Ynyslas, Ceredigion

[SN 605 919]

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Introduction

The spit at Ynyslas, north of Borth (see (Figure 8.2) for general location), forms part of the Dyfi National Nature Reserve. (Watkin, 1976). It is a good example of a sand spit built upon a gravel base, but it is also important because it is possible to show that a similar feature has been in existence here since about 6500 BP (Wilks, 1977, 1979). The southern part of the spit is dominated by a shingle ridge upon which there has been some accumulation of sand. The central part of the spit is dominated by vegetated dunes, whereas the northern, dista, end forms a low sandy flat upon which there are some small vegetated dunes. The behaviour of the spit seems to be related not only to the general tendency in Cardigan Bay for sediment to move northwards, but also to the patterns of water movement within the lower Dyfi estuary (Dobson, 1967; Chesnutt and Galvin, 1974; Williams *et al.*, 1981).

Description

The spit extends about 3 km from the southern side of the Dyfi estuary. The main line of the spit is formed by gravels that are exposed at high-water level along the southern part of the spit. They are veneered with sand on the northern part of the spit, but re-appear north of the distal end of the spit at Cerrigypenrhyn [SN 611 953]. The dunes form a narrow fringing ridge about 100 m in width that extends northwards (from [SN 606 927] to [SN 605 938] whence it swings more and more south-eastwards towards a former distal end at [SN 615 936]. Gravel and shingle are exposed both as a fringing high-water deposit and as a large ridge extending into the estuary (Figure 8.5). Former recurve and swale topography is exposed in this area. The northern part of the spit also extends further into the estuary as an area of dunes up to 9 m OD. Parts of the dunes have been eroded by recreational trampling. Extensive sandflats east of the dunes, parts of which are used for car parking, provide a reservoir of sand for the dunes and the estuarine sandbanks. The Afon Leri flows into the estuary today through a canalized course. However, in the past, before drainage works were carried out in this area, the Afon Leri entered the sea at Ynyslas Turn. This may indicate that there was insufficient sediment transport alongshore to divert the stream mouth farther north.

Offshore from the distal end of the spit, there are intertidal banks, including the South Banks, which cause reflection and refraction of waves approaching the spit from most directions. Tidal range at springs is about 4 m and tidal streams can reach 0.5 m s^{-1} near the shore (Williams *et al.,* 1981). Under storm-wave conditions from the south-west, wave energy is focused at the distal end of the spit, whereas with north-westerlies the distal end is less affected and wave energy is concentrated on the shingle ridge farther south (Williams *et al.,* 1981).

Submerged forest beds (best observed between about [SN 604 924] and [SN 604 933] have been exposed on the foreshore as the spit gradually moved about 150 m landwards during the 19th century (Campbell and Bowen, 1989). The basal peat was dated at 5898 ± 135 BP (Godwin and Willis, 1961) and birch *Betula* wood in *situ* near the base of the forest bed was dated at 6026 ± 135 BP (Godwin and Willis, 1961). Borth Bog, a very important Quaternary site, lies to the east of the spit and owes its development largely to the protection afforded by the spit and its predecessors.

Interpretation

The earliest investigations of the Dyfi estuary focused on the estuary itself and its saltmarshes (Yapp et al., 1917; Richards, 1934; Burd, 1989). The sedimentary history of the estuary, including the behaviour of the area around the spit have demonstrated the longevity of the sedimentation within a sheltered microtidal estuary (Shih, 1991, 1992).

