SOUTH HAVEN PENINSULA

V.J. May

OS Grid Reference: SZ033848

Introduction

South Haven Peninsula on the southern side of the entrance to Poole Harbour (see Figure7.1 for general location and Figure 10.2) is an excellent example of a prograding sandy beach that has been well documented in both the historical record and in more recent field surveys (Diver, 1933; Steers, 1946a; Arkell, 1947; Robinson, 1955; Carr, 1971b; May and Schwartz, 1981; Bray *et al*., 1995; May, 1997b). Three main former ridges occur, each with dunes fronted by a seaward slope extending beneath alluvial deposits. Much of the seaward dune-system is prograding, and accretional forms characterize much of the strandline. However, the northern part of the site, known as 'Shell Bay', has been affected by erosion and the alignment of the beach as a result of the construction of a training bank alongside the main navigable channel to Poole Harbour. The southern part of the site extends to low cliffs at Studland that form the southern limit of the sediment cell that feeds the beach (May and Schwartz, 1981).

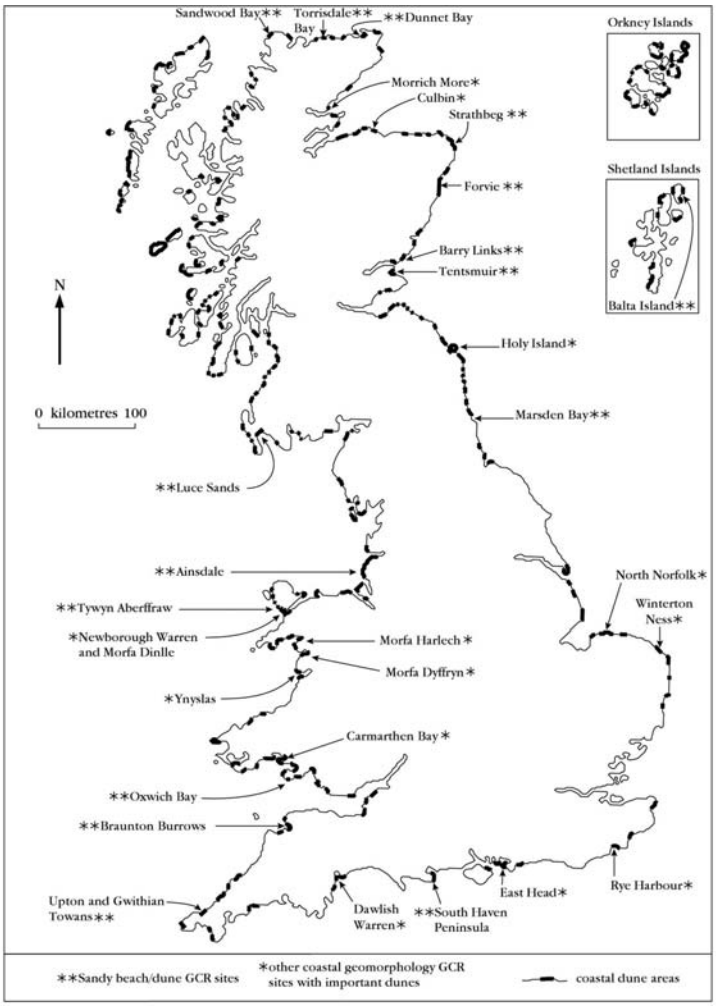

Figure 7.1: Great Britain sandy beaches and coastal dunes, also indicating the location of GCR machair-dune sites (see chapter 9) and other coastal geomorphology GCR sites that contain dunes in the assemblage.

