Walney Island, Lancashire

[SD 194 646]–[SD 236 624] and [SD 167 715]–[SD 175 727]

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Introduction

Walney Island (see (Figure 8.2) for general location) is one of the largest islands around the coastline of England and Wales, exceeded in size only by the Isle of Sheppey, the Isle of Wight and Anglesey. The GCR site at Walney Island has two parts, which represent the main features of the island, in particular the distal features of an island erosion–deposition system. Walney Island itself is the product of erosion and reworking of glacial sediments rather than of coastal deposition (Steers, 1981), but the spits at North End Haws and South End Haws result from transport and deposition of eroded sedments. The spits are important in several respects:

1. They represent the distal features of the island and occur in a macrotidal environment.
2. They differ both in form and sediments. North End Haws is fed by sandy sediments in the intertidal zone and has small dunes on its surface, whereas South End Haws comprises mainly shingle with only limited dune development.
3. They are associated with 'scars' (boulder- and cobble-dominated areas of the intertidal zone) that are a characteristic form on this coast.

Research has concentrated mainly upon the changes in the distal features (Kendall, 1907; Whalley, 1977; Phillips, 1969; Phillips and Rollinson, 1971; Steers, 1981).

Description

The southern part of this GCR site extends from Hillock Whins [SD 194 646] in the north to Haws Hole [SD 236 624] in the south. The beach is set back about 150 m from the low cliffs to the north of Hillock Whins and runs in an almost straight line for 3.5 km (to [SD 209 620]), swings through 40° and runs for another 1000 m (Figure 8.13), beyond which it changes direction and forms a broadening beach for about 1.3 km. At South East Point, it turns abruptly northwards. Between Hillock Whins and South End, a beach of shingle and boulders rests against remnants of a series of low hills composed of till. The beach is about 50 m wide, fronts low bouldery till cliffs and separates a wide intertidal area up to 750 m wide from low-lying pasture, marshland and dunes. Much of the area behind the present-day distal area has been commercially exploited for its gravel and is now characterized by long shallow lakes. Steers (1981) comments that between 1895 and 1905 about 1.2 million tonnes of gravel and cobbles were removed from the Haws Point area.

Changes in the position of the Haws Point Spit were investigated by Whalley (1977, reported in Steers, 1981) and show that between 1907 and 1976 the spit grew by about 565 m. There were annual growth rates of 3.7 m a^{-1} between 1907 and 1919 and also between 1964 and 1976. These rates were far exceeded by almost three times between 1919 and 1946 (9.5 m a^{-1}) and 1946 and 1964 (10.0 m a^{-1}). Kendall (1907) estimated that between 1737 and 1889 the rate of growth had been about 4.4 m a^{-1}. The drift of material is mainly southwards from the till cliffs that are undergoing erosion, which form most of the western side of Walney Island. With a tidal range of 3 m at neaps and 9 m at springs, sufficiently rapid currents develop in the channel beyond the distal end of the spit to move finer grades of sediment in suspension.

The northern part of the site (from [SD 167 715] to [SD 175 727]), in contrast, is much sandier with a low fringing dune ridge resting on a shingle base. The dunes form a broad distal feature about 250 m in width fringed by a narrow shingle beach. The intertidal area is very wide, forming the southern part of Duddon Sands. The northern end of the site is separated from a further area of dunes, Sandscale Haws, by a 400 m-wide tidal channel.

Interpretation

Steers (1946a) described Walney Island as having several features characteristic of an offshore bar. However, the western shoreline of the island appears to have formed as a series of spits and tombolos linking several islands formed of till and related glacial sediments, for example, between Hillock Whins and South End. Erosion in the recent past has been rapid, up to 0.3 m a^{-1}, and variable. Steers suggested that the pattern of tidal streams gave rise to a predominantly southward drift of beach material. He was uncertain about a possible countermovement to feed the northern spit. This is not unusual on comparable features with similar wave refraction in the mouths of estuaries (e.g. the North Norfolk Coast, East Head, South Haven Peninsula, and Dawlish Warren).

The presence of extensive deposits of gravel and boulders, sometimes known locally as 'scars', within the intertidal zone may reflect earlier positions of the retreating shoreline, probably related to high points on the eroded glacial sediments. The 'scars' also influence the distribution of wave energy by causing local refraction and offering more resistance to intertidal erosion. Each of the sharp changes of direction in the southern beach is associated with an extensive boulder covered area. The right-angle turn at South East Point may be partly a result of the effects of the deep water channel, but also of the change in wave direction to which this part of the beach is exposed.