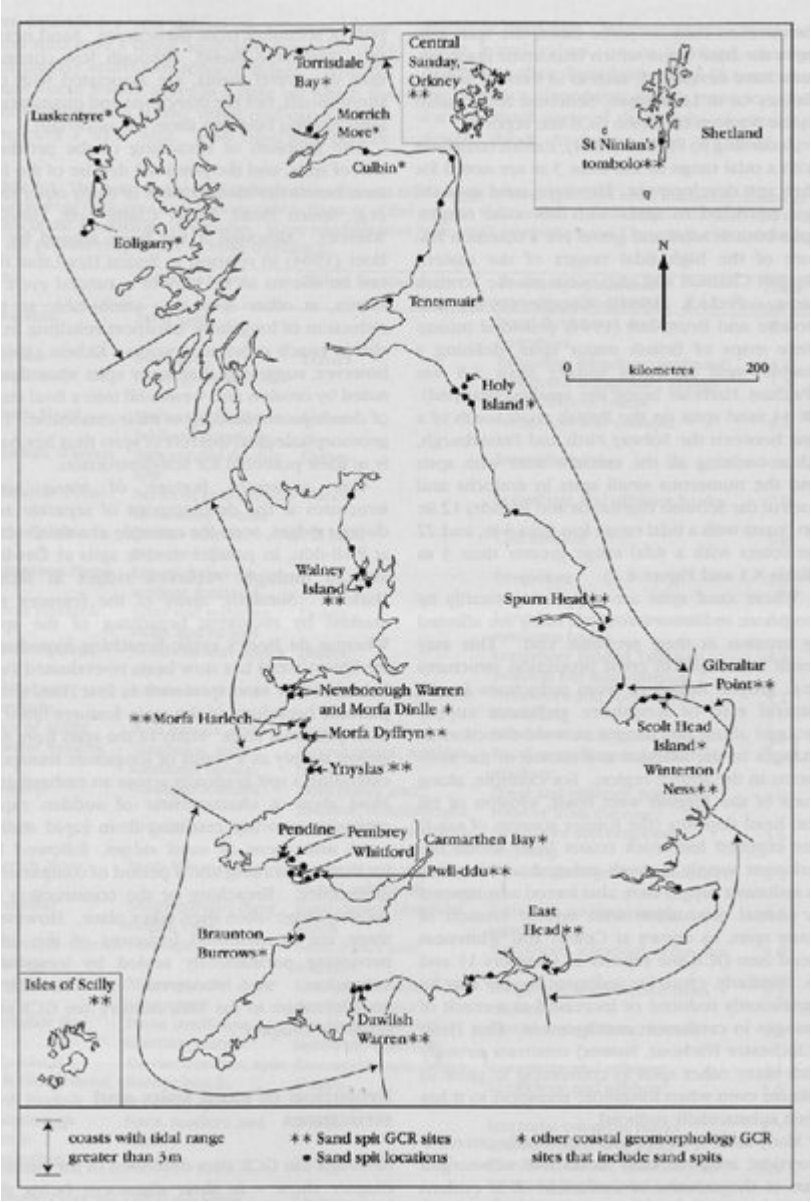
The shingle ridge was established during the Holocene transgression (Williams *et al.,* 1981), when coastal conditions stabilized sufficiently about 6500 BP to allow the creation of a sand and shingle spit that extended northwards from the cliffs at Borth (Wilks, 1979). This earliest position of the spit is thought to have been about 1 km seawards of its present position (Campbell and Bowen, 1989). Interpretation of the stratigraphical, radiocarbon and pollen data from the submerged forest beds and Borth Bog suggests that since about 4000 years BP the spit has been maintained by shingle supplied by the eroded material from the cliffs at Borth and has moved landwards across the submerged forest and peat at about 0.25 m a^{-1}. Churchill (1965), however, suggested that this coast had been elevated by about 3 m since 6500 years BP by iso-static uplift. This could have the effect of increasing the positional stability of the spit by reducing the effects of wave energy inputs.

Detailed analysis of wave and tidal conditions and the associated changes in its form have shown the feature to be relatively stable in recent years (Williams *et al.,* 1981). Although storm conditions are destructive, the spit recovers quickly, with the dunes acting as a sand reservoir. On this site, as elsewhere (for example Hurst Castle Spit, Hampshire and Ainsdale, Lancashire), surges at high springs play a particularly important role in modifying the form of the coast. The storm of 11 November 1977, for example, saw a surge of 1.1 m that coincided with high spring tides. Unlike Ainsdale (see GCR site report), Ynyslas rests on a relatively permeable base and so there is a greater chance of the intertidal sands drying and being blown onto the dunes. In contrast, sand blows around the northern end of the dunes over the wide, distal sandflats, where current action across the intertidal and shallow submerged banks may redistribute sand into the offshore banks. From here, it can return to the beaches. The longshore provision of sand and shingle from the south is now limited, especially as a large groyne-field now extends northwards from Borth. Just as the distal position of the Ynyslas spit affects the channel at the mouth of the estuary, so also the movement of sand into the estuary from the northern beaches affects the channel. The Shoreline Management Plan suggests that sedimentation causing reduction in estuary capacity is probably more concentrated on the northern side of the estuary than at earlier periods when Ynyslas was accreting more rapidly. The relative stability of the spit appears to be a result of its gravel base, as well as the reworking of sand between dunes and beach, the movements of sand between dunes, flats, banks and beaches and the continued but limited sediment supply from the cliffs to the south, although this is now restricted by groynes at Borth. The role of the estuarine water movements and their interaction with waves need to be investigated more fully.

