

# **Coastal vegetated shingle structures of Great Britain**

**Appendix 1 - Wales**



# **Coastal vegetated shingle structures of Great Britain:**

## **Appendix 1. Shingle sites in Wales**

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**Girton College  
Cambridge**

**March 1993**

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**ISBN 1 873701 30 6 Full set**

**ISBN 1 873701 15 2 Main report**

**ISBN 1 873701 16 0 Appendix 1. Wales**

**ISBN 1 873701 17 9 Appendix 2. Scotland**

**ISBN 1 873701 18 7 Appendix 3. England**

Design: Nick Davidson, JNCC  
Cover design: Nature Conservation Bureau Ltd.

Originally printed by: Lake-Shore Graphics, Nottingham.

Converted to digital format from the original by GeoData Institute,  
University of Southampton: 2009

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## **Preface - JNCC's coastal survey programme**

The work reported here was originally commissioned by the Coastal Ecology Branch of the Nature Conservancy Council's Chief Scientist Directorate in 1987. The survey forms part of an attempt to describe the size, location and quality of the main coastal habitats in Great Britain (saltmarshes, sand dunes, vegetated shingle, sea cliffs, strandlines, 'reclaimed' land and maritime islands).

The collection of basic data on the main coastal habitats is an important first step in identifying the most important sites, establishing a basis for monitoring and understanding the impact of management operations and major development projects on them.

A survey of saltmarshes in Great Britain was completed in 1991 and surveys of the majority of sand dune sites in England and Wales, and a selection of the most important in Scotland, have been completed. Responsibility for completing the existing round of survey passed to the Coastal Conservation

Branch of the Joint Nature Conservation Committee's support unit and the results are being published as part of the Branch's publication programme.

This report provides a classification of the main shingle plant communities found on stable or semi-stable shingle structures in Great Britain. It does not attempt to provide an assessment of the comparative nature conservation values of the sites surveyed. The more detailed descriptions presented as appendices to the main report can be used to provide a first indication of importance in relation to the size of site and the number and representation of the plant communities.

Further information can be obtained from:

Dr J.P. Doody. Coastal Conservation Branch, Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough, PE1 1JY, UK.

## Background

A survey of shingle structures in Great Britain was initiated in 1987 under contract to Girton College, Cambridge from the Nature Conservancy Council.

This research project provides:

- a. an overall report which combines all data in order to determine which plant communities are found on shingle at a national level, and how these relate to existing NVC categories; and
- b. written descriptions and maps of the major plant communities at each site surveyed, which are collated into regional reports for Wales, Scotland and England;

This report gives a preliminary description of the results of site surveys conducted in Wales. It forms part of the wider study of the vegetation of shingle structures in Britain. This work has been

conducted within the framework of the National Vegetation Classification (NVC) in order to assess the applicability of existing NVC categories to the shingle communities and, where appropriate, to extend the NVC by highlighting any new communities identified. At the start of the project only one community was specifically attributed to the shingle substrate - SD1, within which two sub-communities had been recognised. This reflected the limited data supply for the shingle substrate at that time.

The main report provides a summary classification which is discussed more fully in the detailed account of Sneddon (1992). This report on the sites in Wales forms Appendix 1 to the main report (Sneddon & Randall 1993). Further reports are Appendices giving site descriptions for Scotland and Wales.

## Acknowledgements

The production of this report would have been impossible without the cooperation of all regional staff in North Wales, Dyfed/Powys, and South Wales regions. In each case help was given in the identification of sites and in obtaining permission for access to those sites for fieldwork.

Thanks should also be offered to The North Wales Naturalists' Trust who allowed access to restricted areas of

Cemlyn Bar Nature Reserve during the site visit.

Finally, many thanks to Ian Agnew and the Cambridge Geography Department Drawing Office who produced the base maps for this report.

P. Sneddon  
R.E. Randall



# Introduction

The term shingle may be applied to any sediment which has a mean grain size of between 2 and 200 mm. Sediments below that size are termed sand, silt or clay, according to mean grain size, while particles of a diameter greater than 200 mm are termed boulders. This empirical distinction reflects a biological distinction based on environmental factors such as moisture content which lead to differing habitats associated with each sediment.

Shingle may occur as a riverine sediment but in the UK it is most commonly found in marine environments around the coast. Indeed, approximately one third of the coastline of England and Wales is bordered by shingle. This marine sediment may have been derived from three major sources:

- a. by rivers transporting shingle to the coast;
- b. as glacial sediments deposited offshore which have been reworked with rising sea levels to be deposited along the coast; and finally,
- c. shingle may result from active erosion of existing coastal cliffs such as the flint shingle derived from chalk cliffs found along much of the south coast.

Five types of shingle beach have been recognised (Sparks 1972, Chapman 1976):

- a. fringing beaches;
- b. spits;
- c. bars;
- d. apposition beaches/cuspate forelands;
- e. barrier islands.

These categories vary according to their mobility and oceanicity and they, therefore, offer different habitats.

It has been shown by Randall (1977) that three key factors are required to enable the establishment of vegetation on shingle

beaches. The first has been mentioned earlier, the mobility of the beach. Clearly, if a beach is highly mobile then a seed is likely to be washed away before it is able to germinate and so the frequency of inundation of a site will have an important influence on the vegetation of that site. Indeed, this factor was recognised by Scott (1963) in his classification of vegetation on shingle which divides shingle vegetation into five categories according to the stability of sites.

A second factor determining the establishment of vegetation on shingle is the presence of a fine matrix in the shingle (Fuller 1987). The nature of the fine matrix has been shown to influence the type of vegetation with four types of shingle substrate identified by Scott (1963); pure shingle, shingle with a sand admixture, shingle with silt and, finally, shingle with wrack (rotting seaweed).

The final factor influencing the presence of vegetation on a shingle beach is the hydrological properties of the shingle. Clearly, shingle has a high porosity and low water retention. However, this is overcome to some extent by the presence of a fine matrix which serves as a reservoir of water, which is critical at the germination stage of seed development. Once established, the vegetation relies on adaptations to drought conditions in the form of thick leaf cuticles and the mulching effect of wetter shingle by dry shingle layers above to provide an adequate water supply (Fuller 1987).

To sum up, the establishment and maintenance of a permanent flora on shingle beaches is dependent upon the mobility, matrix characteristics and moisture conditions of that beach.

For a more detailed introduction see the final report (Sneddon & Randall 1993).



## Methods

Each site was surveyed within the framework of the National Vegetation Classification (NVC). The field techniques were based, therefore, on those outlined in the NVC field manual.

Individual sites were identified from habitat maps held by the Nature Conservancy Council (NCC), through consultation with the then Chief Scientist Directorate of NCC, and, at a local level, with the NCC regional staff. Clearly, not all shingle sites fall into the category of shingle structures. Equally, not all shingle sites are vegetated, e.g. Hell's Mouth. Some sites have, therefore, not been included in this survey. In addition, time constraints led to concentrating on the survey of the vegetation of larger sites.

Sites were firstly surveyed by eye to identify stands of homogeneous vegetation to be used as mappable units. Within these stands, vegetation was sampled using a 4x2 m quadrat, found to be the most appropriate size for the vegetation types encountered, and consistent with the quadrat size previously adopted at other shingle sites (Ferry & Waters 1985; Ferry *et al* 1990). Wherever possible, a minimum of five quadrats was placed in each stand of vegetation, however, in some cases time constraints permitted only one sample per stand.

All species of vascular plants, bryophytes and lichens (excluding saxicolous lichens) were recorded for each quadrat and each species' abundance/cover measured using the Domin scale. In addition, soil depth and pH were noted, along with the vegetation height and evidence of grazing.

Target notes were used to describe any features of interest, either physical or

biological, which may provide a useful supplement to the quadrat data collected in terms of the analysis of community types.

Site data, such as land use and any forms of disturbance, were collected at each site, while additional site information such as % SSSI coverage and past land use were recorded, based on information collected prior to fieldwork.

The quadrat data were entered onto a computer which organised them into classificatory units to be used for mapping. The programmes used were TWINSpan and TWINTAB as specified by the NVC. These packages combine quadrats of similar floristic composition into groups and these groupings were then compared with those already identified by the NVC keys and tables. These units were then used for mapping.

Two methodologies for mapping in the field were employed according to the availability of aerial photographs. Where such photographs were readily available at a suitable scale, these would be used to map units in the field. However, availability was rather limited and the second method was most commonly adopted. This method involved sketching units onto an enlarged 1:10000 map of the sites, on which the position of individual quadrats was marked. The preliminary mapping was used in conjunction with the classification provided by TWINSpan to allow more accurate mapping onto a final map.

Fieldwork on Welsh sites was conducted between May and August 1989.

Nomenclature follows Clapham, Tutin & Moore (1987).

# Introduction to Welsh sites

Much of the Welsh coast is bordered by shingle deposits; however, in many cases the geomorphology of the coastline precludes the formation of major shingle structures, with development often restricted to simple fringing beaches.

In many cases the Welsh shingle is found with varying amounts of sand admixed, whereas in others the shingle provides a skeleton for the growth of sand dunes, e.g. Traeth Dulas on Anglesey.

The distribution of vegetated shingle structures in Wales is largely controlled by the presence of a suitable supply of shingle and the amount of sand available (if too great it leads to sand capping thus masking the shingle below) and, finally, by the configuration of the coastline such that wave and tidal conditions favour deposition of shingle structures.

For descriptive purposes the coast may be divided into three major components: the north coast including Anglesey and the north Llein peninsula; the Cardigan Bay section running from Hell's Mouth on the Llein peninsula down to St Bride's Bay; and the south coast, defined as stretching from St Bride's Bay to Cardiff.

The major shingle sites identified are shown in Figure 1. The northern unit of the coast provides a large number of the potential sites, eight in total. A closer inspection of these sites reveals, however, that most are relatively small and many contain a high proportion of aeolian sand. Indeed, as mentioned earlier, Traeth Dulas comprises sand dunes over a shingle skeleton.

This stretch of coastline is subject to high levels of recreational pressure. Indeed Steers (1964) claims that

"The whole length of coastline from Llandudno to Point of Air is unfortunately spoiled in various ways."

Steers cites sea walls, promenades and quarrying of headlands as examples of typical disturbance to the coast. This is still the case, and at one site -

Penmaenmawr - a newly constructed promenade, covering a potential area of stable shingle, had been opened the day before fieldwork at that site was due to commence.

The north Welsh coast is generally fringed by glacial deposits, alluvium or aeolian sand. Shingle is found in association with large quantities of aeolian sand at Gronant. At the actively growing eastern end of the spit the shingle remains visible in the sand but moving westward the sand cover increases to form a large dune system.

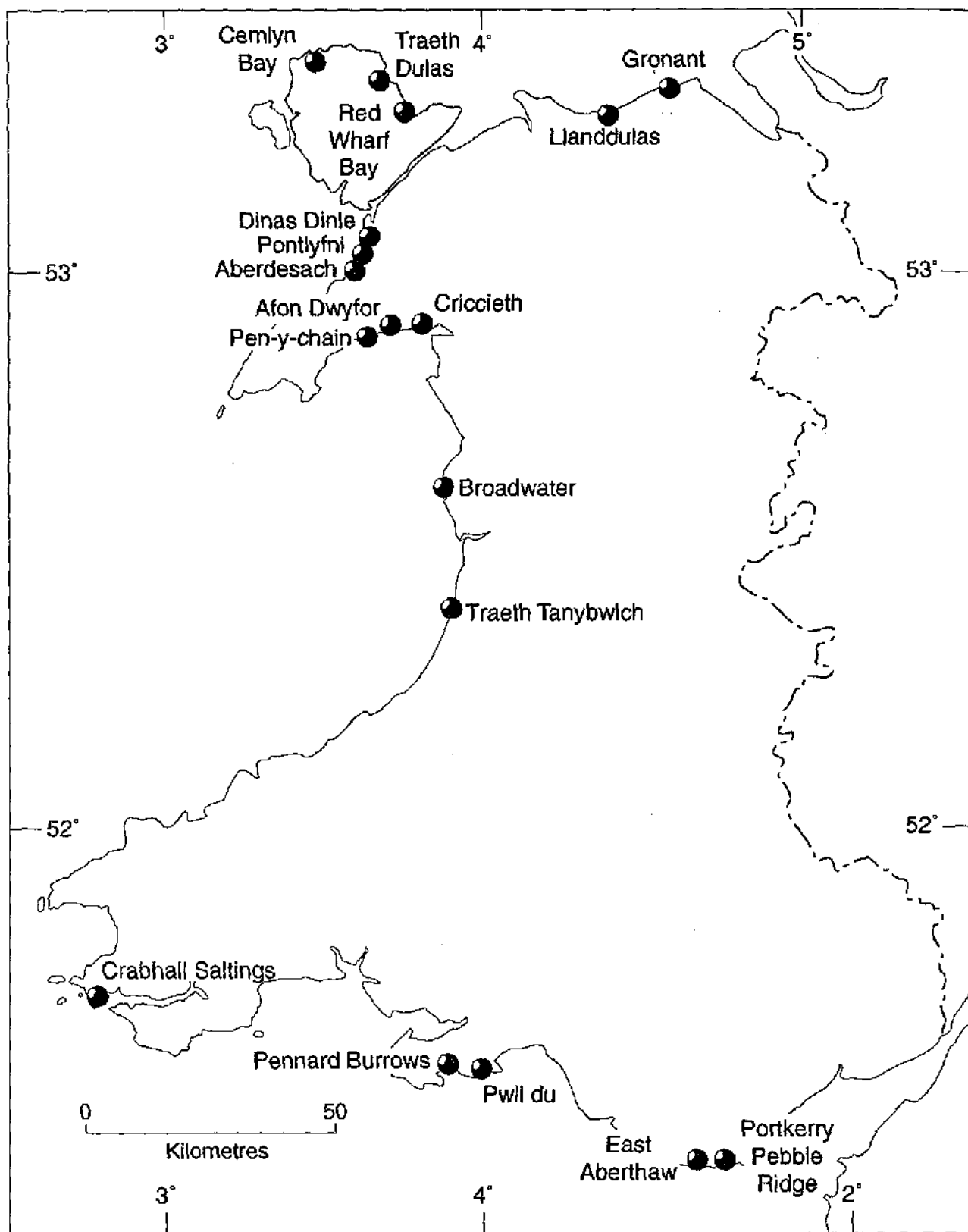
Further west, around Abergele and Llanddulas a drift terrace built up against pre-glacial cliffs is identified by Steers (1964) as being the source of shingle for the beaches which have formed in the area.

There is some controversy concerning the origin of the shingle along this coast. The distribution of shingle east of the Clwyd cannot, it seems, be explained by littoral drift because the Clwyd would deflect any littoral currents running along the shore. The shingle east of the Clwyd could not, therefore, be derived from the boulder clay exposures at Llanddulas. Steers (1964) has postulated that the shingle east of the Clwyd must have originated offshore. This conclusion is supported by the increased accumulation of shingle following gales.

Anglesey provides three potential sites, the first at Red Wharf Bay being a very small shingle/sand spit which grows out from the western edge of the bay over the intertidal sand and silt.

Traeth Dulas, however, is an example of a northerly grown spit with a shingle base but with over 20 cm of blown sand providing a largely dune influenced vegetation.

The final site on Anglesey is Cemlyn Bay. This is mainly pure shingle and has led to the formation of a lagoon behind it at the head of Cemlyn Bay.



**Figure 1** Sites in Wales with shingle structures covered by this survey

On the northern Llyn peninsula, the prevailing SW winds, in conjunction with longshore drift, have led to the northerly growth of Morfa Dinle, a shingle spit skeleton with sand capping. In places the shingle is found near the surface and these areas were included in the survey while dune areas were excluded.

Turning now to consider the Cardigan Bay unit of beaches, the stretch of coastline running from St Tudwall's peninsula to Criccieth comprises

"a series of arcs made up by bays backed by shingle and sand with eastern extremities of bays marked by small outcrops of resistant igneous rocks" (Steers 1964).

The beaches between Pwelli and Criccieth are composed of fluvioglacial sands and gravels which are not derived from marine origins. The shingle content increases eastwards from Pwelli with a large shingle structure deposited at Pen-y-chain. Here, three to four storm ridges have built up as a result of the Pen-y-chain headland acting as a groyne. The almost pure shingle foreshore gives way to older shingle ridges with over 20 cm sand capping in an extensive dune system. Boulder clay cliffs and glacial gravels east of Pen-y-chain provide abundant shingle and its eastern movement has resulted in the deflection of Afon Dwyfor by almost one mile. The Pen-y-chain shingle based spit is covered with dunes.

The boulder clay cliff at Criccieth also provides a suitable shingle source which has led to the formation of a large expanse of shingle three quarters of a mile east of the town. This shingle embankment runs along the coast to Graig Dhu and former breaches are evident in the shingle fans spread out over the lacustrine sediments behind. At Graig Dhu the shingle increases in both amount and overall size.

The central section of Cardigan Bay is characterised by northerly growing spits. The shingle spit at Ro Wen has been supplied by material from the large

gravel fan at Llwyngrwill but this spit is sand capped.

Further south, the Aber Dysynni spit offers another example of an extensive shingle mass with a sand overlay. This shingle spit has deflected the outlet of the Dysynni and led to the formation of Broadwater, a lake of significant ecological interest. The sand capping here is less well developed than at Ro Wen and shingle still exerts an influence over the vegetation.

Perhaps the largest almost pure shingle structure in this unit is Traeth Tanybwllch, the shingle ridge which extends from the Alt Wen cliff south of Aberystwyth north to the harbour wall. This shingle spit has deflected the Ystwyth almost one mile north of its original course.

The Newgale shingle beach comprises one and a half miles of well-rounded stones of local origin - Cambrian carboniferous sandstone and porphyries.

Glacial material has been reworked at the head of the estuary at Dale where Crabhall Saltings has been deposited behind the Pickleridge pebble bank.

Pembrokeshire offers few examples of large shingle structures. Around the mouth of the Thaw, however, there is a collection of coarse shingle which has travelled from the east and has formed a spit across the old estuary mouth.

In addition, there is a small shingle based spit, capped with sand, across the river mouth at Pennard Burrows. Pwll du provides an example of a shingle apposition beach with three major ridges. Finally, Porthkerry pebble ridge is a small, largely bare, shingle bar across an old river valley.

In general the shingle beaches of Wales provide clear examples of the sandy/shingle habitat with pebbles derived from reworked glacial drift.