Experiments using seabed drifters (Phillips, 1969) suggest that accretion on the southern spit results from transport from the seabed. This is important because it means that management of this feature and changes in its form are likely to be affected by offshore conditions, including the effects of gravel or sand extraction. According to Phillips, tidal streams assisted by the stronger waves that accompany the prevailing and dominant westerly winds bring about transport from the seabed. Drifters released on the ebb moved to the outer part of Morecambe Bay, whence they could reach Walney Island. On the flood, in contrast, they moved farther into the bay. Within the bay, movement was mainly to the north and north-east, but at the mouth of the bay, movement is in an anti-clockwise direction towards the north-west corner of the bay. In both cases, sediment would be transported into intertidal areas, whence it could be supplied to the spit at the southern end of Walney Island.

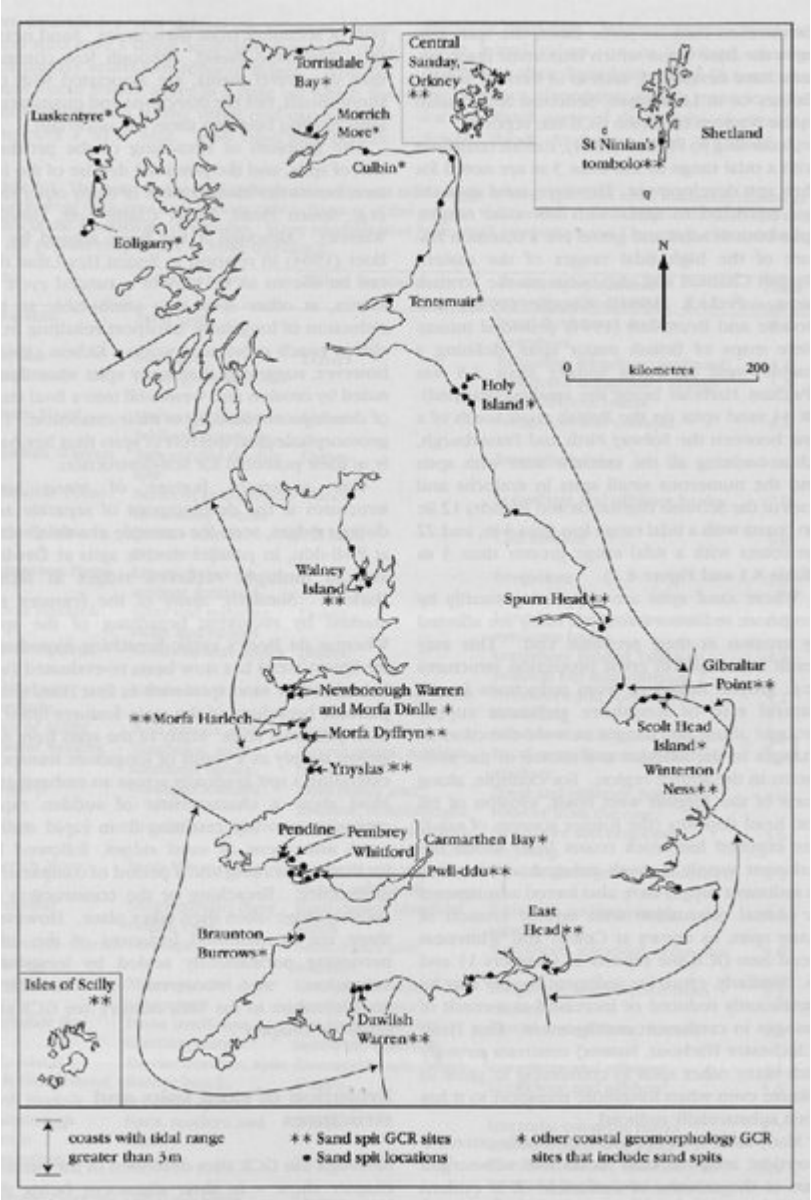
Walney Island has been the focus of several studies, mainly of coastal changes, but as Steers (1981) pointed out, they say little about the changes to North End Hawes or about its relationship with Sandscale Haws across the estuary. Future investigations should consider the evolution of this point and its relation to Sandscale Haws. There remains a need to consider the whole system, although in this volume much of the western cuffed coastline has been excluded from the GCR site because of the coastal defences and its urbanized nature. The spits at either end of the island exemplify well the unique nature of their sources of sediment and their development at opposite ends of this substantial barrier island.

The origins of Walney Island are the subject of some debate. Tooley (1978a) regarded the island as having been separated from the mainland during Lytham II (8390 to 7800 years BP) or possibly even earlier during Lytham I (9270 to 8575 years BP). Steers (1981, p. 132) was unconvinced that a single long island was separated from the mainland as suggested by Tooley, arguing that the island is a 'series of hillocks joined by beach drifting'. Walney Island is not a barrier island in the traditional sense of an entirely depositional feature, because much of its length is not composed of recent beach sediments, but rather of older glacial materials that are being reworked by marine erosion. This is consistent, however, with barrier development in higher latitudes where sediment is largely derived from the erosion of adjacent cliffs cut in glacial materials (Bird, 1984). Similar features were described in New England by Johnson (1925) and Sakhalin by Vladimirov (1961). Walney Island thus provides an unusual contrast with the other barrier sites along the coastline of England and Wales.