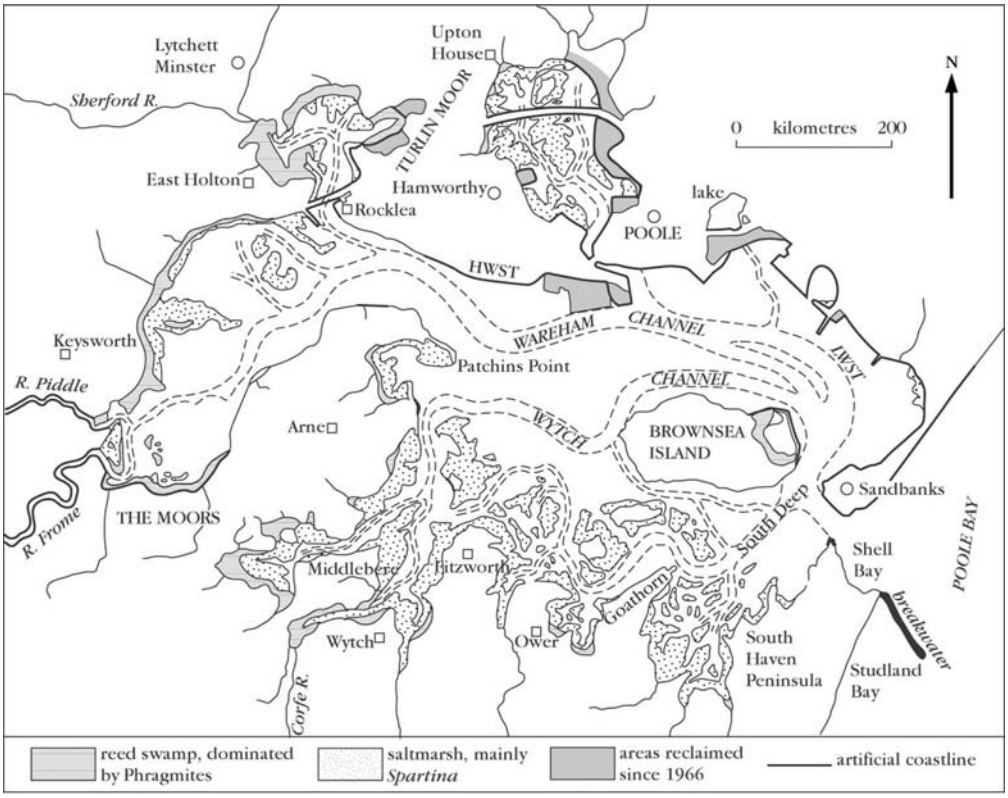

Figure 10.2: Marshes in Poole Harbour, Dorset. Common cord-grass Spartina anglica saltmarsh has developed here since 1899, and this is backed in the upper reaches by Phragmites australis reedswamp, where salinity is reduced by freshwater inflow. Saltmarsh has been reclaimed by embanking, especially near the northern urbanized fringes. (After Bird, 1984, p. 214; based on original map by V.J. May, updated to 2000)

Description

This is one of the few prograding beaches in southern Britain; despite some erosion at its northern and southern extremities and intensive recreational usage, it retains many of the key features which were described by Diver (1933). South Haven Peninsula contains five sub-units.

1. A sandstone cliff (SZ 041 825–SZ 038 828) to the south of Redend Point cut in Bracklesham Group rocks of Eocene age that stands behind a wooded shingle and sand ridge and a modern beach of angular flint and some chalk and sandstone pebbles.

2. Redend Point (SZ 038 828–SZ 036 829). The most resistant part of the site, the headland comprises the Redend Member (formerly Redend Sandstone –Arkell, 1947) and has well-developed platforms, low cliffs and a series of small caves. The cliffs decline to the north and are affected by small landslides.

3. A narrow, fronting sand beach (SZ 036 829– SZ 034 837), which links the cliffs to the main beach at South Haven. Erosion along this section was sufficiently rapid during the 1980s and early 1990s to have stimulated some attempts to retard it using a vertical wooden revetment and gabions. Marram *Ammophila arenaria* was planted to help build up some dunes in front of holiday chalets. These occupy an area that once formed the southern end of the South Haven dunes; it is now severely degraded by trampling and so has been excluded from the site. During early 1996 the wooden structures were outflanked and destroyed and the front edge of the dunes cut back in excess of 4 m; a pattern repeated in early 1997.

4. The main area of the dunes (SZ 034 837– SZ 042 860) faces south-east and is prograding, apart from some erosion at the southern end in the vicinity of the main recreational facilities and the National Trust car park. This part of the site includes the former dune ridges described by Diver (1933), Little Sea, large wetland areas between the dunes, and the former sea cliffs which pre-date the formation of the dunes (Figure 7.4).

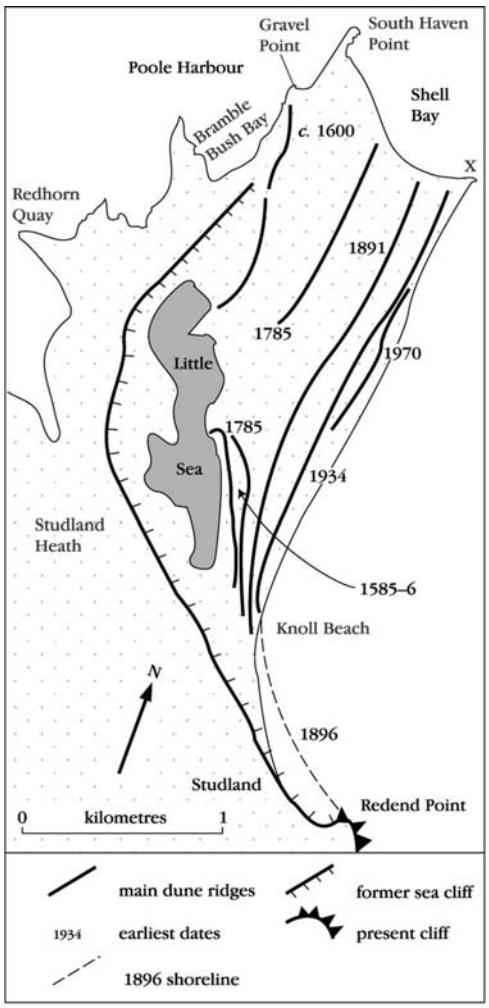

Figure 7.4: Historical dune development at South Haven. The 'Training Bank' extends south-eastwards from point X. (After Diver, 1933.)