# Site Reports

The rest of this report provides detailed reports on all the sites visited during the course of the survey.

Site names are those of the shingle structures present at the site, and so some differ from the named localities in Figure 1. The summary information at the start of each site report lists the location of the site by county and by Ordnance Survey grid reference for the centre of the surveyed site. For some large linear sites the grid references for the extremes of the surveyed site are given. The conservation status of the site is listed, along with the site area and dates of field survey.

Note that for some sites only a representative part of the vegetated structure was surveyed. The surveyed part of the structure is that shown on the site map. The area measurement given is that for the shingle structure, both bare and vegetated, in only the surveyed part of site.

Each site description gives a general introduction to the site giving geomorphological details and outlining site boundaries. This is followed by sections on the threats to the site and any current site management.






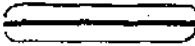



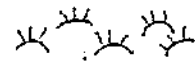
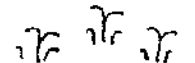



The final section of each site report provides a detailed floristic description of the plant communities found on the site. The communities, as defined in the shingle classification, are then used for mapping purposes. These communities are listed also in a key to the maps given at the end of the vegetation section for each site. Shingle communities are

defined using a numbering system prefixed by "SH" to identify it as a shingle unit. The number listed represents an end group identified in the computer classification. Thus, SH60 represents the 60th unit identified in the computer classification. The final part of the community listing is a species definition in which the species listed represent the major constants in that community. Note that in some cases the community names in these keys refer to a preliminary version of the community classification - more recent community names for each community code are listed in Table 3 of the main report Sneddon & Randall (1993).

Some listed communities have prefix letters other than "SH". These are NVC community codes for habitats other than shingle, except for the code "T" which refers to additional target notes collected during the shingle survey (see Methods).

It should be noted that the shingle classification unit definition may not exactly match the species composition described in the vegetation section of the site report. This is because the definition is only an abbreviated description. For full details on the shingle classification units see the final report (Sneddon & Randall 1993).

Where vegetation survey was undertaken where the shingle structure proved to be entirely unvegetated or others had been wholly or largely destroyed by developments or other human uses. These sites are identified in the relevant site report.

	Mean High Water Mark
	Marine Transition
	Landward boundary of shingle
	Roads
	Paths
	Railway tracks
	Steep slopes
	Rocks
	Cliffs
	Marshes
	Sand dunes
	Buildings
	Greenhouses
	Lagoons

**Figure 2** General key to symbols on site maps

# Llanddulas

Clwyd. SH 930783  
Conservation status: SSSI  
Area: 15.9 ha  
Fieldwork dates: 12-14/6/89

## Introduction

The shore between Colwyn Bay and Abergele forms part of a series of almost continuous fringing beaches (Randall, Sneddon & Doody 1990). At Llanddulas the reworking of glacial drift has resulted in the deposition of a set of parallel storm ridges in the form of an apposition beach. The site consists of an active shingle foreshore backed by an apposition beach although the ridges are no longer distinct.

The area is bounded at the rear of the site by a railway embankment and caravan park. To the east the construction of an esplanade and parking area has destroyed the stable shingle. The beach ridges are composed almost entirely of locally derived limestone with a significant fine matrix composed of calcareous sand. In addition, the sand provides a thin capping layer at the rear of the site.

## Threats

The site suffers from widespread and locally severe disturbance largely due to indiscriminate parking by vehicles. While several tracks are clearly visible being delimited by an absence of any vegetative cover, drivers are by no means restricted to these tracks. The siting of the caravan park at the rear of Llanddulas beach has not only reduced the total area of shingle vegetation but has led to increased vehicular pressure on the site. In the past Ty Crwn (the house at the western end of the site) has moved its garden boundary to incorporate part of the shingle beach.

In addition, recreational pressure at a more general level has led to disturbance of the natural vegetation through trampling and the accumulation of litter on the beach.

At the western end of the site, an area of scrub vegetation marks local disturbance in

the form of dumping soil, presumably from the caravan site or Ty Crwn. This has led to the introduction of ruderal species alien to shingle e.g. *Papaver rhoeas*.

Perhaps more worrying, however, is the clearance of natural vegetation along the caravan site wall. This area has clearly been disturbed with visible ridge and furrows. The clearance has led to the formation of a scrubby grassland community with a high ruderal content comprising *Bromus sterilis*, *Sisymbrium officinale* and *Papaver rhoeas*, and which in parts has been planted by caravan owners with garden species such as wallflowers. Clearly, this not only represents a loss of natural vegetation but the presence of this modified seed source could have serious repercussions for secondary succession following any further disturbance.

The site is lightly grazed by rabbits.

## Management

At the eastern end of Llanddulas beach SSSI concrete posts have been positioned to prevent vehicular access to a small part of the foreshore. This delimits the area where *Mertensia maritima* had been found up to 1987, the last Welsh station for this nationally rare species. During this visit to Llanddulas beach, however, there was no sign of the *Mertensia* within this plot and it seems unlikely that any plants would have survived the severe storms of February 1990.

While the SSSI site does appear to be in equilibrium, with little active erosion or deposition, it is interesting to note that recent stabilisation works have been carried out at the base of the cliffs at the western end of the site. This sea defence takes the form of groynes and large blocks of rock and concrete. Such an obstacle may starve Llanddulas beach of its foreshore shingle input which is supplied from the west (Steers 1964). Additional sea defence works to the east of the site in the form of groynes have caused concern over damage



to *Mertensia maritima* populations in the past.

### Vegetation

The site is floristically simple with the foreshore vegetation characterised by the presence of pioneer species typically associated with sandy shingle such as *Rumex crispus littoreus*, *Crambe maritima* and *Glaucium flavum*, whereas the increased proportion of fine matrix at the rear of the site leads to a closed grassland vegetation indicative of the sandy shingle substrate. There is relatively little east/west differentiation in vegetation except that the vegetation is slightly better developed on the wider, less disturbed western end.

The foreshore is typified by the sandy shingle pioneer community characterised by the constant presence of *Elymus farctus boreali-atlanticus* and *Eryngium maritimum* with *Taraxacum officinale officinale* agg., as an additional constant. This is a generally species-poor community with sparse cover - on average each quadrat contains at least 50% shingle and sand. *Honckenya peploides* and *Sonchus asper* are frequently associated with this community while occasional associates include *Desmazeria marina* and *Erodium cicutarium*. This community extends along the entire length of the foreshore of the site.

At the eastern end of the site the level of disturbance increases and this has led to the destruction of much of the mature vegetation and the presence of a pioneer community behind the storm crest.

On the rest of the site, behind the storm crest, the stable shingle ridges are dominated by a *Festuca rubra*, *Ononis repens*, *Lotus corniculatus* grassland typical of sandy shingle sites. This community is species-rich with associated herb species such as *Achillea millefolium*, *Anthyllis vulneraria*, *Cerastium diffusum*, *Crepis capillaris* and *Galium verum*. The stability of the area supporting this community is illustrated by the presence of arenicolous bryophyte species, in particular, *Brachythecium albicans* and *Tortula ruralis ruraliformis*.

Within this community there are patches where *Plantago lanceolata* and *Rumex crispus littoreus* become locally dominant in the *Festuca*, *Ononis* grassland.

Disturbance of this community at its eastern end close to the storm crest has led to the introduction of pioneer species such as *Rumex crispus littoreus* and *Crambe maritima* within an open version of the grassland.

There is a small patch of mixed grassland at the western end of the site which is a *Festuca rubra*-*Dactylis glomerata* community with some *Arrhenatherum elatius* and *Poa compressa*. This community is relatively species-rich with a high herb content including *Vicia sativa* and *Centaurea nigra*.

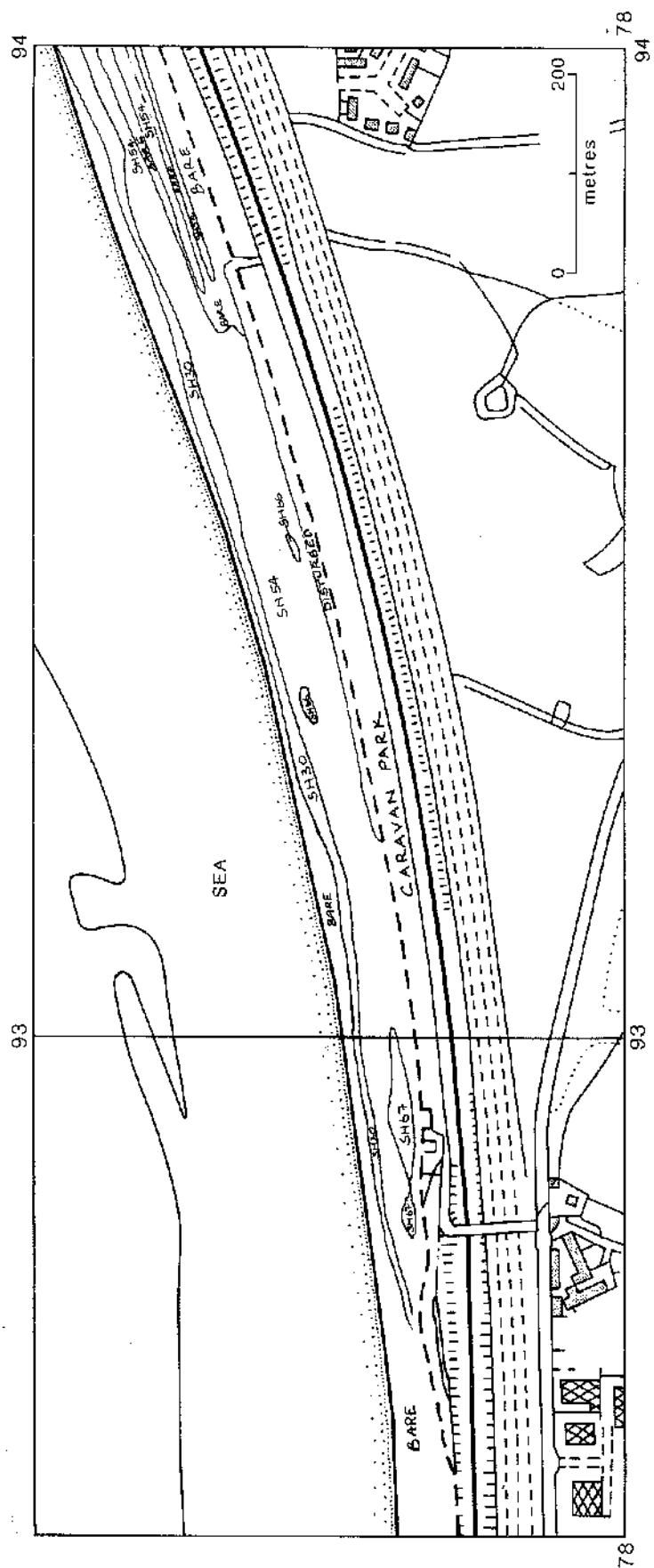
### Community key

SH67 *Festuca rubra* - *Dactylis glomerata* - *Lottum perenne* - *Bromus hordeaceus* mixed grassland;

SH66 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland with *Rumex crispus littoreus*;

SH54 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland with herbs such as *Achillea millefolium*;

SH30 *Elymus farctus boreali-atlanticus* - *Honckenya peploides* - *Eryngium maritimum* pioneer community.



**Figure 3** Llanddulas

# Gronant

Clwyd. SJ 100860  
Conservation status: SSSI  
Area: 1.94 ha  
Fieldwork date: 26/6/89

## Introduction

Gronant dunes represent the final remains of a much larger dune system in North Wales. This site is primarily a sand dune system with one main dune ridge in the west which divides into a series of ridges in the east up to the Prestatyn Gutter.

There is a bare shingle ridge which has grown out at the northern limit of the shore from the major dune ridge. This is a bare spit/ridge and is not greatly elevated and so may be subject to frequent inundation at high tides. Thus, there is no vegetation on the ridge despite nutrient enrichment from the terns which breed there each year.

At the eastern limit of the Gronant system, there is a high shingle content in the deposits which form the distal end of the spit, adjacent to the Prestatyn Gutter. This shingle appears to form a layer over the sand and the presence of sand is reflected in the sandy-shingle communities. This outer ridge is clearly moving back over the substrates behind as seen by the bare shingle fans on the lee of the ridge.

There is a lower area behind this ridge which supports a community reflecting a mixture of shingle, sand and silt and is an area which clearly gets flooded on a regular basis. This slack gives way to a second sandy, shingle ridge.

## Threats

The site may be characterised as a sandy shingle spit with local evidence of recreational pressure. There has also been localised vehicular damage to the site but this has resulted in only negligible damage. A golf course has destroyed much of the sand dune habitat.

## Management

While there is no stabilisation work on the site, there are groynes and sea defence works nearby.

The bare shingle ridge is fenced off and wardened during the tern breeding season.

The site has not been grazed.

## Vegetation

The major community found on the shingle at the eastern end of the Gronant dune system is a sandy pioneer community. This is characterised by the presence of *Elymus farctus boreali-atlanticus* and *Honckenia peploides*. The area is highly dynamic and, hence, cover remains low with an average of 90% of each quadrat comprising bare shingle or sand. In places, the *Elymus farctus boreali-atlanticus* is found in association with *Sedum acre* and *Rumex crispus littoreus*.

The small depression behind the initial storm ridge supports a slightly different flora which is a variation of the previous community. It comprises *Elymus repens* and *Elymus farctus boreali-atlanticus* found in association with saltmarsh species such as *Aster tripolium*, *Puccinellia maritima*, *Limonium vulgare* and in some cases *Beta vulgaris maritima*.

## Community key

SH29 *Elymus farctus boreali-atlanticus* - *Honckenia peploides* - *Rumex crispus littoreus* pioneer community;

T1 *Elymus farctus boreali-atlanticus* - *Honckenia peploides* - *Rumex crispus littoreus* pioneer community with *Aster tripolium*, *Limonium vulgare* and *Puccinellia maritima*.

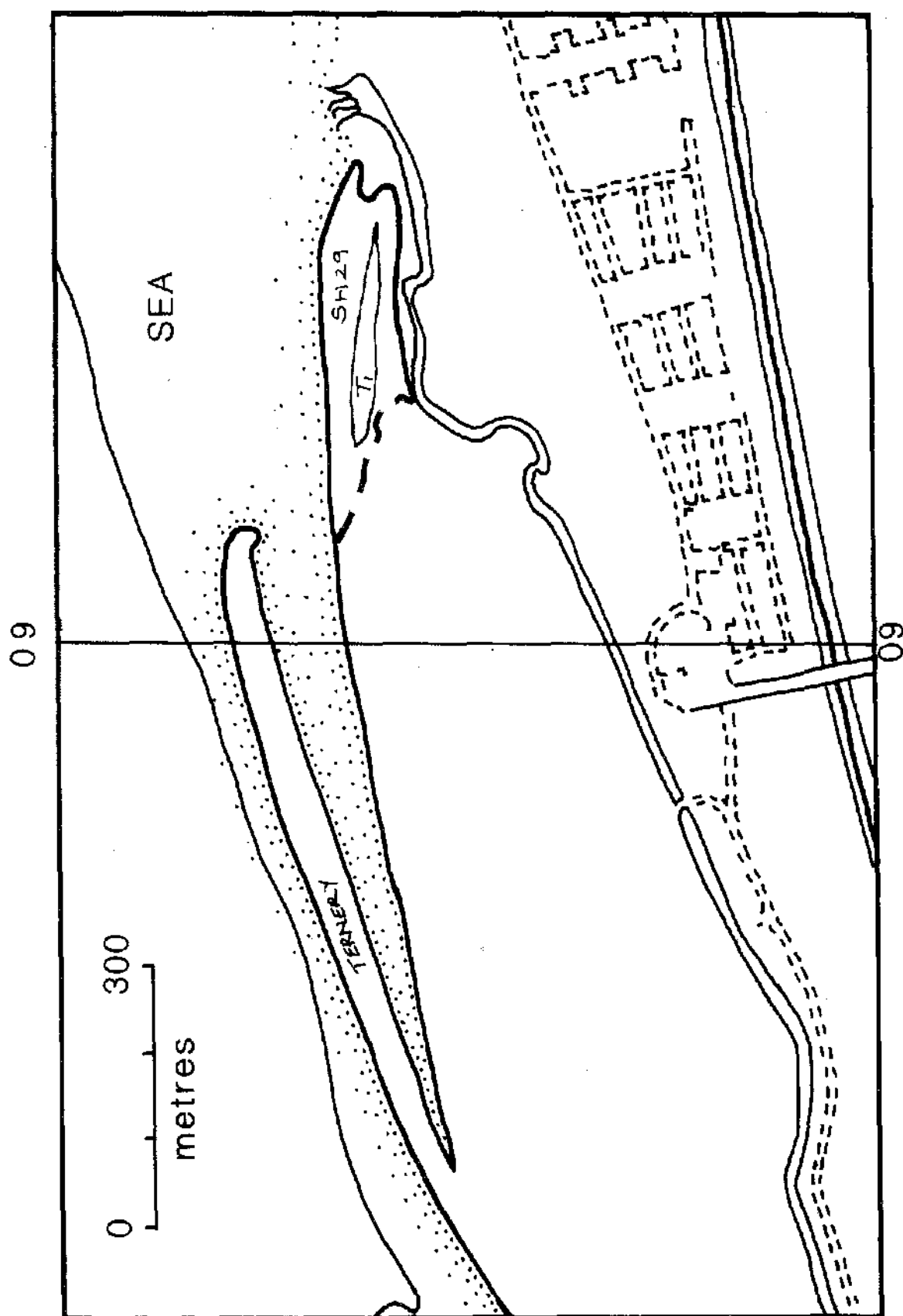


Figure 4 Gronant

# Red Wharf Bay

Anglesey, Gwynedd. SH545802  
 Conservation status: none  
 Area: 0.28 ha  
 Fieldwork date: 9/6/89

## Introduction

This site comprises a very small, highly sandy, calcareous shingle spit which grows out into the north western section of the bay.

## Threats

The site suffers from high levels of recreational pressure across the entire spit. Many boats are moored here and the spit provides easy access to the moorings. Indeed, several rowing boats are pulled up onto the spit. The recreational pressure takes the form of trampling, litter, and nutrient inputs from dogs walked on the site. The site is in equilibrium and is unaffected by grazing.