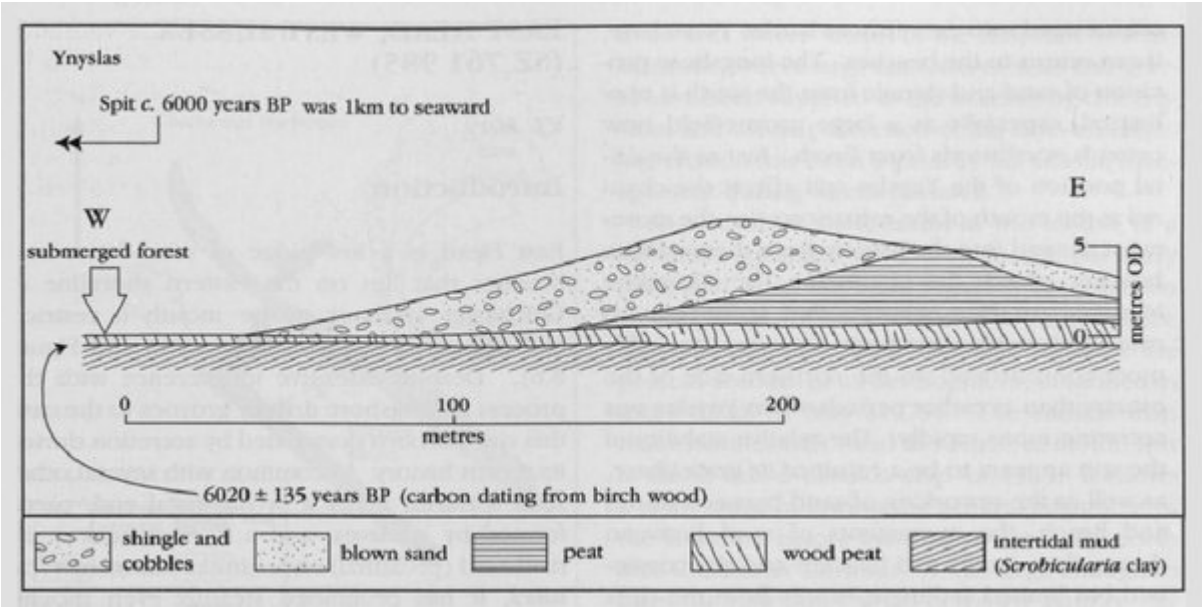
There are similarities with the cobble ridge at Westward Ho! (see GCR site report in Chapter 6) where the ridge has also moved landwards and exposed older sediments in the intertidal area, but Westward Ho! lacks the critical evidence of the age of the feature, which is provided by dates from Borth Bog and the submerged forest. Ynyslas is especially important because of the links between local coastal processes and other aspects of Quaternary geomorphology.

Conclusions

This shingle and gravel ridge — or a similar feature — may have existed here or slightly offshore since about 6500 BP and has become the base for dunes at the mouth of the Afon Dyfi. It is of particular interest because of its age and effects on other features of the local landscape. It is not always possible to demonstrate that a beach has maintained much the same position at the mouth of an estuary while migrating landwards. Although dates for the origin of the spit have been suggested they allow only a limited estimate of the average rate of migration (between 0.15 and 0.25 m a^{-1}). The probable age of the Ynyslas spit, and its similarities with the feature at Westward Ho!, make it important for our understanding of the timescale over which many features of the British coast have developed.



(Figure 8.2) The location of sand spits in Great Britain, also indicating other coastal geomorphology GCR sites that contain sand spits in the assemblage. (Modified after Pethick, 1984).



(Figure 8.5) A east–west beach section at Ynyslas. The large arrow indicates the position of the submerged forest beds. (After Campbell and Bowen, 1989.)