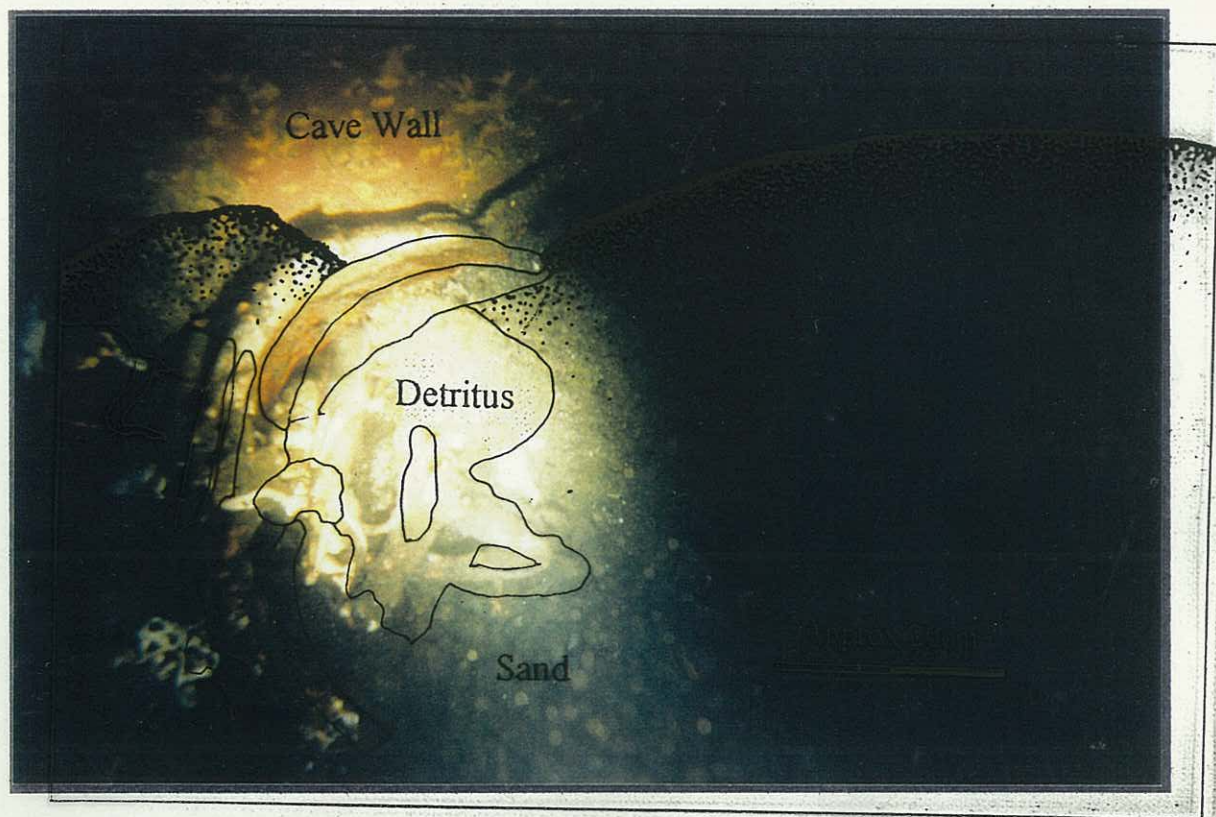
No subsequent monitoring has been possible, nor has any definite information been collected from sports divers. (See recommendations)

##### *Extent and impact of oiling and clean up.*

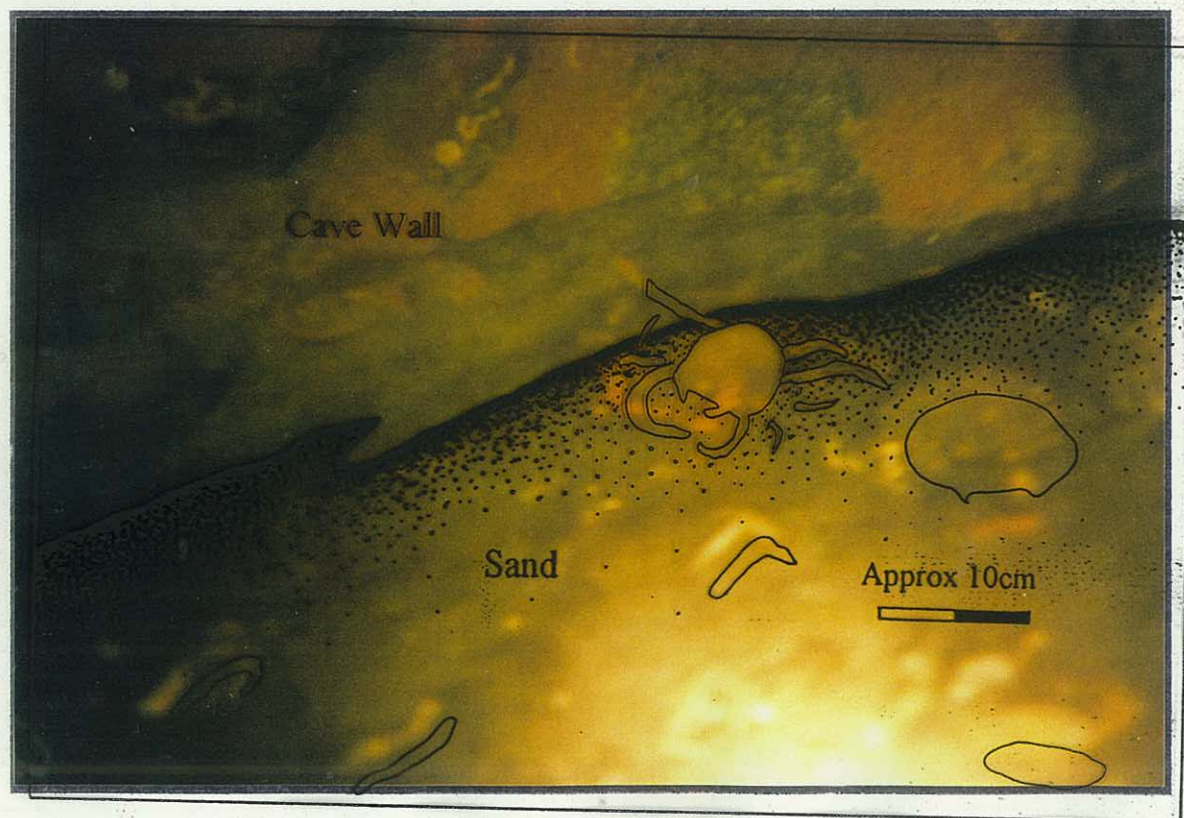
Whilst there does not appear to have been any damage as such to the wreck sites on the basis of the limited information from the sample dives, the lack of any subsequent monitoring means that it is not possible to arrive at a final conclusion on the impacts, if any, of the underwater archaeological resource.