## Vegetation

The sandy nature of the substrate is reflected in the vegetation of the spit with a sandy-shingle pioneer community around the seaward edge. The proximal end of the spit, next to the mainland, is largely bare but moving towards the distal end the vegetation becomes a closed turf.

The vegetation on this site has been disturbed and this is reflected in the mosaic of different communities present and locally monospecific stands. However, at a broader level, the vegetation may be divided into three main categories. The first is a very open, sandy pioneer community found on the steep exposed foreshore, and is characterised by the presence of *Rumex crispus littoreus*, *Tripleurospermum maritimum* and *Honckenya peploides*. The second community, found at the distal end of the spit is a *Lolium perenne* grassland with *Festuca rubra*, *Poa pratensis* and *Trifolium repens* found in

varying proportions. This *Lolium* community is relatively local to Red Wharf Bay and is best defined as a subgroup of a much broader *Lolium perenne*, *Trifolium repens* community.

The main body of the spit supports a *Festuca rubra*, *Plantago coronopus* grassland with *Armeria maritima*. However, the disturbance appears to have led to a complicated mixture of minor associates including *Cochlearia officinalis*, *Plantago maritima* and *Honckenya peploides*.

## Community key

SH67 *Festuca rubra* - *Dactylis glomerata* - *Lolium perenne* - *Bromus hordeaceus* grassland;

SH35 *Armeria maritima* rich *Festuca rubra* grassland.

SH27 *Tripleurospermum maritimum* - *Atriplex prostrata* - *Rumex crispus littoreus* pioneer community;

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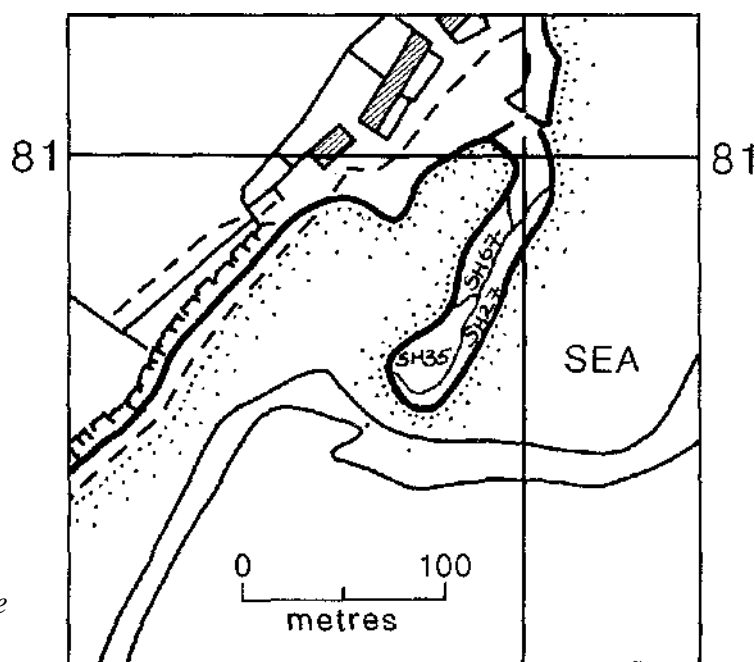


Figure 5 Red Wharf Bay

# Traeth Dulas

Anglesey, Gwynedd. SH 485888  
Conservation status: SSSI  
Area: 3.18 ha  
Fieldwork date: 8/6/89  
No vegetation survey

site supports a typical sand dune flora of *Ammophila arenaria* grading back into *Festuca rubra* and *Lotus corniculatus* grassland, and then into *Rosa pimpinellifolia* and *Ulex europaeus*.

## Introduction

Traeth Dulas is a shingle spit growing across the Dulas bay from the southern Coed y Cell cliffs. The bay contains much intertidal shingle which has clearly been reworked at the coast to form the skeleton of the spit. However, the shingle is capped by wind blown sand which has collected to a depth of at least 30 cm, with shingle only visible around the foreshore. At the leeward side of the distal end of the spit, by the creek mouth, shingle appears at the base of the sand and supports an ephemeral, largely pioneer vegetation of *Atriplex portulacoides*, *Plantago maritima* and *Armeria maritima* thus reflecting its proximity to the saltmarsh. This is, however, strandline vegetation and is below high water mark as witnessed by the driftline of fresh seaweed on top of the flora.

Some shingle appears at the surface of the spit, however, this has been thrown up on top of the sand and probing reveals that there is sand immediately below the surface.

## Vegetation

The depth of sand capping has a major influence on the vegetation on the spit and this

As a result, this site was not surveyed as part of the shingle survey.

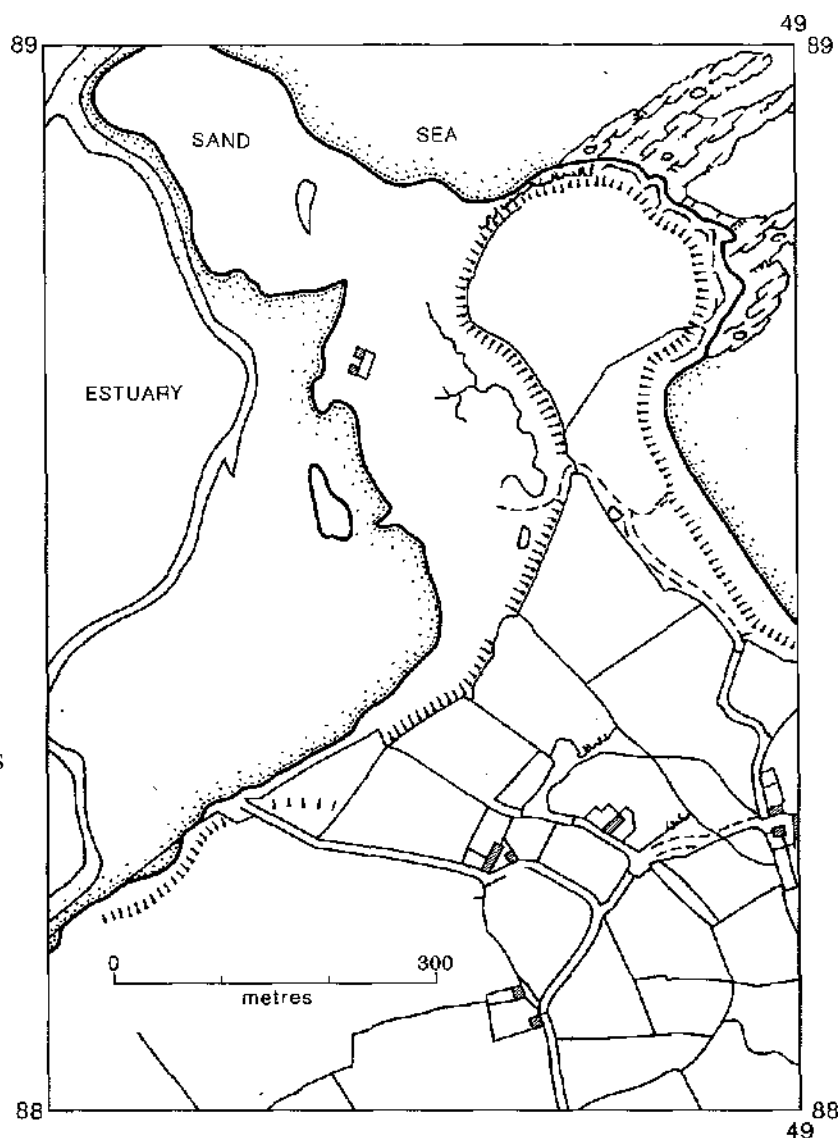


Figure 6 Traeth Dulas

# Cemlyn Bay

Anglesey, Gwynedd. SH 331932  
Conservation status: SSSI, Nature reserve -  
North Wales Naturalists' Trust (leased  
from The National Trust)  
Area: 2.95 ha  
Fieldwork dates: 6-7/6/89

## Introduction

This site is a classic example of a shingle bar. The bar has isolated the inner part of Cemlyn Bay from the sea. Landward of the bar there is a brackish lagoon which is linked to the sea via a weir at the northwest end of the bar.

The bar comprises flat pebbles with an average diameter of 5 cm. There is clear sorting and grading of the shingle from the east (smallest) to the west and also the typical sorting associated with a normal beach profile.

The bar has a little coarse sand admixed with the shingle at either end, with a sand capping up to 20 cm and a narrow strip of shingle/silt composition along the leeward lagoon edge. The shingle is derived from as far afield as Scotland and the Lake District and is glacial in origin.

The bar is, on average, 50 m wide although this figure increases to 80 m in places. The central section of the bar is occasionally subject to overtopping and this results in the landward movement of the bar.

Within the brackish lagoon behind the bar, there exist small shingle islands which provide a nesting site for various species of tern during the breeding season. The islands are largely bare of vegetation as they are subject to flooding.

## Threats/management

The presence of a tern colony has resulted in active wardening of the bar during the breeding season and pedestrian access to the site is greatly restricted. Hence, this site is largely undisturbed except for past gravel extraction and reworking at the

north-west end for the installation of a weir. There is no vehicular access to the site, nor is there any sea defence work.

There is little evidence of rabbit activity on the bar.

## Vegetation

This site provides examples of pure shingle pioneer communities on the foreshore, a more mature grassland on the stable areas at either end of the bar, shingle/saltmarsh grassland communities along the lagoon/bar margin and patches of scrub vegetation. There is some evidence of east west differentiation, both in terms of different communities and of detailed species composition within these communities.

A *Rumex crispus littoreus*, *Crambe maritima* community occupies a zone running along much of the length of the foreshore extending from the active storm crest back down onto the lee slope. This strip of pioneer vegetation is relatively narrow at the south-eastern end but occupies a wider belt on the central section of the bar which is subject to greater maritime influences, being particularly narrow at this point. Within this general *Rumex* - *Crambe* community, typical of pure shingle sites, there are areas where other associates become locally important and this has led to a shift in classification definition, but when viewed at a local level it is clear that these should be considered sub-groups of the original community. This is clearly illustrated in quadrats which contain *Silene uniflora* in association with *Rumex* and *Crambe*.

At each end of the bar, where it widens, the pioneer community gives way to grassland communities. However, there is some differentiation in the type of grassland. At the south-eastern end of the bar, where sand capping is greatest, the grassland is characterised by a *Festuca rubra*, *Elymus repens*, *Dactylis glomerata* coarse mixed grassland with *Holcus lanatus* present in small quantities. This



community may also contain limited herb species, typically, *Plantago lanceolata*, *Galium verum* and *Taraxacum officinale* agg.. Moving north-west along the bar, this community then grades into a slightly different grassland community which is less diverse. In this case the *Festuca rubra* and *Holcus lanatus* become increasingly important components of the community and they are associated with *Arrhenatherum elatius*, *Poa pratensis* and *Plantago lanceolata* with the occasional presence of *Scilla verna*. Moving further north-west along the bar this community is replaced by a more pioneer grassland which may be defined as a *Festuca rubra*, *Rumex crispus littoreus*, *Tripleurospermum maritimum* grassland. This is consistent with the increased maritime influence on the lee slope as the bar narrows at this point.

This mixed grassland in turn gives way to a very different *Festuca* grassland. This community is a *Festuca rubra*, *Armeria maritima* grassland with an unusually high *Beta vulgaris maritima* content. It rapidly grades into a community which is even more pioneer in nature and offers less cover. It comprises a sub-community of the broader *Festuca rubra*, *Tripleurospermum maritimum*, *Silene uniflora* association with *Beta vulgaris maritima* as the differential species. This community is found along much of the length of lee slope of the bar at its narrowest point and up to the north-western end.

As the bar widens at the north-western end the broader area of shingle at the storm crest down to the *Beta vulgaris maritima* community at the base of the lee slope is occupied by a *Festuca rubra* grassland indicative of drier more stable conditions. It is characterised by the constant presence of *Festuca rubra*, *Plantago lanceolata* and *Lotus corniculatus* with a high herb content. Typical associated herbs include *Anthyllis vulneraria*, *Crepis capillaris*, *Hieracium pilosella*, *Galium verum* and *Sedum anglicum*. There is also the additional presence of *Aira caryophylla* and *Koeleria macrantha* in small amounts.

A narrow strip, no more than two metres wide, of a shingle/marsh community runs along the lagoon/bar margin. This area supports a *Festuca rubra*, *Agrostis stolonifera* saltmarsh community which, at its eastern extreme, develops into a more overtly saltmarsh association as the bar widens. Here the vegetation closely resembles SM16 *Festuca rubra* - *Agrostis stolonifera* - *Glaux maritima* - *Juncus effusus* community.

The final type of community found at Cemlyn is the scrub vegetation which is found in small patches towards the rear of the bar at either end. This community is *Ulex europaeus* dominated and is found in dense patches providing almost total cover. It is found in association with various grasses, commonly *Festuca rubra*, *Anthoxanthum odoratum* and *Dactylis glomerata*.

### Community key

SH109 *Ulex europaeus* - *Rubus fruticosus* - *Agrostis capillaris* scrub.

SH80 *Agrostis stolonifera* - *Festuca rubra* saltmarsh community;

SH70 *Festuca rubra* - *Silene uniflora* ~ *Lotus corniculatus* grassland;

SH68 *Festuca rubra* - *Plantago lanceolata* - *Poa pratensis* grassland;

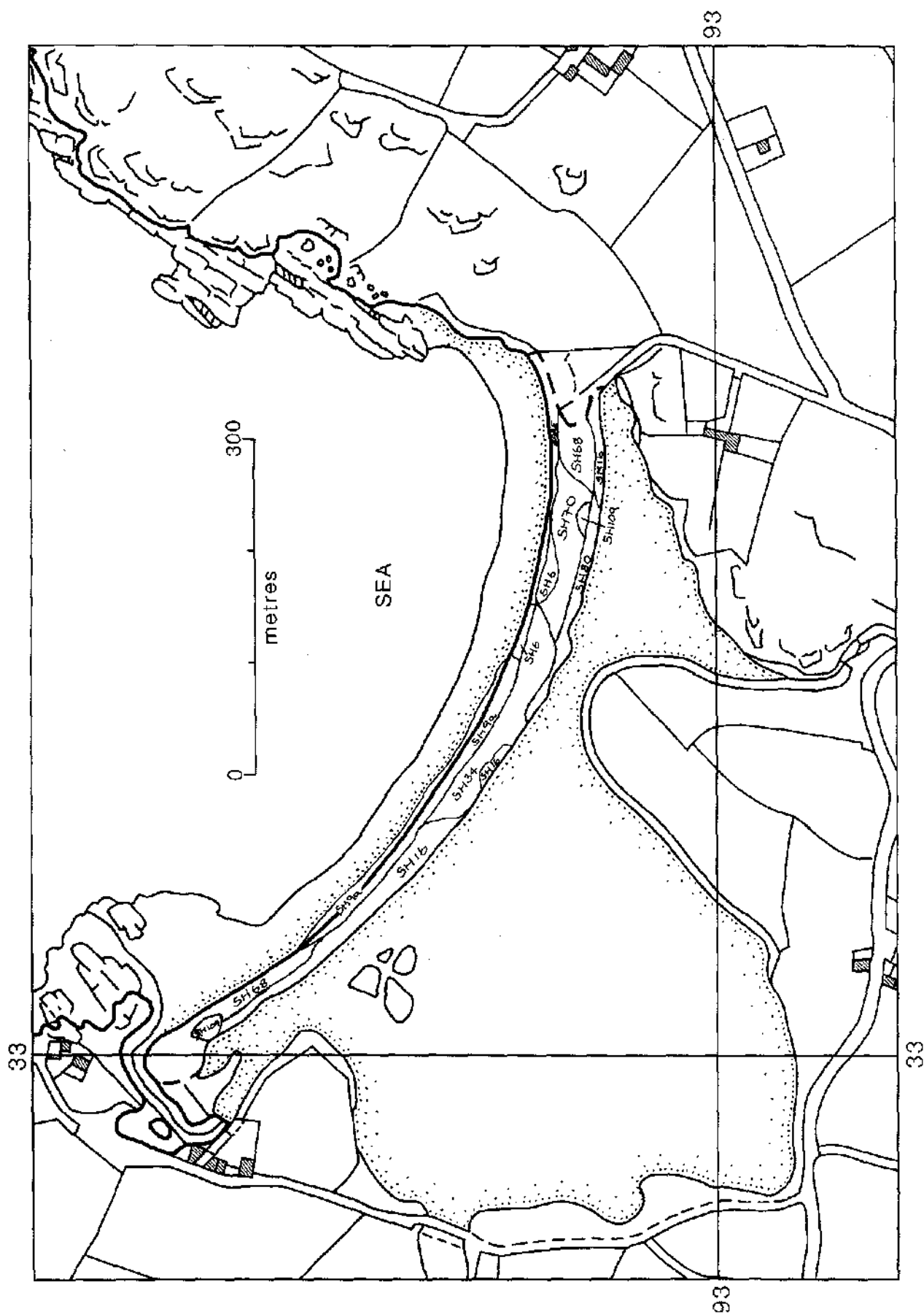
SH34 *Festuca rubra* - *Armeria maritima* - *Plantago maritima* grassland;

SH16 *Beta vulgaris maritima* - *Festuca rubra* - *Tripleurospermum maritimum* community;

SH9a *Crambe maritima* - *Rumex crispus littoreus* pioneer community;

SH6 *Silene uniflora* - *Crambe maritima* pioneer community;

SM16: *Agrostis stolonifera* - *Festuca rubra* - *Glaux maritima* - *Juncus effusus* grassland.



**Figure 7** Cemlyn Bay

# Dinas Dinle

Gwynedd. SH 440585 - SH 440575  
Conservation status: none  
Areas: 1.9 ha (south), 2.1 ha (north)  
Fieldwork dates: 24-25/6/89

## Introduction

The beach running north from Dinas Dinle up to Morfa Dinle comprises a shingle foreshore growing into a shingle-based spit. The foreshore, particularly in the south, represents a sandy-shingle fringing beach. On the spit proper there is a tall storm crest above the fringing beach which falls away steeply behind to a flatter area occupied by the airport. The spit consists of a shingle skeleton supporting a major dune system as sand capping.

At the proximal end of the spit, between the end of the car park and the start of the dunes, there is a small area of predominantly shingle-based substrate with shingle clearly visible although there is also a major sand component (see Figure 8). This rapidly grades into sand dunes with associated dune communities.