5. Shell Bay (SZ 042 860–SZ 036 867). This is the northern part of the sand dunes where they have been limited in their northwards growth by the deep-water entrance to Poole Harbour.

Interpretation

Diver (1933) used the many maps of the entrance to Poole Harbour, from Saxton (1575) onwards, to interpret the history of the ridges of blown sand that form South Haven Peninsula. The 17th century shoreline was represented by a low bluff or cliffs of sands and clays within the Bracklesham Group. By the time of Avery's 1721 survey, the first of the sand ridges had begun to form enclosing a tidal inlet that became a lagoon (Little Sea) by the end of the 18th century, and is now totally enclosed. Its western shore is the mid-17th century cliffline. However, a detailed estate map of Studland parish drawn by Ralph Treswell in 1585 and 1586 shows Little Sea as a narrow arm of the sea along whose banks there are no fewer than fourteen fields held as tenancies. The seaward coast of Little Sea was formed by a narrow northward-trending ridge named 'Burnet poynte'. The western shoreline extended northwards to form a large recurve that, according to Treswell, had its distal end at 128 perches (641 m) from Brownsea Castle. Today, although the present tip of South Haven Peninsula lies twice as far (1200 m) from Brownsea Castle, a series of low intertidal gravel and sand ridges are exposed between South Haven Point and Brownsea Island. The northernmost tip of these ridges, known as 'Stone Island', lies about 500 m from Brownsea Castle. On the Poole Harbour side of the ridge there are four small headlands known in order from south to north as 'Rede orde', 'Coke orde', 'Geries orde' and 'Rickmans orde'; these co-incide in position with the modern Redhorn Quay, an unnamed ridge, Jerry's Point and Gravel Point. The southern three are formed in Bagshot Beds (Poole Formation) and gravels similar to others associated with former terraces of the Frome and its tributaries. There is no field sedimentary evidence to suggest that they represent

former distal features of the South Haven spit, although it is possible that at one time the beach at Jerry's Point was linked to the spit. In contrast, the last, Rickmans orde (i.e. Gravel Point), lies in the approximate position where Diver located the distal end of the spit portrayed on Camden's 1607 map. In light of Treswell's survey it is now possible to regard the dunes at South Haven as having an earlier origin than Diver (1933) or later writers have suggested. The presence of salterns (sites of salt production) at the head of Little Sea (recorded as early as the Domesday survey (1086 AD; Thom and Thom, 1983) and tenanted enclosures on the ridge to seaward of the 16th century Little Sea suggest at least some stability to the feature.

The early dune ridges were fronted by a wide intertidal area of drying sand and the low tide limit was close to its present-day position. Indeed, even allowing for the limitations of comparison of maps and charts, the low-water mark has remained in more or less the same position for at least 200 years, a fact apparently overlooked by all previous writers.Robinson (1955) noted that the one fathom (*c*. 2 m depth) line had moved shorewards between 200 m and 300 m in the six decades following Mackenzie's survey of 1785.Ward (1922) considered that the northern spit at Sandbanks was supplied by sand moving from the east;Steers (1946a) supported the idea of a counter-drift of sand, i.e. from both south and north, towards the mouth of Poole Harbour. The entrance to Poole Harbour is deep, with a maximum ebb-tide current of 2.5 m s^{-1}. There is no evidence to suggest that its position has changed during the last few centuries. Robinson (1955) concluded that there was no evidence of such counter-drifting and proposed that the development of South Haven Peninsula resulted from a process of frontal accretion in which a series of beach ridges were built up parallel to the dominant waves, providing the foundation for the dunes. He went on to suggest that the apparent double spits at the mouth of Poole Harbour could have resulted from a single embankment across the harbour mouth that resembled a partial bay-bar, even though there was no documentary evidence to support this. Kidson (1963) took issue with the frontal accretion hypothesis and supported the view of Steers (1946a) that counter-drifting was a possible explanation for the double spits.