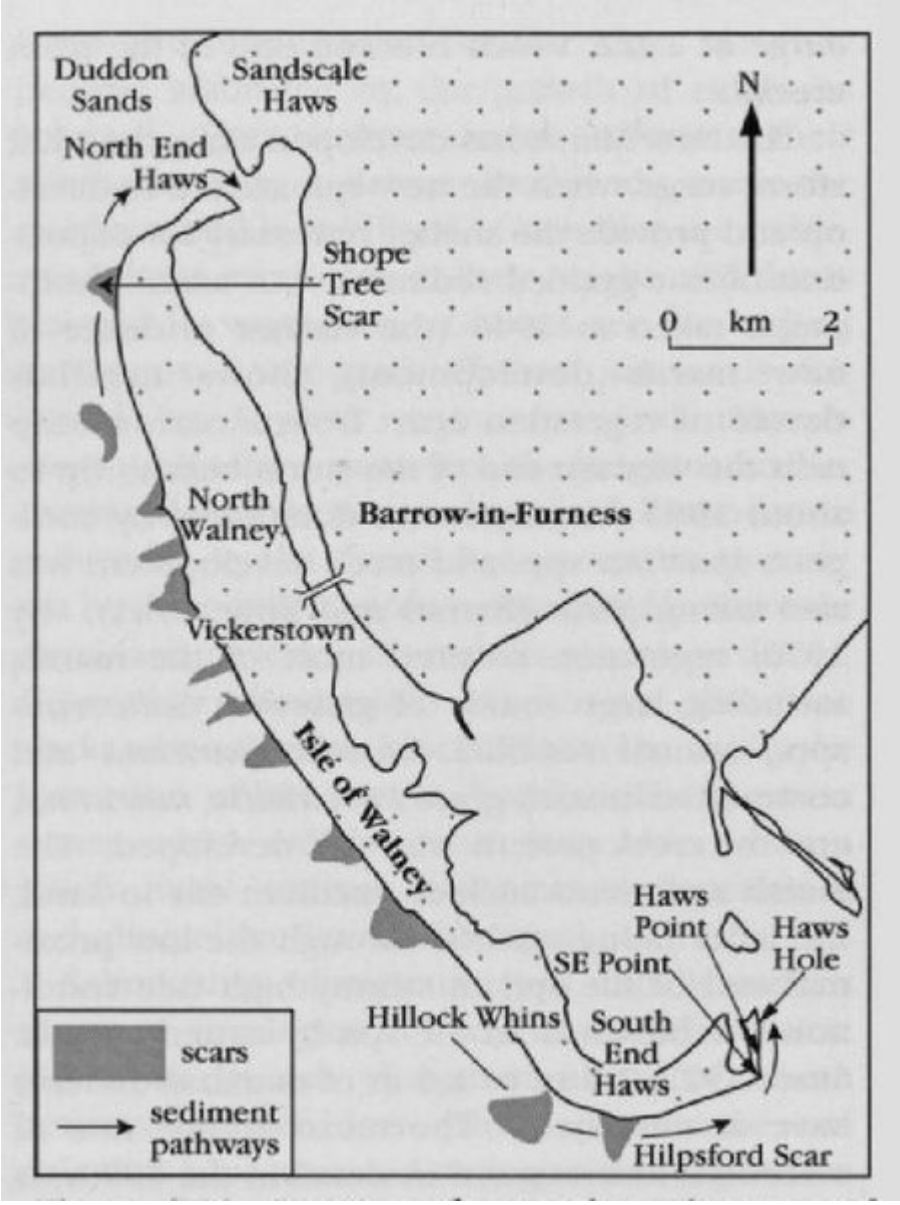
Conclusions

The Walney Island GCR site has two parts, both containing the distal features of a barrier island. Walney Island, however, differs from the usual characteristics of barrier beaches in being mainly the result of erosion and the reworking of glacial sediments rather than the result of coastal deposition. The spits at the northern and southern extremities of Walney Island form the distal features of an unusual barrier island. They are of considerable interest because of their sediment sources and the changes that have taken place within the spits themselves. Walney Island is a unique feature of the English coast, in that small eroded hillocks have been joined by a series of sand, gravel and cobble beaches to produce a single island. It warrants more research, for better understanding of its development will facilitate a better

interpretation of the recent evolution of the coastline of north-west England.



(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 8.13) Location of scars along the coast of Walney Island, Lancashire.