## Threats

Running south from the spit there was, in 1977, a thin strip of sandy shingle which supported a relatively closed grassland community. However, this area has since been greatly reduced in floristic interest by the provision of parking bays on this area, thus destroying its interest as a shingle site. All that is left is a bare fringing beach with gambions to protect against the erosion of the parking bays.

Further south still, beyond the Dinas Dinle embankment, there is a very small area of undisturbed shingle supporting a sandy shingle grassland community (see Figure 9). This area had extended further south in the past but much of the area has been disturbed by ploughing which has led to the introduction of an open ruderal community.

The site has obviously suffered widespread and moderate recreational pressure in the

form of trampling. Other than the destruction of much of the site for parking, vehicular damage is limited.

## Management

The site is grazed by rabbits. There is little sea defence work other than the gambions although the site is clearly subject to erosion.

## Vegetation

Five communities may be recognised at this site, all of them characteristic of a sandy shingle substrate. The most widespread community is a *Festuca rubra*, *Ononis repens* grassland with a high herb content including *Thymus polytrichus britannicus*, *Hypocheris radicata*, *Lotus corniculatus* and *Anthyllis vulneraria*. In some areas there is a significant lichen and bryophyte component in this community, in particular, *Cladonia macilenta* and *Tortula ruraliformis*, which are indicative of more stable conditions.

Another community commonly found on shingle at Dinas Dinle is similar in species composition to the previous one. It is a *Festuca rubra*, *Plantago lanceolata* grassland with *Lotus corniculatus* as a key species and it is characterised, in this instance, by the absence of *Ononis repens*.

There is a small area occupied by another similar community which is similar to the *Festuca* grassland already discussed but in this case its presence on the storm crest has led to the introduction of maritime pioneer species such as *Silene uniflora* and *Honckenya peploides* in the grassland. Additional herb associates include *Lotus corniculatus* and *Galium verum*.

The fourth community is also *Festuca rubra* dominated with *Ononis repens* but is differentiated from the community discussed earlier by the constant presence of *Armeria maritima* and *Plantago coronopus*. This is indicative of more maritime influences and it is found in a small patch on the storm crest where it is subject to more salt spray.

The final community emerges in the pioneer section of the classification. It occupies a small area on the seaward margin of the site and is a *Festuca rubra*, *Ammophila arenaria* grassland with *Rumex crispus littoreus*.

#### Community key

SH54 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland;

SH53 *Festuca rubra* - *Ononis repens* - *Anthyllis vulneraria* grassland;

SH48 *Festuca rubra* - *Plantago lanceolata* - *Hypnum cupressiforme* - *Lotus corniculatus* grassland;

SH46 *Festuca rubra* - *Ceratodon purpureum* - *Sedum acre* grassland;

SH28 *Honckenya peploides* - *Elymus pycnanthus* - *Ammophila arenaria* pioneer community with *Rumex crispus littoreus*.

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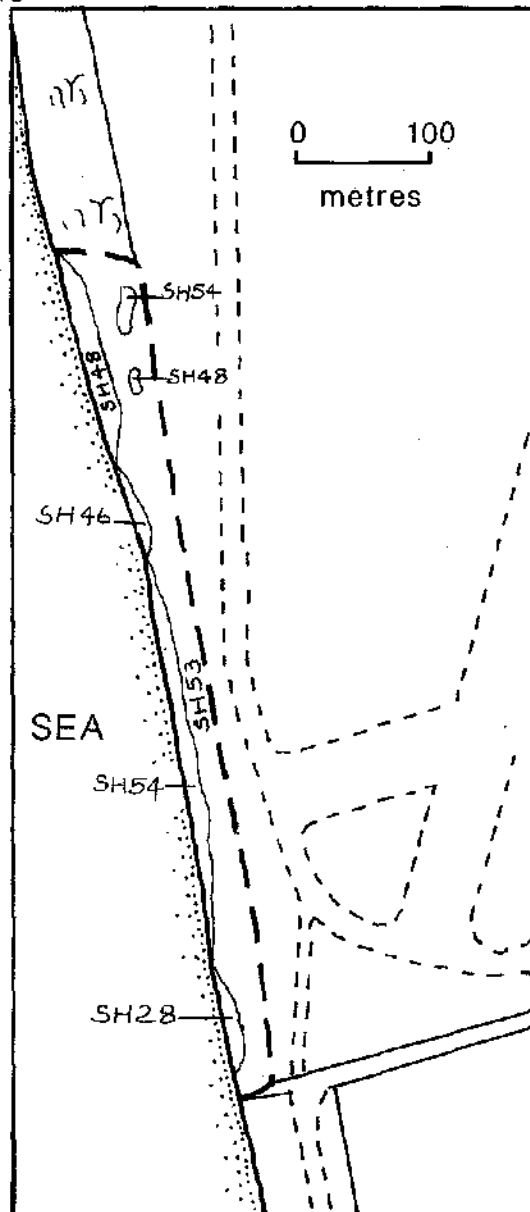


Figure 8 Dinas Dinle (north)

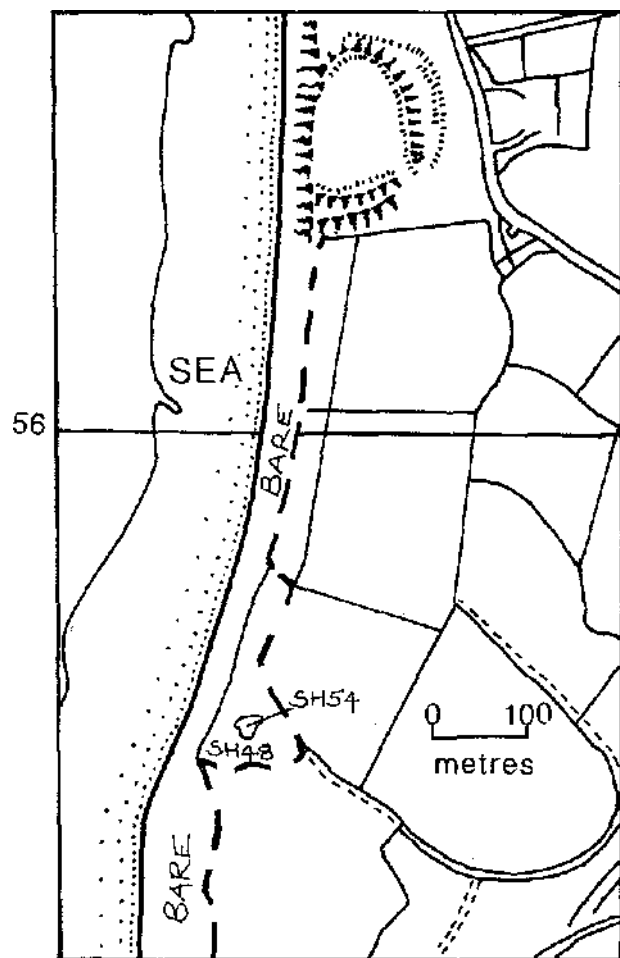


Figure 9 Dinas Dinle (south)

# Pontlyfni

Gwynedd. SH 433533  
Conservation status: none  
Area: 2.54 ha  
Fieldwork date: 23/6/89

## Introduction

This site comprises a small sandy fringing beach extending north from the holiday camp up to Afon Llyfon. The beach forms a spit across the Afon Llyfni although this has been subject to coastal stabilisation works with recent placement of gambions on either side of the river mouth.

To the north of Afon Llyfon the sandy shingle ridge continues but the proportion of sand increases greatly with little shingle visible.

## Threats

This northern part of the site has been greatly disturbed in recent years with the construction of a new sewage works. This appears to have destroyed much of the original shingle vegetation (see Randall, Sneddon & Doody 1990) both directly, by actual loss of land to the works, and indirectly through the disturbance of the natural flora by tyre tracks of the heavy machinery used in construction, and the subsequent introduction of ruderal species which now dominate the foreshore community.

South of the Afon Llyfni there is a relatively well developed foreshore pioneer community with a closed *Festuca rubra* sward behind on the more stable shingle. This part of the site suffers from widespread recreational pressure although damage remains light.

## Management

Immediately behind the foreshore the land is fenced off for livestock fanning and represents some loss of original vegetated shingle which can now be seen through the grass. There is no grazing on the beach.

The site suffers from erosion at its southern end near the campsite.

## Vegetation

There are three major communities at this site with an additional two communities found in small quantities.

A key community which occupies the southern foreshore at this site represents an example of a sandy pioneer community. It is characterised by the presence of *Elytrigia farctus boreali-atlanticus* and *Eryngium maritimum*. Common associates are also typical of sandy shingle substrates including *Tripleurospermum maritimum*, *Rumex crispus littoreus* and *Honckenya peploides*. This community offers only limited cover with, on average, 60% bare sand and shingle in each quadrat.

In the far south, where there is active erosion, this community grades into an ecologically similar community being arenicolous and pioneer in nature, but with *Ammophila arenaria* and *Honckenya peploides* becoming locally dominant.

The second major community is found on top of the stable shingle ridge, immediately behind the foreshore. This community is a *Festuca rubra*, *Plantago lanceolata* grassland with *Ononis repens* and *Rumex crispus littoreus* as additional constants. The presence of *Rumex crispus littoreus* separates this grassland from other *Festuca rubra*, *Plantago lanceolata* grasslands and reflects the degree of maritime influence on this community due to its proximity to the sea.

Indeed, where this stable area widens in the north, adjacent to the tiny spit, the maritime influence is reduced slightly and the above community grades into a *Festuca rubra*, *Ononis repens* grassland with *Lotus corniculatus* and *Plantago lanceolata* as occasional associates.

North of the Llyfni, the area of vegetated shingle has been greatly reduced and what remains has been subject to high levels of disturbance. This is reflected in the major community here. It is characterised by the constant presence of *Rumex crispus littoreus*,

*Tripleurospermum maritimum* and *Potentilla anserina* and keys out to SH27a, an example of a relatively species-poor pioneer community. However, this particular community is more diverse in terms of species composition than would be expected of SH27a. This may reflect an area which supported a more permanent flora in the past but which has reverted to a pioneer nature through disturbance. Additional constants here include *Holcus lanatus*, *Agrostis stolonifera* and *Cirsium arvense*. In one area sampled *Plantago lanceolata* was found to be locally dominant within this pioneer community.

There is a small patch of the *Festuca rubra*, *Plantago lanceolata*, *Ononis repens* community on this northern side of the river mouth.

### Community key

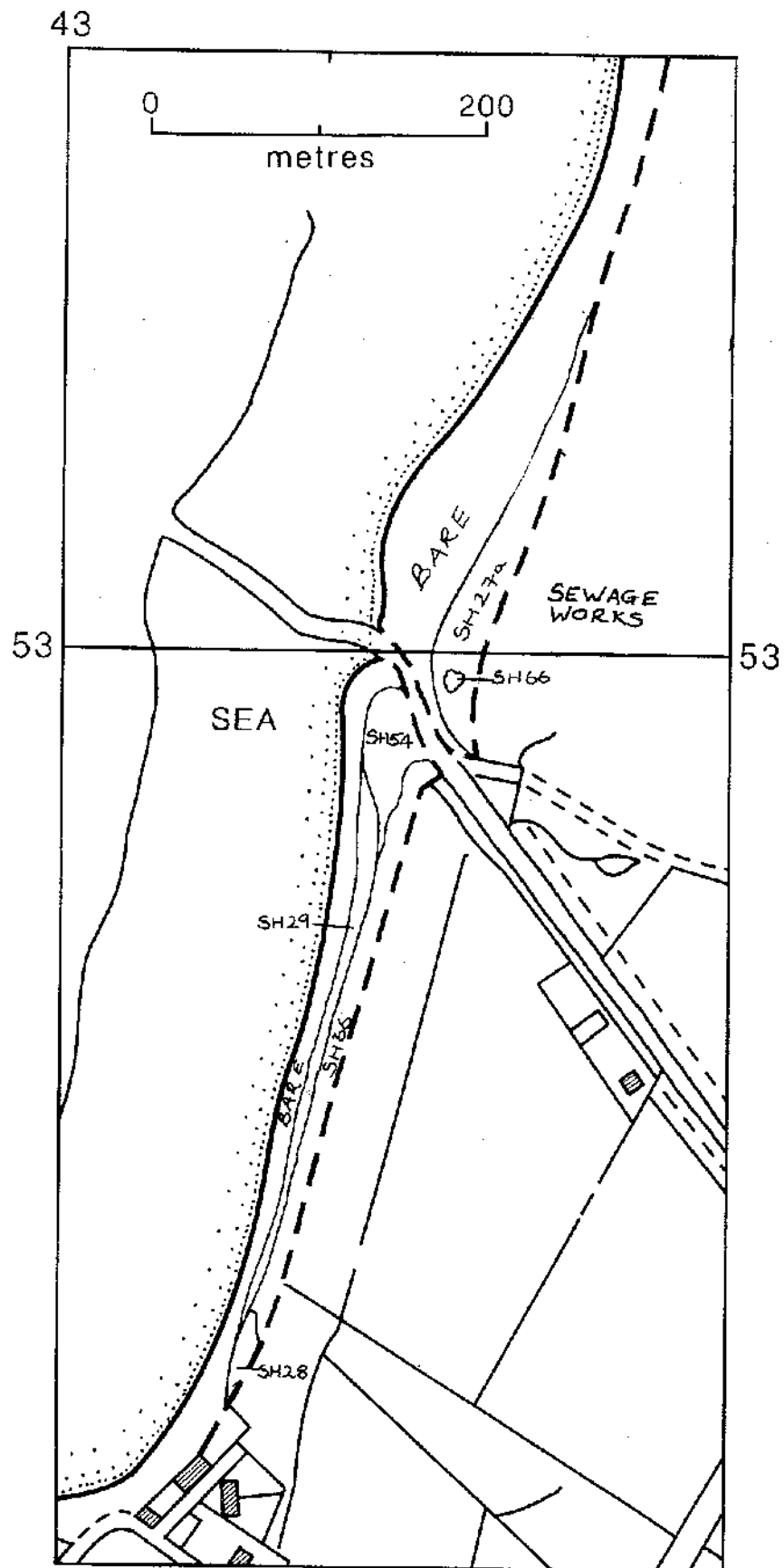
SH66 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland;

SH54 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland with *Ononis repens*;

SH29 *Elymus farctus boreali-atlanticus* - *Honckenia peploides* - *Rumex crispus littoreus* community;

SH28 *Honckenia peploides* - *Ammophila arenaria* - *Elymus pycnanthus* pioneer community;

SH27a *Rumex crispus littoreus* - *Tripleurospermum maritimum* - *Potentilla anserina* pioneer community



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**Figure 10** Pontlyfni



## Aberdesach

Gwynedd. SH 425515  
Conservation status: none  
Area: 1.39 ha  
Fieldwork date: 23/6/89  
No vegetation survey

### Introduction

This beach was an example of a double ridge system with the frontal ridge separated from the second landward ridge by Afon Desach in 1982 (Randall, Sneddon & Doody 1990). However, when visited as part of the shingle survey in 1989, this site was found to comprise only a fringing beach in front of the holiday cottages. This was made up of boulders with sand admixed. Indeed, the entire site is generally very sandy grading into pure sand in the north.

### Threats

The original double ridge system has been destroyed by the construction of a car park which has led to the clearance of any natural vegetation.

The construction of holiday cottages has also reduced the area of natural shingle vegetation.

There is widespread recreational pressure on the site, no doubt heightened by the car park although the damage to the shingle is generally light.

The site was not included in the survey due to its reduction in size and the high sand content of the intact beach.

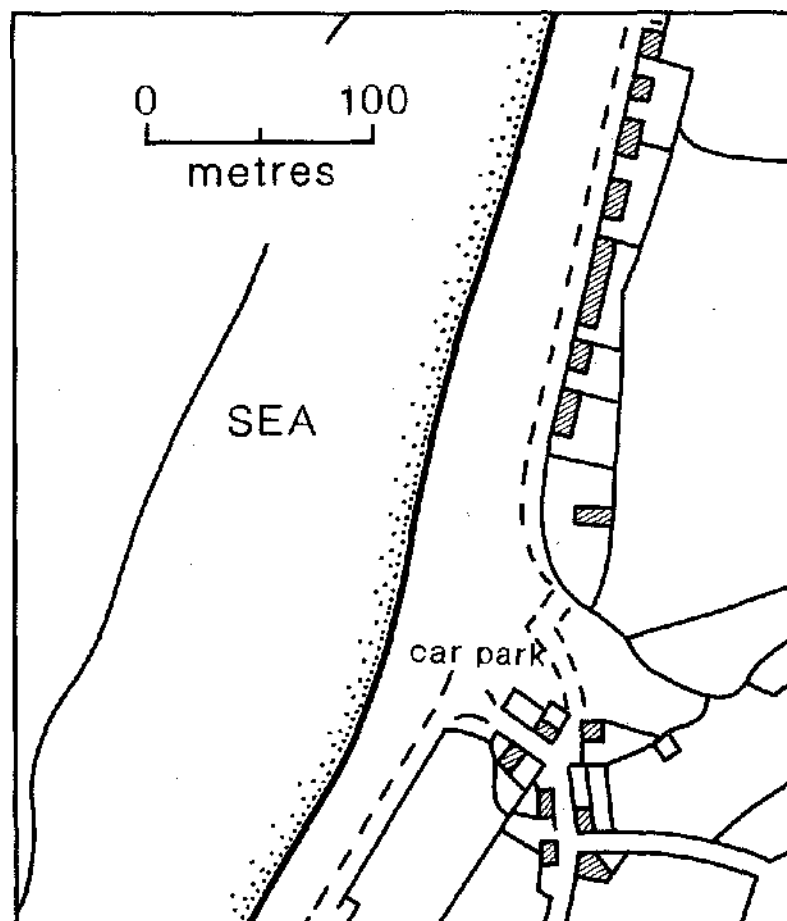


Figure 11 Aberdesach.

# Afon Dwyfor

Gwynedd. SH 475375 Conservation status: none Area: 0.86 ha

Fieldwork date: 21/6/89

## Introduction

Afon Dwyfor is a very small shingle site but forms part of the wider unit of sites stretching along the coast from Pwelli to Criccieth. The site comprises a shingle based spit which has deflected the course of the Dwyfor eastwards. This is an example of a sandy shingle site, with some shingle visible around the foreshore, but with the more stable parts of the site having a sand capping of up to 20 cm.