\*(Handed by HJ. to J. Dack.)



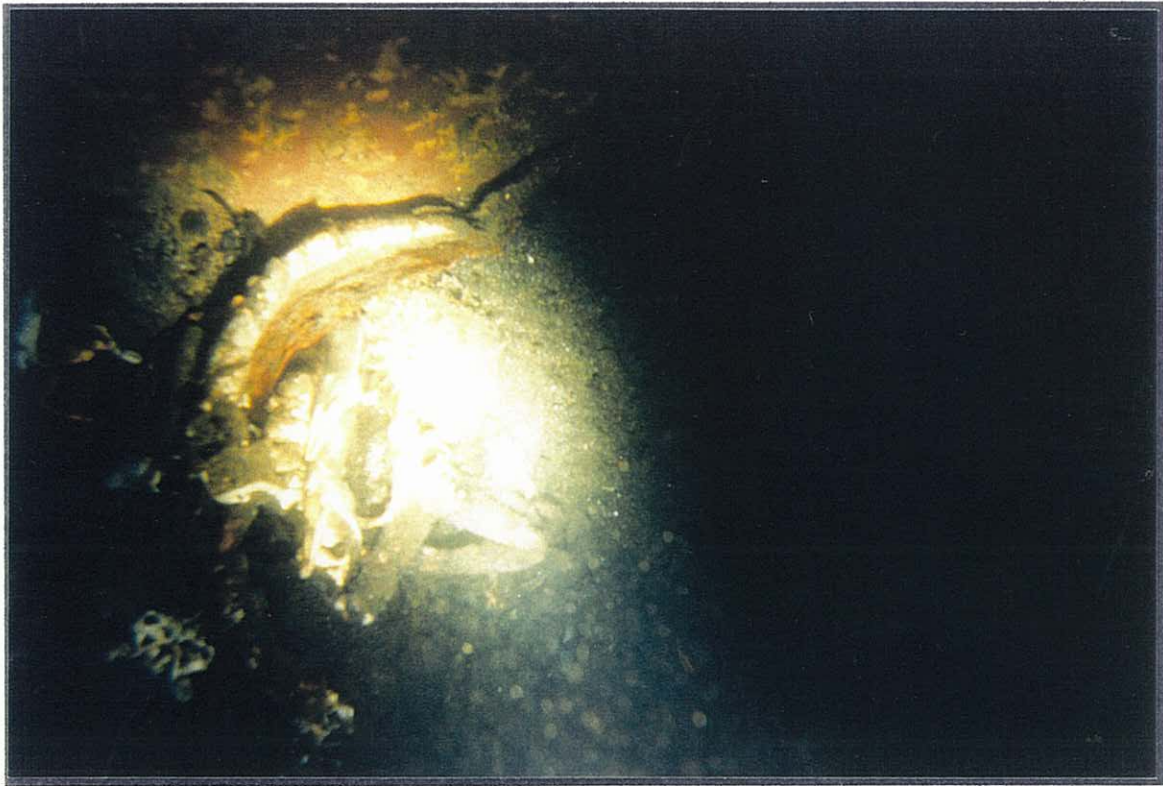


The torch illuminates dead crabs on the black, possibly oil stained sandy cave floor.



The black, stained cave floor is evident against the back of the cave.





The torch illuminates dead crabs on the black, possibly oil stained sandy cave floor.



The black, stained cave floor is evident against the back of the cave.

## 5. RECOMMENDATIONS

It is recommended that the fish trap at South Beach, Tenby be monitored by means of two visits p.a. at low water springs early and late in the year in autumn/winter 1997; spring 1998 and later in 1998 to establish whether there is a cycle of exposure and besanding.

It is recommended that a radiocarbon determination be carried out on the sample stake from the fish trap, to indicate the date of the feature. If it were of early medieval date, statutory designation might be justified.

It is recommended that a programme of dives be carried out in 1998 off Manobier, in and around Caldey Sound and Lydstep Ledge to compare wreck and seabed conditions with those on the sample dive.

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