The main body of the spit supports, therefore, a sand dune flora which has been widely and in parts heavily grazed. The shingle flora surveyed consisted of a strip of natural vegetation at the high water mark.

## Threats/management

There is limited access to the site such that there is negligible disturbance from

recreational pressure. There has been no stabilisation work on the site or adjacent to it.

## Vegetation

The only natural shingle community on this site runs around the seaward edge of the spit and comprises a *Honckenya peploides* - *Ammophila arenaria* - *Rumex crispus littoreus* open grassland community. The sandy nature of the substrate is clear from the occasional presence of additional arenicolous species including *Carex arenaria* and *Euphorbia paralias*. In some cases the *Ammophila arenaria* is replaced locally by *Elymus farctus boreali-atlanticus* but the associates remain the same with *Honckenya peploides* as a constant throughout.

## Community key

SH28 *Honckenya peploides* - *Elymus pycnanthus* - *Ammophila arenaria* pioneer community with *Elymus farctus boreali-atlanticus* instead of *E. pycnanthus*.

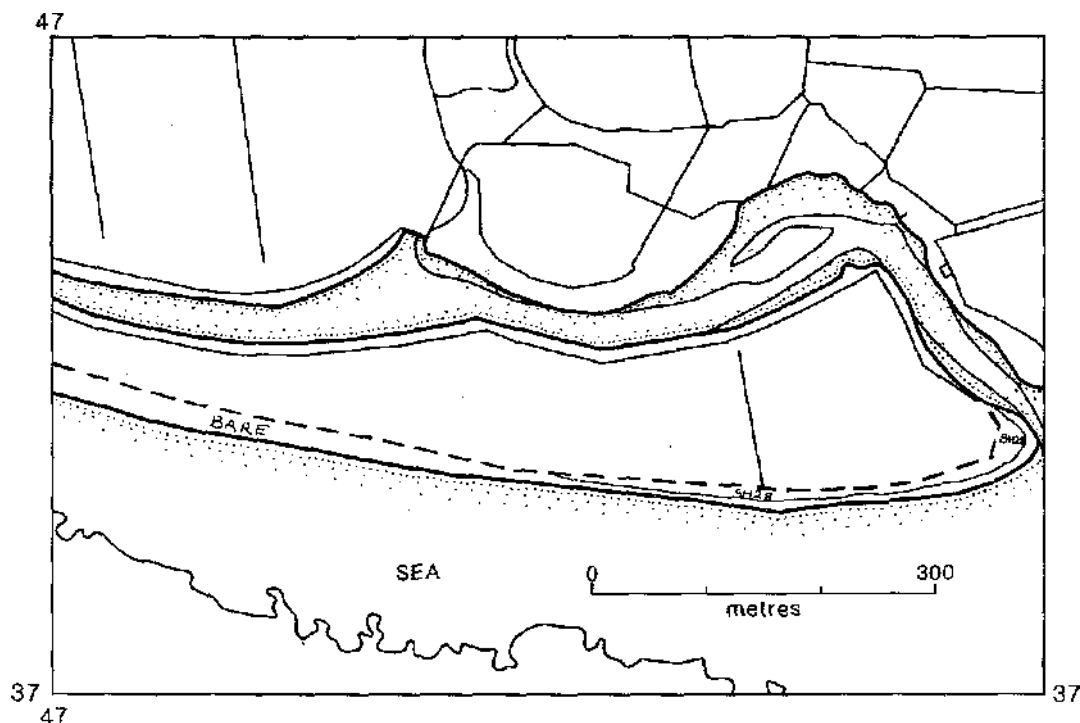


Figure 12 Afon Dwyfor

# Pen-y-chain

Gwynedd. SH 440355  
Conservation status: none  
Area: 6.30 ha  
Fieldwork date: 22/6/89

## Introduction

This site comprises an apposition beach which has been deposited at the eastern end of a coastal arc. It has been laid down against the resistant igneous headland of Pen-y-chain. A series of sandy shingle storm ridges have been deposited and are largely bare, supporting only a limited pioneer flora above high water mark. This lack of vegetation illustrates the high energy nature of the beach. Further inland the shingle ridges are overlain by up to 20 cm of sand and sandy heath communities are present. This part of the system was not surveyed. The proportion of sand within the shingle also increases to the west.

## Threats

There is very little recreational pressure on the site which has limited access mainly from the beach to the west.

The shingle has, in the past, been used as a rifle range which has clearly led to some disturbance but equally will have restricted access to the site. Current disturbance takes the form of localised vehicular tracks although damage to the shingle is negligible.

## Management

The sand dune part of the site is currently grazed by sheep and cows which provide nutrient enrichment to an otherwise nutrient-poor environment. There has been no other agricultural improvement to the site.

## Vegetation

This site provides examples of pioneer communities, found on the shingle storm ridges, and of transitional heathland communities which are found on the lee of the storm slope and then develop into mature heathland on the dunes behind.

The pioneer communities are characterised by the constant presence of *Rumex crispus littoreus* and *Tripleurospermum maritimum*. They are very open in nature with around 95% bare sand and shingle in each quadrat. Within this major grouping there appear to be two sub-communities.

The first is commonly found along the foreshore and on the flatter crest of the storm ridge, and in this case the *Rumex crispus littoreus* and *Tripleurospermum maritimum* are associated with *Glaucium flavum* and *Cerastium diffusum*. There are other species which may be found as occasional associates and they also reflect the sandy nature of this site. These include, *Cakile maritima*, *Cochlearia officinalis* and *Honckenya peploides*.

The second sub-community found in this zone occurs primarily along the active foreshore and is differentiated from the first by the constant presence of *Atriplex prostrata* with the *Rumex* and *Tripleurospermum*. This may reflect the higher level of organic input in the active storm crest zone.

On the lee of the main shingle ridge there is a much more mature, well developed vegetation, reflecting, perhaps, the increased sand content on this side of the slope. The cover here is much greater with little bare sand or shingle visible.

These communities are heathland in nature with *Festuca ovina*, *Calluna vulgaris* and *Erica tetralix* as the constants found in varying proportions with *Scilla verna*, the moss *Pleurozium schreberi*, and *Anthoxanthum odoratum*. Indeed, the quantity of *Anthoxanthum* varies considerably across this part of the site and this is the basis of a distinction between two sub-communities identified, the first being described as a *Festuca ovina*, *Erica tetralix*, heathland where *Anthoxanthum* is not a major component, while the second is an *Anthoxanthum odoratum*, *Festuca ovina* heathland with *Calluna vulgaris* and *Erica*

*tetralix* in smaller, but generally equal, amounts.

In places there is an absence of heathland species, and here the vegetation comprises a herb-rich *Festuca ovina*, *Plantago lanceolata* grassland.

#### Community key

SH92a *Calluna vulgaris* ~ *Cladonia impexa* heathland, *Anthoxanthum odoratum* - *Festuca ovina* sub-community;

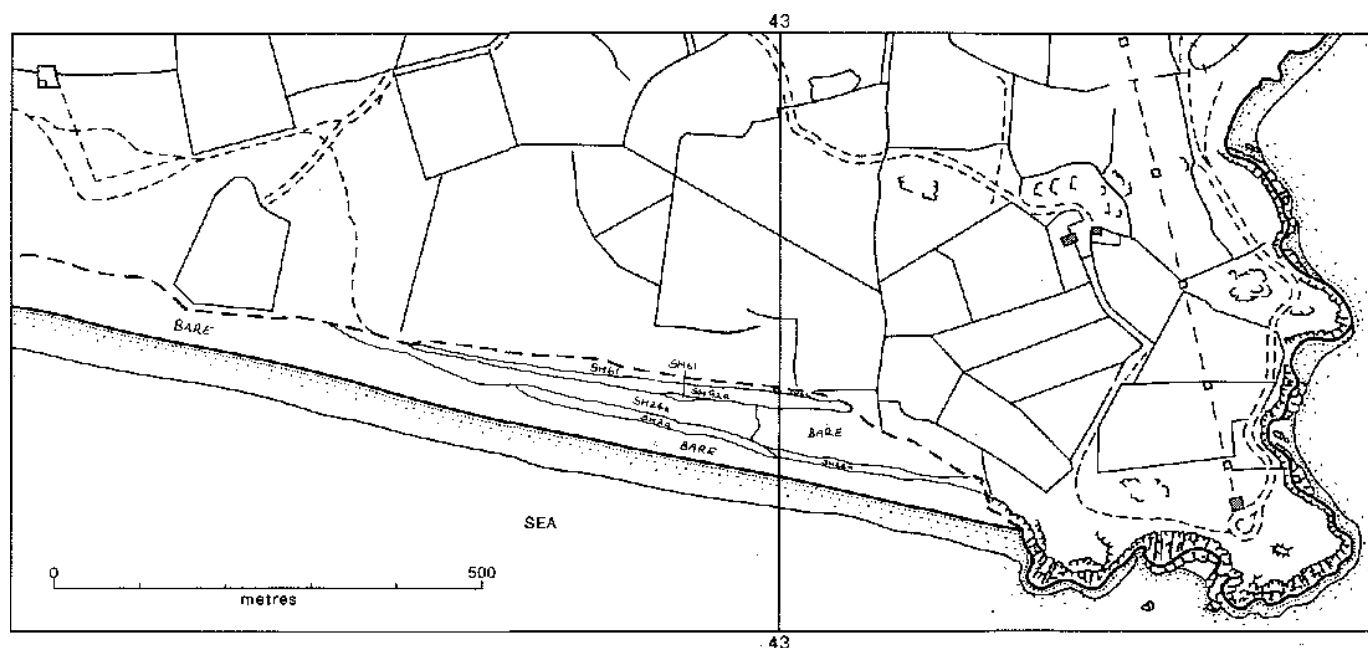
SH62 *Festuca ovina* - *Agrostis stolonifera* - *Poa pratensis* - *Anthoxanthum odoratum* grassland;

SH61 *Festuca rubra* - *Anthoxanthum odoratum* - *Lotus corniculatus* grassland;

SH27a *Tripleurospermum maritimum* - *Atriplex* spp. - *Rumex crispus littoreus* pioneer community;

SH24 *Rumex crispus littoreus* - *Tripleurospermum maritimum* - *Glaucium flavum* pioneer community;

SH24a *Rumex crispus littoreus* - *Tripleurospermum maritimum* - *Glaucium flavum* pioneer community, *Cerastium diffusum* sub-community;



**Figure 13** Pen-y-chain

# Criccieth

Gwynedd. SH 525375  
Conservation status: none  
Area: 19.64 ha  
Fieldwork date: 21/6/89

## Introduction

This site lies at the eastern end of a stretch of coast characterised by a series of arcs, with deposits of shingle and sand collected against the resistant headlands at the east of each arc.

The beach to the east of Criccieth comprises a shingle beach with a minor sand matrix. The shingle is disc shaped and ranges in size from 5 to 8 cm. The shingle foreshore runs from the car park at the main beach east to the Craig Dhu headland. The railway runs at the back of the site for much of its length.

The site consists of a very active storm ridge which widens at its eastern end to form a minor apposition beach. This has formed not through the repeated deposition of shingle storm ridges, but rather through the landward movement of the beach by overtopping and breaching, which has led to shingle fans spreading onto the sediments behind.

There is a ditch behind the storm crest on the flatter lee area and this has clearly flooded in the past with associated flora resulting. Behind this there is a raised terrace which marks the back of the site.

## Threats

There is much litter on the site, particularly in the strandline on the foreshore.

Whilst there is some recreational pressure on this site, its distance (c. 1 km) from the main beach means that disturbance from such pressure is limited.

## Management

There has been some artificial reworking of the shingle at the eastern end, with two banks of finer gravel deposited; these are

now vegetated. Additional stabilisation works at the site include beach feeding with boulders at the actively eroding eastern end, and the placing of wooden fencing and railway sleepers behind the central section of the storm crest to halt the creep of shingle towards the railway line, which marks the back boundary of the site at this point.

The site is currently grazed by sheep and cattle.

## Vegetation

This site offers examples of a variety of sandy shingle communities, both pioneer in nature and more mature grassland communities. In addition there is a small area of wetter ground around the ditch which supports a very different community.

Pioneer communities run along the top of the current storm ridge. The major pioneer community consists of scattered *Rumex crispus littoreus* plants. This most closely resembles SH24 which is a *Rumex crispus littoreus*, *Tripleurospermum maritimum*, *Glaucium flavum* community, but highlights the problems of dealing with largely monospecific stands within the shingle classification. In places along the foreshore *Rumex crispus littoreus* is found in association with other species such as *Silene uniflora*, *Tripleurospermum maritimum* and *Atriplex prostrata*. This community may be defined as SH27 *Tripleurospermum maritimum*, *Rumex crispus littoreus*. Clearly, the monospecific *Rumex crispus littoreus* stands may be considered a sub-group of this community.

The more stable shingle behind the storm crest supports two major communities. The first is found at the eastern end of the shingle and is characterised by the constant presence of *Festuca rubra*, *Plantago lanceolata* and *Hypochoeris radicata*. This grassland is species rich supporting many herbs such as *Thymus polytrichus britannicus*, *Silene uniflora* and *Sagina apetala*. This is a relatively mature community and largely undisturbed as illustrated by the

presence of bryophyte and lichen species including *Rhytidiadelphus squarrosus* and *Peltigera canina*.

In addition, this community includes a number of spring annual grasses such as *Aira praecox* and *Poa annua* which may indicate that it represents a sub-community of the more general *Festuca*, *Plantago* community. This may be a result of grazing of the community leading to bare patches which are subsequently colonised by annuals.

This sandy grassland shows a slight variation in the west with the increased presence of *Cerastium semidecandrum* and *Carex arenaria*. This represents a sub-community of the original grassland reflecting an increased sand content in the shingle matrix.

In parts this community is tending towards sandy heathland with the presence of small amounts of *Calluna vulgaris* and *Erica tetralix*.

At the rear of the site there is a small patch of *Ulex europaeus*, *Rubus fruticosus* scrub.

Around the ditch which runs along the back of the site there is a community indicative of wetter conditions, SH32, which is a *Festuca rubra*, *Plantago maritima*, *Glaux maritima* grassland which is, in this case, rather impoverished having been recently flooded.

#### **Community key**

SH24 *Rumex crispus littoreus* - *Tripleurospermum maritimum* – *Glaucium flavum* pioneer community;

SH27 *Tripleurospermum maritimum* - *Atriplex prostrata* - *Rumex crispus littoreus* community with *Silene uniflora*;

SH49 *Festuca rubra* - *Lotus corniculatus* - *Thymus polytrichus britannicus* - *Cladonia Jurcata* grassland with a high annual content e.g. *Aira praecox*;

SH109 *Ulex europaeus* - *Rubus fruticosus* - *Agrostis capillaris* scrub;

SH32 *Festuca rubra* - *Plantago coronopus* grassland.





# Aber Dysynni

Gwynedd, SH 582027  
Conservation status: SSSI  
Area: 19.3 ha  
Fieldwork date: 1/6/89

## Introduction

At Aber Dysynni a small shingle spit growing northwards has led to the formation of the Broadwater lagoon behind. The shingle spit extends north from Twywn and has some sand capping on the inland ridges. It is a very complex coastal system with a small depression trapped between ridges, which is frequently flooded, even in summer. This leads to the presence of saltmarsh influenced communities in close juxtaposition with the shingle and sand habitats. Such diversity within a relatively small area is unusual.

A railway line running along the coast provides a convenient rear boundary for the site. This is an example of a shingle site with a high proportion of interstitial and capping sand - only around 10% of the site offers a pure shingle habitat, much of which is restricted to the bare foreshore where pebbles are on average 15 cm in diameter.

## Threats

The proximity to Twywn encourages widespread use of the site for recreational purposes resulting in a light level of disturbance limited to litter and the presence of footpaths across the site.

Damage by vehicles is localised and minor. However, there appears to be an area immediately behind the active storm crest which has undergone major reworking and been cleared of vegetation in the recent past. This has resulted in ridges and furrows running perpendicular to the coast, which support an open sandy shingle grassland with a high *Lotus corniculatus* content.

## Management

This site is one of the few Welsh sites supporting a breeding colony of terns, although none bred in 1989. While the presence of the colony increases the number of visitors to the site, the restriction of access to the bare shingle nesting area serves to preserve that part of the site which supports pioneer communities important to this study.

Beach stabilisation measures are seen south of the spit and take the form of groynes but there has been little further alteration. The site suffers slight erosion at the distal end, perhaps due to shingle starvation caused by the groynes.

The site is widely grazed by rabbits but overall damage is light.

## Vegetation

The sandy nature of this site is reflected in the plant communities present. At the southern end of the site, where there is sand capping to a depth of 15 cm on average, the two key communities are more commonly associated with sand dunes. The first, which occupies the area immediately behind the storm crest, is an *Ammophila arenaria*, *Festuca rubra* sandy grassland with *Senecio jacobaea* and *Carex arenaria* as additional constants. This is a species rich community with occasional herb associates including *Rhinanthus minor*, *Viola riviniana* and *Vicia sativa*. This community most closely resembles the existing sand dune community SD7 *Ammophila arenaria*, *Festuca rubra* semi-fixed dune community.

This then grades into a more fixed grassland at the rear of the site which comprises a *Festuca rubra*, *Carex arenaria* dominated grassland, with the presence of *Poa subcaerulea* and *Dactylis glomerata* as minor associates. It appears to be similar to the *Carex*, *Festuca*, *Agrostis* grassland community defined as SD12, although in this case it is *Festuca rubra* rather than *Festuca ovina* which is found. SD12 is typical of stable, acid dunes and is commonly associated with lower areas in

old dune systems. It is often indicative of leached conditions.

The major community on the northern part of the spit is found on the old shingle ridges. Such areas support a *Festuca rubra*, *Plantago lanceolata*, *Lotus corniculatus* grassland with a high herb content. *Anthyllis vulneraria* and *Trifolium repens* serve as particularly useful indicators for this community. In certain areas this dominant community forms a mosaic with other *Festuca* grassland communities according to the local abundance of particular associate species.

An example of such a mosaic patterning may be seen landward of the lagoon where *Cladonia furcata* is found in small amounts and so quadrats thrown in this area key out to a different community. *Ononis repens* > *Desmazeria marina* and *Dactylis glomerata* also become locally important species within the general *Festuca* grassland on the shingle ridges.

Pioneer communities are found along the northern exposed seaward edge of the spit on the tern breeding area. These communities are very open with around 90% bare shingle or sand in each quadrat. The major pioneer community in extent comprises an open *Tripleurospermum maritimum*, *Silene uniflora* assemblage with *Lotus corniculatus*, *Euphorbia paralias* and *Eryngium maritimum* as frequent associates indicating the sandy nature of the substrate. This community is seen to be more developed on parts where cover is greater and the *Tripleurospermum* and *Silene* are found in association with *Festuca rubra*. There is no pattern to this development which is very localised.

The disturbed area supports a very open version of the *Festuca rubra*, *Plantago lanceolata*, *Ononis repens* community.

The area around the lagoon supports a shingle/saltmarsh community which comprises a *Festuca rubra* - *Armeria maritima* - *Agrostis stolonifera* grassland with halophytic herb associates such as *Glaux maritima* and *Limonium vulgare*.

## Community key

SH70 *Festuca rubra* - *Silene uniflora* - *Lotus corniculatus* pioneer community;

SH67 *Festuca rubra* - *Dactylis glomerata* - *Lolium perenne* - *Bromus hordeaceus* grassland;

SH66 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland;

SH53 *Festuca rubra* - *Ononis repens* - *Anthyllis vulneraria* grassland;

SH49 *Festuca rubra* - *Lotus corniculatus* - *Thymus polytrichus britannicus* - *Cladonia furcata* community;

SH33 *Plantago coronopus* - *Festuca rubra* - *Armeria maritima* grassland;

SH28 *Honckenya peploides* - *Elymus pycnanthus* - *Ammophila arenaria* community

SH23 *Tripleurospermum maritimum* - *Euphorbia paralias* - *Silene uniflora* pioneer community;

SD12 *Carex arenaria* - *Festuca ovina* - *Agrostis* grassland.

SD7 *Ammophila arenaria* - *Festuca rubra* grassland.

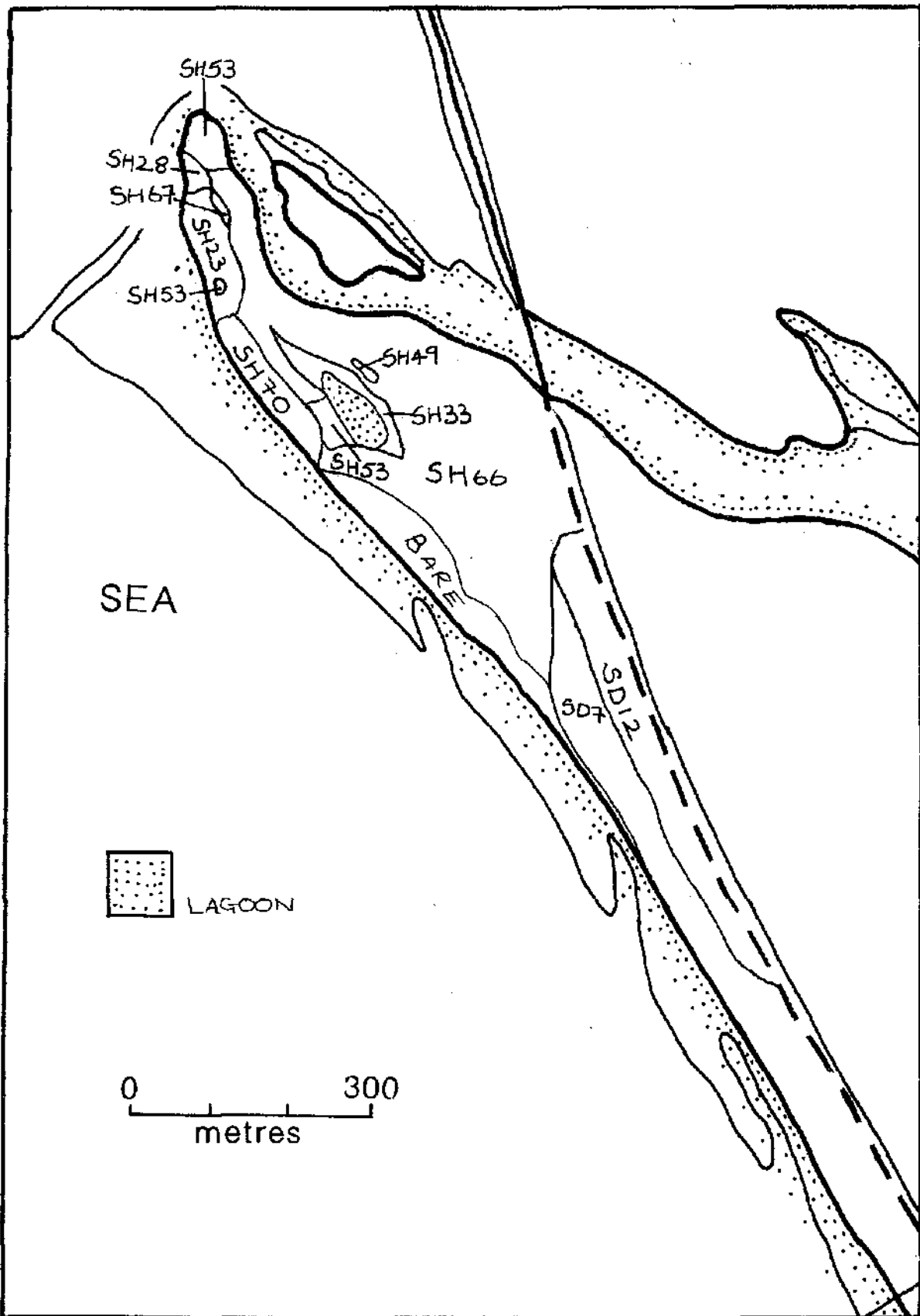


Figure 15 Aber Dysynni

# Traeth Tanybwlech

Dyfed.SN 577800

SSSI

Area 5.6 ha

Fieldwork dates 30-31/5/89

## Introduction

Traeth Tanybwlech comprises a sandy shingle spit running northwards along the coast from the Alt Wen cliffs up to the pier forming the southern barrier to Aberystwyth harbour, thus deflecting the natural path of the Ystwyth. At the southern end of the spit the deposits are large boulders or cobbles and are clearly derived from the adjacent cliffs. North of this there is a general increase in sand content within the shingle, indeed, in parts the sand becomes dominant.

The foreshore is very steep and is clearly active, being devoid of vegetation, a typical example of a high energy beach. Indeed, the active nature of the existing storm crest is reflected in the lack of vegetation, even on the lee of the storm crest down to the track which runs the length of the spit.

There is some evidence for undercutting of the spit by the Ystwyth at the northern end where slumping on the leeward slope has led to bare shingle being exposed and the need to shore up the track.

There is a gradation of the vegetation from relatively pioneer around the track to closed turf further down the lee slope. This gives way to a steep section of slope which is bare in places with only patches of vegetation, and below this a flatter area. There is then a sharp break of slope down to the river which supports a closed vegetation reflecting the higher silt and water content.

Between the track and the Ystwyth the shingle has been stable for a long period. This is reflected by the presence of scrub species e.g. *Prunus spinosa*.

## Threats/management

The entire spit suffers from widespread recreational use but the extent of the damage is only moderate. Parking areas on the more sandy, southerly shingle have destroyed patches of vegetation and led to a minor litter problem. In addition, the flatter 'flood plain' was being used for camping, with locally severe effects on the vegetation through flattening and attenuation. This is also a major litter source.

There is easy vehicular access to the whole spit, although this is largely restricted to tracks due to the gradient of the slopes. Vehicular damage may be described as local in extent but of a moderate level over those areas affected.

The maritime influences on the spit appear to be in dynamic equilibrium although there may be erosion of the northern leeward slope. There are no stabilisation works on this site.

There is no evidence of grazing

## Vegetation

This site provides examples of sandy shingle grassland communities, scrub communities and some interesting pioneer associations.

Perhaps the most interesting feature of one pioneer community is its location on the lee of the slope which would normally be more stable than the foreshore. However, the undercutting at the northern end of the spit has led to a renewal of the pioneer phase in floral development at this site.

This pioneer community comprises a very open *Silene uniflora*, *Rumex crispus littoreus* association with *Plantago maritima* and *Armeria maritima* as minor constants, reflecting the influence of the river behind the spit.

The major pioneer community in the south, where the sand content is greatest, may be described as a *Rumex, crispus, Glaucium flavum* association typical of sandy shingle

sites which contains occasional herb associates such as *Sedum anglicum* and *Plantago lanceolata*. In this case the community is found on the storm crest as expected. There is a slight variation on this community in areas where *Tripleurospermum maritimum* is an additional constant, and this may represent a sub-group of the original *Rumex*, *Glaucium* community where a higher level of organic material is found.

This community is found in close proximity to a more closed *Festuca rubra*, *Sedum anglicum*, *Ceratodon purpureus* grassland with *Silene uniflora*, *Armeria maritima*, *Plantago coronopus* and *Lotus corniculatus* as additional minor constants indicating the more maritime nature of the community. It is thought that this represents the next stage in the seral development.

Most of the site, however, supports a closed *Festuca* grassland which commonly comprises a *Festuca rubra* - *Ononis repens* herb rich grassland. This community is typically associated with sandy shingle and this is reflected in the largely southern distribution of the community in the area with highest sand content.

Variations on the general *Festuca* grassland include a *Festuca rubra*, *Plantago lanceolata* grassland with *Lotus corniculatus* and *Sedum anglicum* as frequent associates. This community is not as diverse as the previous grassland and is primarily *Festuca* dominated. In places, however, the presence of a well developed bryophyte flora indicates the stability of this shingle community.

A further grassland found in small amounts across much of the spit is a *Festuca rubra*, *Trifolium repens* dominated herb-rich grassland. The herb component of this community comprises *Cerastium semidecandrum*, *Centaurea nigra* and *Achillea millefolium* as frequent associates.

At the break of the lee slope poor drainage conditions have resulted in a strip of wetter ground which supports a different grassland. This community is characterised

by the constant presence of *Agrostis stolonifera* and *Holcus lanatus* with *Potentilla anserina*, *Armeria maritima* and *Rosa tomentosa* as occasional associates. This is a relatively species-poor community.

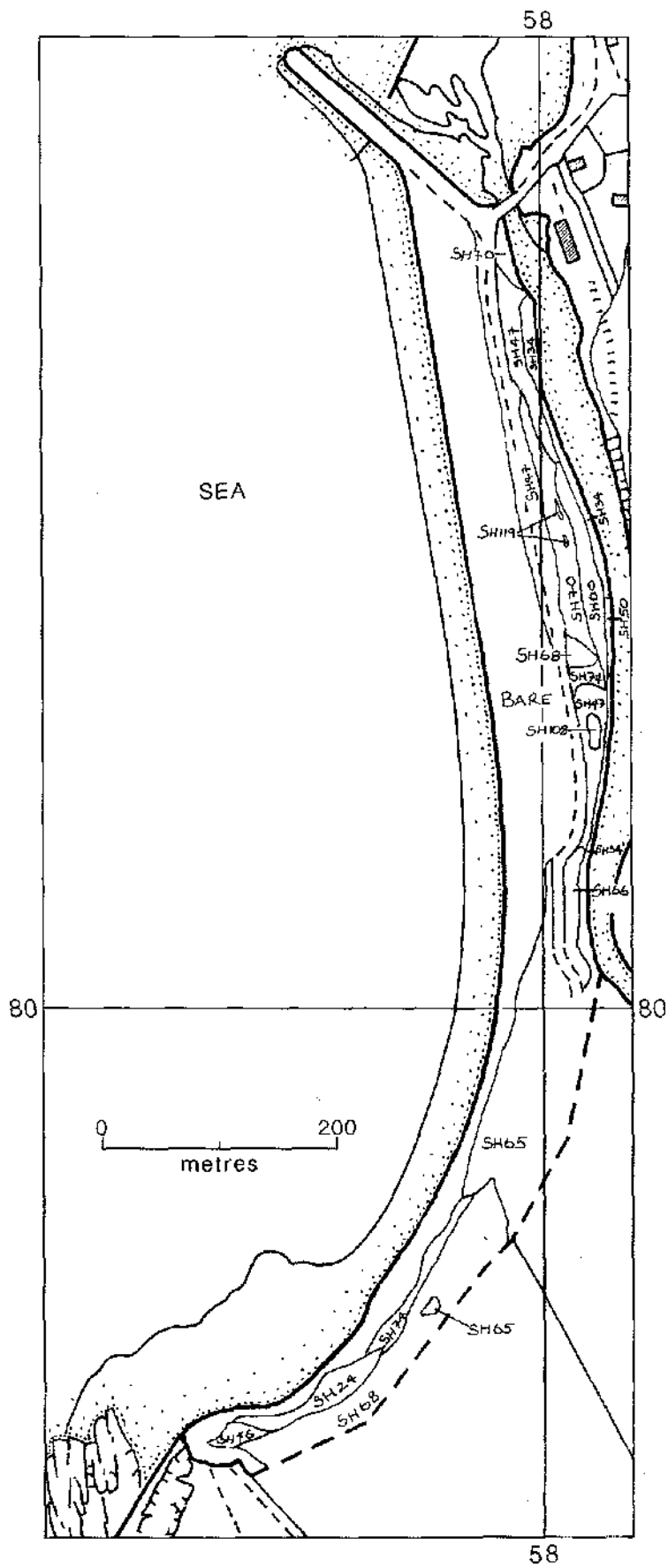
A narrow strip of the spit running along the river margin supports a community which reflects the marsh influences associated with the silt from river sediments. This community is characterised by the constant presence of *Festuca rubra*, *Armeria maritima*, *Plantago maritima*, *Agrostis stolonifera* with *Silene uniflora*, *Cochlearia officinalis* and *Lotus corniculatus* as frequent associates. In places, where the amount of *Festuca rubra* decreases, this community grades into an *Armeria maritima*, *Silene uniflora*, *Cladonia verticilliata* community. The constant presence of lichens indicates the increased stability of this community and this is consistent with its position on the southern half of the lee slope.

On the middle section of the lee slope the steep slope has areas of what appears to be bare shingle, although a closer inspection reveals that there is a very open vegetation. These patches support a sub-community of the more general *Silene uniflora* - *Festuca rubra* - *Plantago lanceolata* grassland. In this instance the constant presence of prostrate *Prunus spinosa* necessitates the redefinition of the community. The *Prunus* and the presence of saxicolous lichens indicates the great age of these patches which remain largely bare.

There are patches of scrub developed on the stable parts of the lee slope and these are either *Ulex europaeus* dominated with *Prunus spinosa* or *Rubus fruticosus*, or a purely *Prunus spinosa*, *Rubus fruticosus* association. In each case the open nature of the scrub cover is such that there are more associates than are normally found in such communities. These associates commonly include *Dactylis glomerata*, *Rumex acetosella*, *Festuca rubra* and *Plantago lanceolata*.

## Community key

- SH119 *Rubus fruticosus* - *Arrhenatherum elatius* scrub;
- SH108 *Ulex europaeus* - *Rubus fruticosus* scrub;
- SH74 *Agrostis stolonifera* - *Trifolium repens* - *Festuca rubra* grassland with *Holcus lanatus*;
- SH70 *Festuca rubra* - *Silene uniflora* - *Lotus corniculatus* community;
- SH68 *Festuca rubra* – *Plantago lanceolata* - *Poa pratensis* grassland with *Trifolium repens*;
- SH66 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* community.
- SH65 *Festuca rubra* - *Achillea millefolium* - *Lotus corniculatus* - *Silene uniflora* grassland;
- SH60 *Agrostis stolonifera* - *Holcus lanatus* - *Trifolium repens* community;
- SH50 *Festuca rubra* – *Aira praecox* - *Plantago lanceolata* with *Armeria maritima* grassland;
- SH47 *Festuca rubra* - *Lotus corniculatus* - *Plantago lanceolata* grassland;
- SH46 *Festuca rubra* - *Ceratodon purpureus* - *Sedum anglicum* grassland;
- SH34 *Festuca rubra* - *Armeria maritima* - *Plantago maritima* marsh community;
- SH24 *Rumex crispus littoreus* - *Tripleurospermum maritimum* – *Glaucium flavum* pioneer community.



**Figure 16** Traeth Tanybwllch

# Crabhall Saltings

Dyfed. SM 817060  
Conservation status: SSSI  
Area: 3.5 ha  
Fieldwork dates: 28-29/5/89

## Introduction

This site represents the only shingle structure on the Pembrokeshire coast considered of a sufficient size to survey. It comprises a spit growing north-east from Dale across the estuary. There is also an incipient spit growing from the opposite side of the estuary. The resulting saltings trapped behind the spits provide an important nesting site for a diverse avifauna. The main shingle ridge has also led to the formation of a brackish lagoon behind and this also supports many different bird species.

The spit has been protected at its narrowest point, 300 m from the proximal end, with the placement of large boulders to strengthen the exposed seaward foreshore.

At its distal end, the spit has been reworked by the river to form several hooks and there is sand capping to a depth of 20 cm on the laterals which support a scrub-type vegetation. Indeed, at the distal end of the spit generally the amount of sand within the shingle increases considerably.

## Threats

A coastal path runs along the length of the spit and it is possible to cross to the opposite bank at low tide. This clearly heightens the recreational pressure on the site but damage attributable to this is negligible. There is no vehicular access to the spit.

Clearly, there is erosion on the main ridge of the spit but there is some evidence to suggest that the distal end is accreting with a large area of low lying sandy shingle.

## Management

The site has been grazed lightly by rabbits in most places and there has been some shaping of the scrub vegetation by rabbits.

It seems that there may have been artificial reworking of the distal end of the spit to maintain the brackish lagoon.

## Vegetation

This site offers examples of shingle vegetation with a major saltmarsh influence and, in some cases, this has led to difficulty in interpreting the quadrats within the shingle classification.

The small spit growing out from the eastern edge of the estuary supports a *Beta vulgaris maritima*, *Festuca rubra* pioneer community with occasional associates including *Tripleurospermum maritimum* and *Atriplex prostrata* which is similar to the community found at Cemlyn on Anglesey. On the lee of this spit there is a very narrow strip of *Atriplex portulacoides* dominated vegetation which is clearly a saltmarsh community reflecting the frequency of flooding of this part of the site. This community was separated from the main data set at an early stage in the analysis and keys out SM14.

The *Beta vulgaris maritima*, *Festuca rubra* community occurs also on the foreshore of the main spit running along the main arm of the spit. A more closed version of this community is seen on the lee slope of the spit where undercutting has led to slumping and much bare shingle visible on a very steep slope (44 degrees). This community comprises *Beta vulgaris maritima* and *Festuca rubra* with additional grass species as minor associates, e.g. *Dactylis glomerata*, *Holcus lanatus*, and *Desmazaria marina*, while its proximity to the lagoon behind is reflected in the presence of *Cochlearia officinalis* and *Tripleurospermum maritimum*.

There are areas supporting scrub vegetation at either end of the main spit. At the distal end, on the recurved hook, two scrub communities are represented. The first is



*Prunus spinosa* dominated with dense *Prunus* cover shading out many potential associates. In this instance the *Prunus* is found with *Urtica dioica* and the shade-tolerant moss *Eurynchium praelongum*. In places, however, the *Prunus* is replaced by *Rubus fruticosus* to form a *Rubus*, *Urtica dioica* community.

At the proximal end of the spit, on the lee slope extending back to the mainland, there are also two types of scrub community. One is a variation of the *Prunus* scrub seen at the distal end. In this instance, however, there is less clear delineation between the two species and it is the more common *Prunus spinosa*, *Rubus fruticosus* scrub community with *Hedera helix* and *Urtica dioica* as minor associates.

The second type of scrub is a *Ulex europaeus*, *Rubus fruticosus* community typical of many shingle sites. The presence of *Solanum dulcamara* as a minor associate is, however, relatively unusual. This community occupies the area nearest to the car park.

Running along the top of the spit and out onto the wider recurved area at the distal end, there is a mixed community which is hard to define in the classification as it is unique to Crabhall. It comprises a dwarf *Ulex* dominated grassland with the *Ulex* growing in association with *Dactylis glomerata*, *Anthoxanthum odoratum*, *Festuca rubra* and the annual *Aira caryophyllaea*, along with various herb species, in particular, *Vicia saliva*, *Plantago lanceolata* and *Lotus corniculatus*.

There is a stable pure grassland with clear maritime influences also found at the distal end of the spit. This comprises a *Festuca rubra*, *Armeria maritima*, *Plantago coronopus* community with a high lichen content including, *Cladonia chlorophaea*, *C. impexa* and *C. rangiformis* along with the constant presence of the moss *Ceratodon purpureus*. Lichen heath incorporating those species is characteristic of a sandy/shingle substrate. This community keys out to SH48 within the shingle classification a *Festuca rubra*,

*Sedum acre*, *Ceratodon purpureus* grassland. Elsewhere there is a mosaic of *Festuca* dominated grasslands with the local importance of *Desmazeria marina* and *Lotus corniculatus* forming the basis of the mosaic differentiation.

There is an area of relatively bare shingle visible on the major recurve of the spit. This area supports an *Arrhenatherum elatius*, *Geranium robertianum* community with few associates. In places the *Geranium robertianum* becomes dominant. This community has been noted at Dungeness and Pwll du and closely resembles the NVC U24 community.

### Community key

SH122 *Prunus spinosa* - *Eurynchium praelongum* scrub;

SH123 *Prunus spinosa* - *Rubus fruticosus* - *Arrhenatherum elatius* community;

SH107 *Ulex europaeus* - *Rubus fruticosus* - *Arrhenatherum elatius* scrub;

SH79 *Festuca rubra* - *Agrostis stolonifera* grassland;

SH67 *Festuca rubra* - *Dactylis glomerata* - *Lolium perenne* - *Bromus hordeaceus* grassland with *Ulex europaeus*;

SH46 *Festuca rubra* - *Ceratodon purpureus* - *Sedum* spp. community;

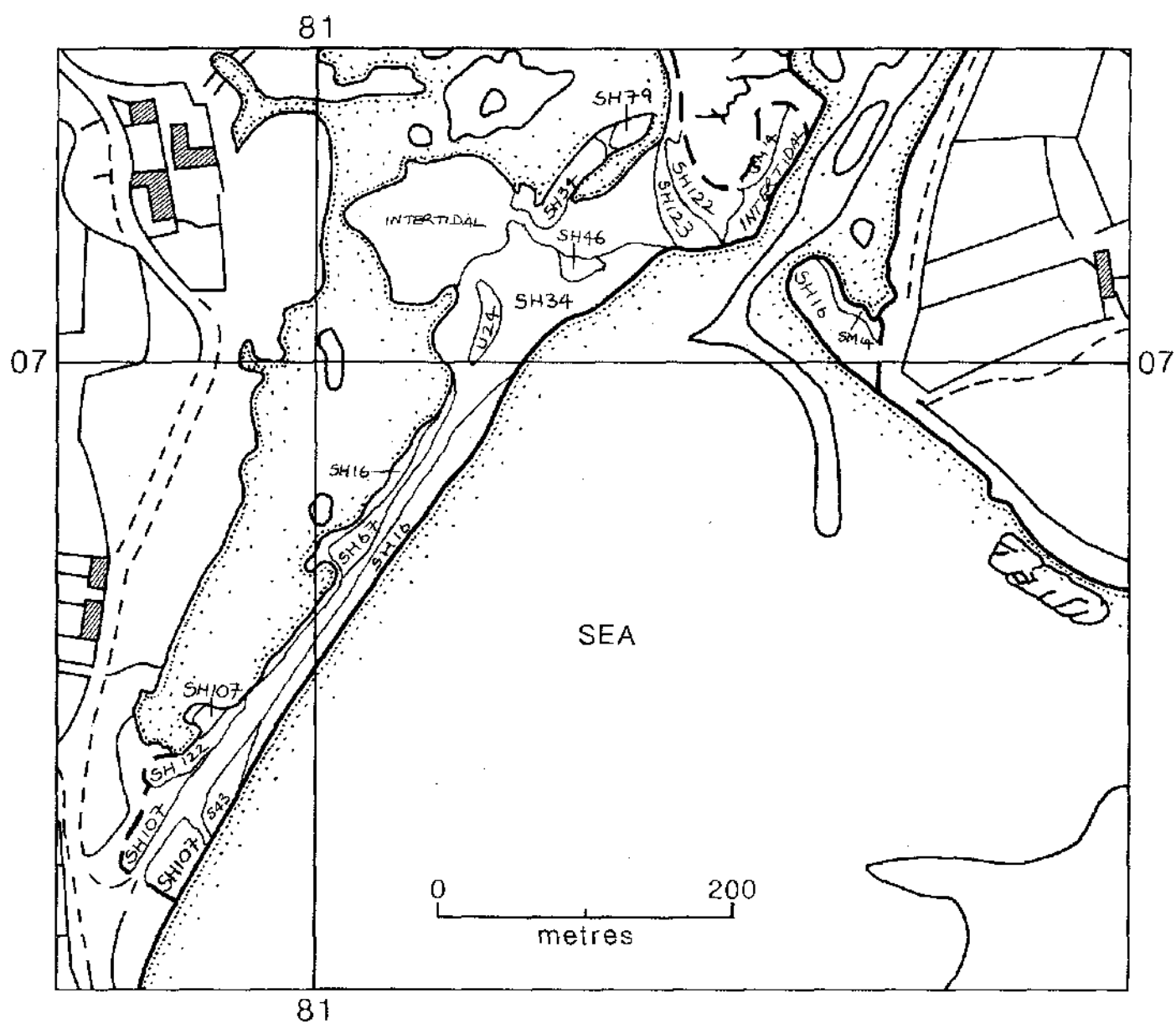
SH43 *Dicranum scoparium* - *Festuca rubra* - *Plantago lanceolata* grassland;

SH34 *Festuca rubra* - *Armeria maritima* - *Plantago maritima* grassland;

SH16 *Beta vulgaris maritima* - *Festuca rubra* - *Tripleurospermum maritimum* community;

SM14 *Atriplex portulacoides* salt-marsh;

U24 *Arrhenatherum elatius* - *Geranium robertianum* grassland.



**Figure 17** Crabhall Saltings

# Pennard Burrows

W. Glamorgan. SS 540870  
Conservation status: SSSI, National Trust.  
Area: 1.11 ha  
Fieldwork date: 27/5/89

## Introduction

Pennard Burrows consists of a small sandy shingle spit growing out from the eastern edge of Three Cliffs Bay. The shingle here is visible on the active foreshore and on the main body of the spit at its proximal end. As the spit widens at its distal end the sand content increases and sand capping occurs. The spit encloses a relatively small saltmarsh with an *Armeria maritima* and *Festuca rubra* sward, which is lightly grazed. Behind that there is a large dune system protected by the spit.

There is evidence of erosion at the distal end of the spit with undercutting of the sand capping. At the proximal end of the spit, recent overtopping of the shingle has led to lobes of shingle being thrown out onto the marsh and dunes behind. The shingle here is largely bare except for the presence of a driftline indicating the recent history of the lobes. The bare shingle supports a sandy shingle pioneer flora while the sand capping provides a base for closed grassland/scrub communities.

While not a major site in a national context, this provides an additional example of sandy shingle communities.

The pebbles are 5 cm diameter on average which is slightly smaller than those on other sites in the region,

## Threats/management

This area is subject to moderate recreational pressure in the form of trampling, a little litter and, more destructive for the vegetation, evidence of recent bonfires on the spit.

There is no vehicular damage to the site as access is restricted to a footpath. The site is lightly grazed by rabbits and horses.

## Vegetation

The vegetation on this site reflects the high sand content within the shingle matrix. This is seen both in the pioneer communities and the more mature grassland communities.

The foreshore of this spit is characterised by a very open sandy pioneer community with *Honckenya peploides* as the constant species. It has *Elymus pycnanthus* and *Eryngium maritimum* found in association with *Honckenya peploides* and is found all along the foreshore of the spit. A species-rich variation on this community, which is characterised by the additional presence of *Ammophila arenaria* and *Beta vulgaris maritima*, is largely confined to patches on the lee of the spit at its proximal end where lobes of shingle have been driven over marsh and sand sediments behind.

The major area of the spit, at its broad distal end supports a *Festuca rubra*, *Plantago lanceolata* herb-rich grassland. The herbaceous component of this community includes *Rhinanthus minor*, *Thymus polytrichus britannicus*, *Trifolium dubium* and *Anthyllis vulneraria*, while the presence of *Rhytidadelphus squarrosus* indicates the undisturbed nature of this area.

Behind this community, on the lee of the spit, there is a narrow strip of a different *Festuca* grassland. In this case, while its position would suggest a more mature community, this area is a more open with an average of 10% bare sand or shingle in each quadrat. It is species-poor by comparison with the previous grassland with *Festuca rubra* as the dominant species found in association with *Plantago coronopus*, *Sagina apetela*, *Ceratodon purpureus* and *Armeria maritima*. It is clearly influenced by the marsh behind the spit and is probably flooded on occasion.

On the arm of the spit running from half way along to the wider distal end is a *Ulex* scrub community found across many shingle sites. In this instance the *Ulex*

*europaeus* offers almost total cover in each quadrat with few associates. Typically these few include *Rubus fruticosus* and the moss *Pleurozium schreberi*. This part of the spit is the most exposed and has the greatest depth of sand capping.

### Community Key

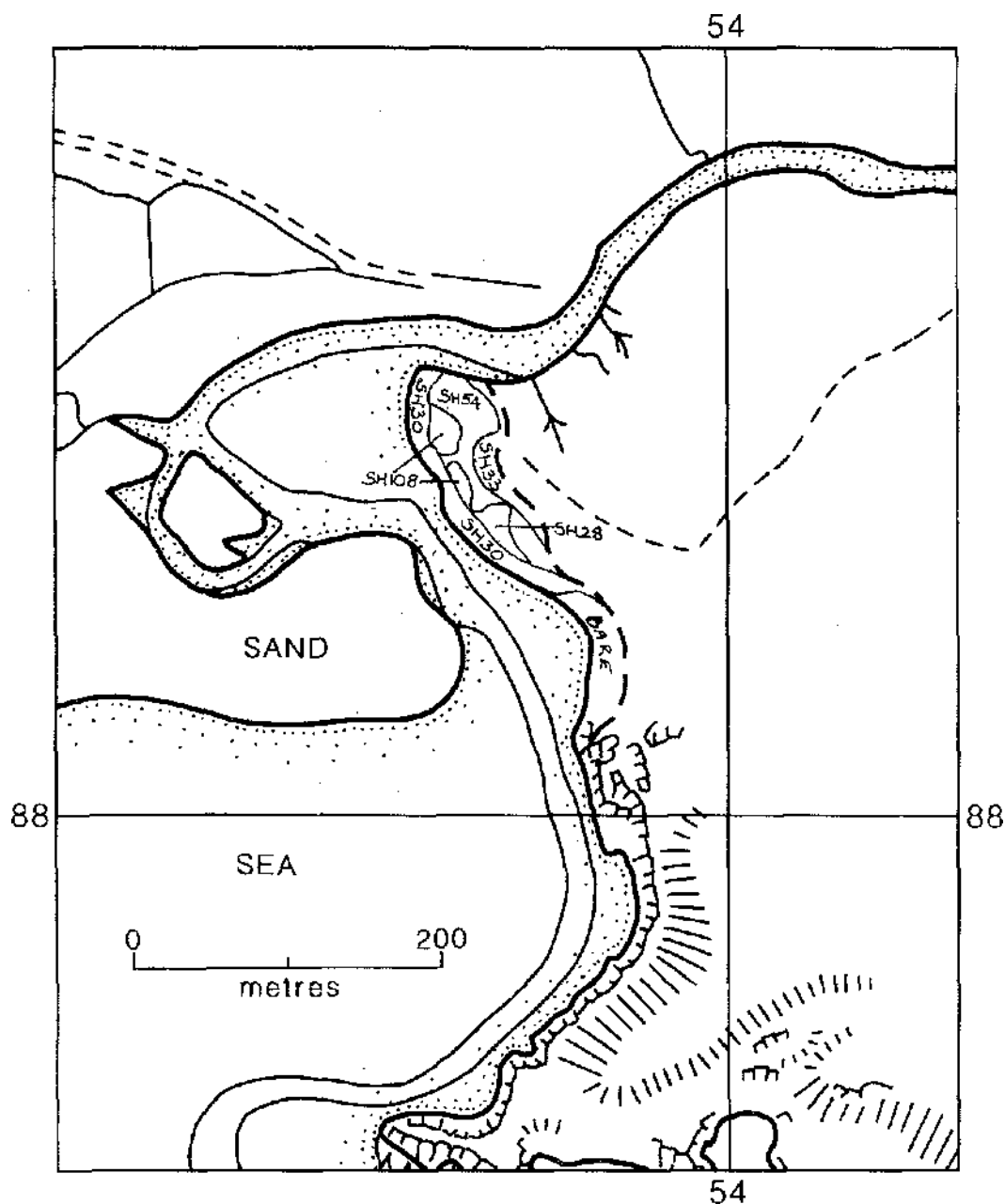
SH108 *Ulex. europaeus* - *Rubus fruticosus* - *Eurynchium praelongum* scrub;

SH54 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* herb rich grassland;

SH33 *Plantago coronopus* - *Armeria maritima* community;

SH30 *Honckenya peploides* - *Elymus farctus boreali-atlanticus* - *Eryngium maritimum* pioneer community, with *Elymus pycnanthus* instead of *E. farctus boreali-atlanticus*;

SH28 *Honckenya peploides* - *Elymus pycnanthus* - *Ammophila arenaria* pioneer community



**Figure 18** Pennard Burrows

# Pwll du

W. Glamorgan. SS574875  
Conservation status: SSSI, National Trust, AONB.  
Area: 2.63 ha  
Fieldwork date: 26/5/89

## Introduction

Pwll du beach is a good example of a pure shingle apposition beach which has diverted the course of Bishopston Pill. It comprises three major shingle ridges which are almost like spits, growing out from the western cliffs and stopping just short of the eastern cliff where the freshwater stream drains into the sea. A small, interlocking ridge has grown out from the eastern side. There is a significant difference in pebble sizes on this ridge and the major shingle structure where pebbles are much larger (10 cm on average).

There is little differentiation in pebble size across the beach profile. However, the shingle at the rear of the site is very angular suggesting deposition in a different sequence to the newer ridges. The existing foreshore of very rounded pebbles, from material derived from glacial drift, supports a steep and bare slope.

The presence of the freshwater stream has had a major impact on the vegetation behind the shingle ridges, where alluvium associated with freshwater flooding has led to fen type communities. The alluvium was found to a depth of over 10 cm and so this area was excluded from the survey.

## Threats

There is a small village at the base of the western cliffs and this has clearly affected the level of recreational pressure on the site although damage is limited to the occasional garden escape, dumping of garden rubbish and one bonfire site. There are localised vehicle tracks at the western edge of the site but these have caused light damage to only one community. Otherwise, there has been very little disturbance to the site.

## Management.

There is no grazing on this site.

## Vegetation

Vegetation is largely restricted to the lows between the shingle ridges where the shingle is mixed with a high proportion of silt, and to the older ridges at the rear of the site.

Although this is a relatively small site, it supports a wide variety of communities one of which is nationally rare. In particular, this site offers interesting shingle/marsh communities.

There are two major vegetation types found at this site, the first being grassland communities, and the second scrub communities.

The major grassland community, found on the pure shingle ridges, comprises a herb-rich *Festuca rubra*, *Plantago lanceolata* community which is clearly very stable with a well developed lichen and moss component. The herb associates found in this community include *Arenaria serpyllifolia*, *Lotus corniculatus*, *Leontodon hispidus* and *Thymus polytrichus britannicus*, while the following lichens are commonly found – *Cladonia foliacea*, *C. rangiformis* and *C. furcata*.

Where this community is in close proximity to the marsh sediments there is a slight variation in the species composition, with *Armeria maritima* and *Phragmites australis* found in small amounts within the *Festuca* dominated grassland, along with *Ceratodon purpureus* and *Sedum acre*. Interestingly, this community is also found on the smaller shingle spur which grows out from the eastern side of the bay but in this case it occurs on top of the ridge.

There is further zonation within the *Festuca rubra* grassland to a less diverse community, a gradation which occurs moving down the spur towards the marsh sediments. This community is *Festuca rubra* dominated but with pioneer

associates such as *Tripleurospermum maritimum*, *Rumex crispus littoreus*, *Potentilla anserina* and *Beta vulgaris maritima*, thus reflecting influences both from the shingle and marsh substrates. A further pioneer community which displays a major marsh influence is found where shingle from the current storm ridge, i.e. the youngest ridge, has overtopped the silt behind such that bare shingle is clearly visible in the quadrats, while it is clear that the vegetation is rooted in silt and can therefore be considered as relict vegetation. This community comprises a *Phragmites australis*, *Tripleurospermum maritimum*, *Rumex crispus littoreus* association.

A more mixed grassland community is characteristic of the older shingle at the rear of the site. This community is best described as a *Festuca rubra*, *Anthoxanthum odoratum*, *Cerastium semidecandrum* mixed grassland with a high herb content including *Achillea millefolium* (*Plantago lanceolata*, *Ranunculus bulbosus*, *Galium verum* and *Sanguisorba minor*). Despite the continued presence of *Festuca rubra* the major and minor associates found in this community are very different.

A very open community, which is found on the older ridges, is unique to Pwll Du. This is an open *Geranium robertianum*, *Epilobium parviflorum* association with *Hieracium pilosella* as an occasional associate. This keys out to SH2.

The remaining communities are all scrub communities, which occupy areas of older, stable shingle, often found at the shingle/marsh transition. The level of scrub development seems to be out of proportion with the scale of the site which is, on a national scale, very small. However, it appears that the combination of a source of freshwater and of a seed source (from the Bishopstone valley woodlands) has led to its development. Clearly, the lack of human disturbance is also a contributory factor.

The major distinction between the different scrub communities is made on the presence of *Prunus spinosa*. The first community is

a *Rubus fruticosus*, *Teucrium scorodonia*, *Dicranum scoparium* community which, while *Rubus* dominated, often supports a varied grass and herb content in particular *Geranium robertianum*, *Plantago lanceolata* and *Hieracium pilosella*.

The second scrub community may be described as an open *Prunus spinosa*, *Geranium robertianum* community with prostrate and dwarfed *Prunus* found in association with scattered plants of *Geranium robertianum* and *Hypnum cupressiforme*. This community is found at the edge of the scrub communities, furthest from the marsh sediments which may act as a nutrient source, and may be indicative of a nutrient-poor environment.

These represent two ends of a continuum and, not surprisingly, in places where the pure *Rubus* scrub grades into the *Prunus* scrub, the community definition becomes unclear and an additional community may be defined. This third scrub community comprises fully developed *Prunus spinosa*, *Rubus fruticosus* scrub with various herb and grass species, in this case *Agrostis capillaris*, *Festuca rubra*, *Senecio jacobaea*, *Cirsium arvense* and *Rumex crispus littoreus*. Additional woody associates include *Crataegus monogyna* or *Fraxinus excelsior*.

### Community key

SH121 *Rubus fruticosus* - *Prunus spinosa* - *Arrhenatherum elatius* scrub;

SH119 *Rubus fruticosus* - *Arrhenatherum elatius* scrub.

SH103 *Phragmites australis* - *Tripleurospermum maritimum* reed bed;

SH63 *Festuca rubra* - *Plantago lanceolata* - *Dicranum scoparium* - *Anthoxanthum odoratum* grassland;

SH49 *Festuca rubra* - *Lotus corniculatus* - *Thymus polytrichus britannicus* - *Cladonia furcata* grassland;

SH46 *Festuca rubra* - *Ceratodon purpureus* - *Sedum* spp. grassland;

SH16 *Beta vulgaris maritima* - *Festuca rubra* -  
*Tripleurospermum maritimum* grassland;

SH2 *Geranium robertianum* - *Prunus spinosa*  
 community.

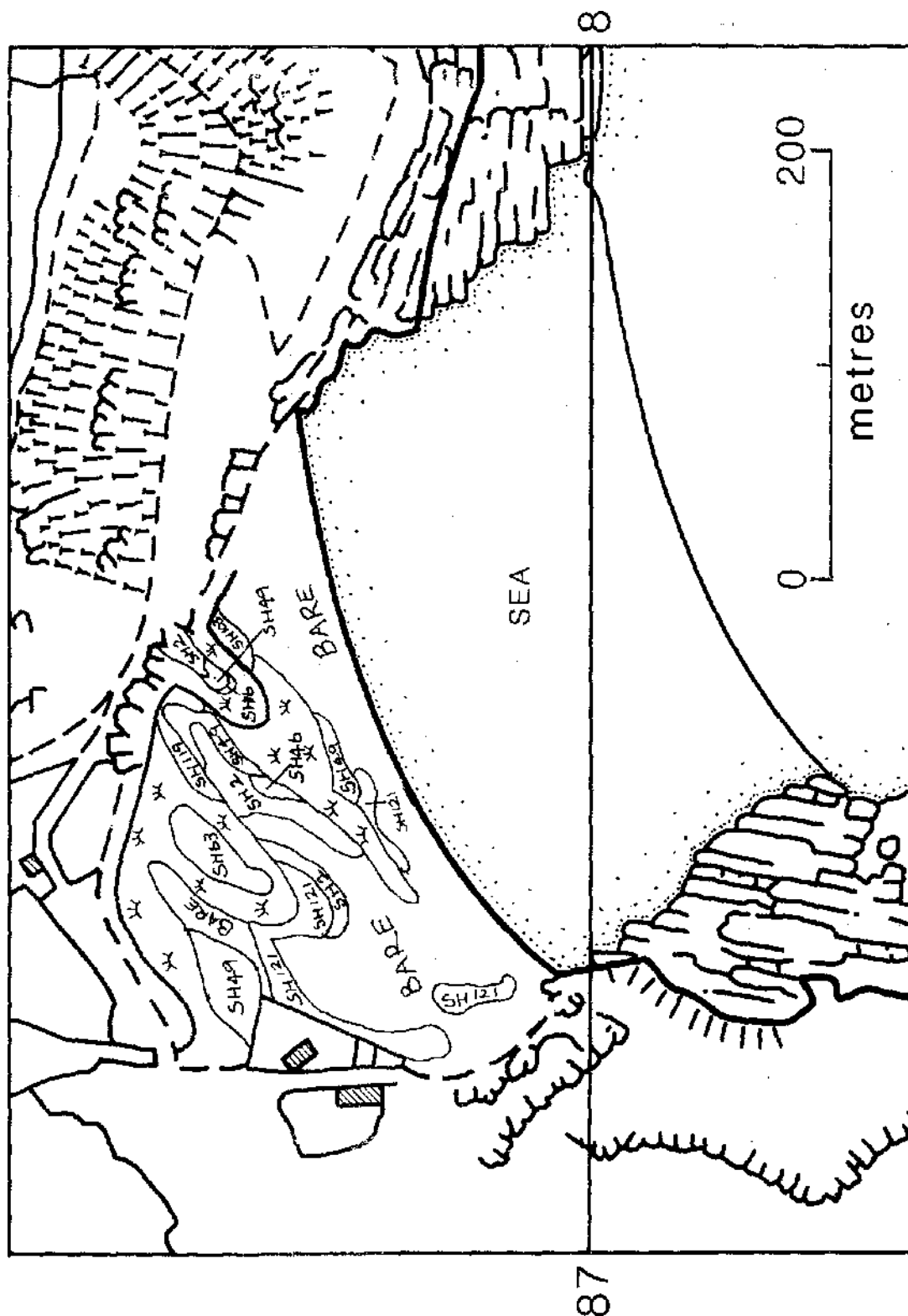


Figure 19 Pwll du

# East Aberthaw

S. Glamorgan SS 033657  
Conservation status: SSSI  
Area: 10.4 ha  
Fieldwork date: 25/5/89

## Introduction

This relatively small site comprises a shingle spit growing out from the Lias cliffs to the east of the estuary trapping a small saltmarsh behind. In addition, there is much intertidal shingle within the old estuary and a narrow strip of permanent sandy shingle trapped by groynes on the western side of the site.

The spit is highly dynamic being frequently breached and rebuilt at its western end. This results in an impermanent flora on the western hook of the spit where it comes close to the sea inlet to the marsh. This is presumably due to increased exposure, as there is the reappearance of a more permanent vegetation on the stable recurve of the spit which is protected from such direct maritime influences.

It is an example of a predominantly sandy shingle site with small areas of silty shingle at the marsh edge. The site appears to be suffering active erosion witnessed by the need for groynes at the western end of the site and the obvious landward movement of the spit over marsh sediments. This is evident in the shingle fans and lobes seen spreading out over the marsh and in the fact that old marsh sediments are appearing along the foreshore as the shingle is driven backwards.

The foreshore and storm crest are devoid of vegetation, perhaps because of the active nature of the site which precludes the establishment of pioneer communities more typical of this area on a shingle beach.

The structure of the spit consists of a current storm crest which is separated from a secondary ridge by a small depression.

The secondary ridge in turn gives way to the marsh behind.

At the eastern end of the site there is a ridge running along the base of the cliff. This has a sand capping of approximately 5cm and the vegetation reflects the sandy nature of the substrate.

## Threats/management

Despite its proximity to the caravan park on top of the cliffs, this site appears to suffer little disturbance from recreational pressure. The groynes are the only form of stabilisation work at this site.

Access to the site is restricted to pedestrians, so there is no vehicular damage.

There is no evidence of grazing at this site.

## Vegetation

This site offers examples of shingle communities which display saltmarsh influences and of sandy shingle communities.

On the western side of the bay there is a narrow strip of sandy shingle which supports relatively closed grassland communities. At the far western end of this strip there is a small patch of *Festuca rubra*, *Plantago lanceolata*, *Lotus corniculatus* grassland found on the less disturbed area. This contrasts with the *Elymus pycnanthus*, *Dactylis glomerata*, *Plantago lanceolata* mixed grassland found on the rest of this area. The herb associates in this community include *Anthyllis vulneraria*, *Raphanus raphanistrum maritimus*, *Crepis capillaris* and *Trifolium dubium*.

Further down the foreshore, immediately above the driftline, the grassland community gives way to a more open *Festuca* grassland with pioneer species as additional constants such as *Rumex crispus littoreus* and *Tripleurospermum maritimum*. This keys out to a *Festuca rubra*, *Silene uniflora*, *Lotus corniculatus* community.



This community is also found on the main spit.

An additional pioneer community found on the spit, but very localised is a *Crambe maritima*, *Rumex crispus littoreus*, *Tripleurospermum maritimum* community typical of many shingle sites.

Much of the spit is occupied by a shingle/saltmarsh community which is found commonly at the edge of the lee slope of the shingle and may be described as a *Atriplex portulacoides*, *Cochlearia officinalis* community with *Spergularia media* and *Plantago maritima* as frequent associates, although in places *Beta vulgaris maritima* becomes important.

A second community found along much of the spit is, however, an example of a *Festuca rubra*, *Elymus pycnanthus* grassland with other marsh associates including *Armeria maritima* and *Plantago maritima*. This is clearly a mature *Festuca* grassland typical of a shingle substrate which is subject to marsh influences. In places which have been particularly stable this community appears to be developing into a closed community with the *Festuca rubra* and *Elymus* found in association with moss and lichen species indicative of stability such as *Ceratodon purpureus*, *Eurynchium praelongum* and *Cladonia rangiformis*.

The herb rich *Festuca*, *Plantago*, *Lotus* community occurs also on the very sandy ridge which runs along the base of the cliffs.

### Community key

SH68 *Festuca rubra* - *Plantago lanceolata* - *Poa pratensis* grassland;

SH65 *Festuca rubra* - *Achillea millefolia* - *Lotus corniculatus* grassland;

SH63 *Festuca rubra* - *Plantago lanceolata* - *Dicranum scoparium* grassland;

SH54 *Festuca rubra* - *Plantago lanceolata* - *Lotus corniculatus* grassland;

SH53 *Festuca rubra* - *Ononis repens* - *Anthyllis vulneraria* community;

SH46 *Festuca rubra* - *Ceratodon purpureus* - *Sedum* spp. grassland;

SH36 *Elymus pycnanthus* - *Festuca rubra* - *Atriplex portulacoides* grassland;

SH16 *Beta vulgaris maritima* - *Festuca rubra* - *Tripleurospermum maritimum* community.



# Porthkerry

S. Glamorgan ST 091670  
Conservation status: none, but close  
to SSSI and LNR  
Area: 1.9 ha  
Fieldwork date: 24/5/89

## Introduction

Porthkerry pebble ridge is a shingle bar which has diverted the flow of the stream. The bar comprises a steep foreshore which is largely bare giving way to an extensive area of intertidal shingle and a wave cut platform. The pebbles, which are derived from the local limestone, are large, disc shaped and, particularly at the top of the slope, are highly imbricate which could clearly have important implications for seed germination. This pebble structure may also help to explain the steep angle associated with the foreshore.

The vegetation is largely limited to the ends of the ridge close to the limestone cliffs with the main central section of the bar supporting no vegetation. The vegetation has been mapped largely using target notes.

## Threats

There is a golf course on the alluvial plain which is behind the shingle and this forms part of the Porthkerry Country Park. Clearly, this heightens the level of recreational use of the site which may, in part, account for the general lack of vegetation. However, despite widespread public access there is little evidence of damage to the site by trampling.

## Management

There has been no loss of vegetated shingle to any form of development and there is no need for stabilisation works as the site is in dynamic equilibrium, although there is some evidence of a minor landward movement of the shingle with marsh sediments reappearing on the foreshore.

There is no evidence of grazing on this site.

## Community key

T1 Narrow strip of discontinuous strip of vegetation comprising *Rubus fruticosus*, *Arrhenatherum elatius*, *Rumex crispus littoreus*, *Dactylis glomerata* and *Lolium perenne*. This closely resembles SH119 *Rubus fruticosus* - *Arrhenatherum elatius* scrub.

T2 A muddy matrix has led to the development of *Festuca rubra*, *Lolium perenne*, *Dactylis glomerata*, *Cirsium arvense* and *Geranium robertianum*.

T3 Mixed vegetation comprising patches of *Geranium robertianum*, *Dicranum scoparium*, *Senecio jacobaea* and *Potentilla erecta* with occasional *Rubus fruticosus* plants.

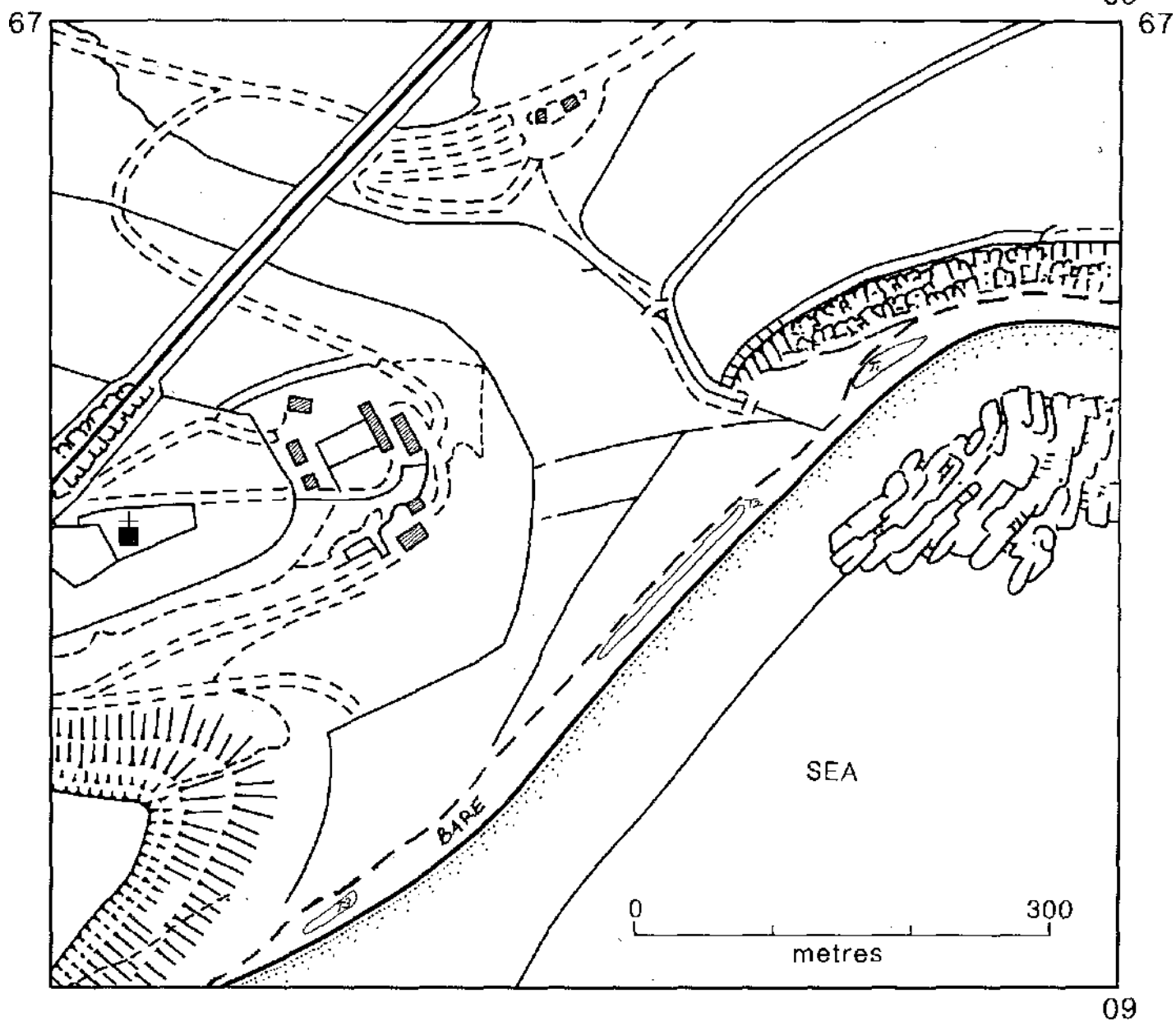


Figure 21 Porthkerry

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For all key references relating to shingle vegetation see:

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- the undertaking and commissioning of research;
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The Branch provides an advisory service to the country agencies, as well as information and advice to Government on UK and international issues. It provides also a UK-wide link between conservation bodies, government ministers, research organisations and conservation managers concerned with coastal management for nature conservation.

The Coastal Review Unit within the Branch facilitates these aims through the collection, collation and analysis of data on coastal wildlife and human activities. Its information base will be linked to other data sources and made available in standardised ways, providing a basis for monitoring, assessment of potential impacts and the development of Coastal Zone management policies.

The Sand Dune Survey of Great Britain, the Inventory of UK Estuaries and the Directory of the North Sea Coastal Margin are some of the recent projects which contribute to the information base.

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ISBN 9781873701164



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