Using aerial photographs taken between 1936 and 1970,Carr (1971b) showed that erosion had occurred at the southern end of the dunes (a maximum of 0.8 m a^{-1}) and in Shell Bay (maximum 0.67 m a^{-1}), but accretion had been more typical of the main part of the dunes, gaining an average of 2.15 m a^{-1} and a maximum of 4.3 m a^{-1}. Since 1970, these trends have continued, although phases of accretion alternate with erosion, with some large erosion events affecting even the normally accreting shoreline. During periods of prolonged east winds (e.g. during early 1996), the dunes between Redend Point and the Knoll car park were cut back by over 4 m. Eyewitness accounts suggest that the beach was lowered in January 1996 to levels which had last been exposed in the 1940s during preparations for the Normandy D-Day landings.

May and Schwartz (1981) indicated that a maximum of 10% of the total volume of sand added to the beach between 1933 (Diver's survey) and 1971 (Carr's 1971b survey) could be accounted for by the presumed pattern of erosion and longshore transport. AlthoughBray *et al*. (1995) and the Shoreline Management Plan (Halcrow Maritime, 1999) use the general model of longshore transport associated with shoreward transport on the shallow sea floor of Studland Bay, they did not quantify in detail the rates or volumes of sediment movement.

Surveys by BP (British Petroleum) over 15 months in 1990 and 1991 carried out in connection with a proposal to build an offshore island for drilling indicated that, for a zone extending seawards 450 m from the dunes between the Sandbanks Ferry and the chalk cliffs at Redend Point, there was a net gain of volume between July 1990 and May 1991 of*c*. 90 000 m^3 and between May 1991 and October 1991 a net loss of volume of*c*. 91 000 m^3. The foredune– ? beach–shallow water area system was therefore in balance. The largest gains occurred within Shell Bay (more than 40 000 m^3 gained over a length of about 370 m) and the greatest losses in Shell Bay (over 32 000 m^3) and in the southern parts of the dunes (over 40 000 m^3). Over the 3 km from the Training Bank (the northern beach) to Knoll Beach, however, there was a gain in the first period of 23 890 m^3 and a loss in the second period of 19 436 m^3, a net gain of 4454 m^3. The net vertical gain over the whole of this area was 3 mm. There were considerable movements of sand within this zone, with erosion on individual profiles sometimes balanced by accretion within the same profile. The differences in quantities in individual profiles suggest that there are important local movements of sand within the shallow water zone that are not a

simple longshore process of transport. These are not yet fully understood.

Since the 1990–1991 surveys, the general pattern of accumulation in Shell Bay and southwards from the Training Bank has continued. The northern beach has suffered several phases of erosion, as has the whole frontage southwards to Middle Beach. As a result, Middle and Knoll beaches are very narrow at high water. In contrast, the beach north of Knoll Beach is much wider and is able to absorb most waves without significant erosion of the dunes themselves. However, the continuing retreat at Knoll Beach is changing the alignment of the shoreline. This puts the southern end of the dunes north of Knoll Beach at progressively greater risk.

Farther south around Redend Point, the late 19th century Geological Survey maps and the First Edition of the OS 1:2500 plans of 1886 show that the dunes had earlier extended over 80 m seawards of the present cliffline. Although there is no direct evidence to describe the earliest relationship between this cliff and the development of the dunes, Treswell's 1585–6 survey indicates a cliff with ‘furzy ground' where the oldest dunes survive today. However, to the south of Redend Point, the cliffs have not been eroded by the sea during this century and they have developed a small talus slope of sand that is pitted with small holes and casts (between 6 and 10 mm in diameter) of sand-wasp burrows. To seaward of the cliff, trees several decades old stand on a sand and shingle ridge. A stack of Redend Sandstone that rose from the present-day beach was partly demolished by a fall from the cliffs above it in 1995. There is at present no evidence for the last date at which the sea cut the cliffs.

The development of caves and a shore platform in the Redend Sandstone demonstrates a clear link with near-vertical joints in the sandstone. Most of the caves are narrow clefts in the rock, but some are semi-circular in cross section with considerable evidence of the effects of abrasion in the morphology of the cave floors. The floors are usually continuations of the platform across which it is possible to trace some of the joints. Figure7.6 shows that the longer caves tend to be both higher and wider than shorter caves, probably caused by structural controls. Potholing occurs both on the platform and within the caves, sometimes in association with the truncated parts of pipes within the sandstone. This is a very rare feature, the only other site where planed-off pipes have been reported being to the west of Cuckmere Haven, Sussex (Castleden, 1982). Marine and subaerial erosion is taking place at the cliffs, but it is slow compared to the changes that have taken place in the dunes to the north. The contribution to the sediment budget of the South Haven beaches by sediment derived from cliff erosion is relatively small. The occurrence of chalk pebbles on the southern part of the beach seaward of the National Trust car park is a good indication that sediments do travel from the southern part of the site. Nevertheless, the main source of sand for the beach appears to be the seabed where there have been extensive sandbanks around the mouth of Poole Harbour throughout the time for which there is a cartographic record.

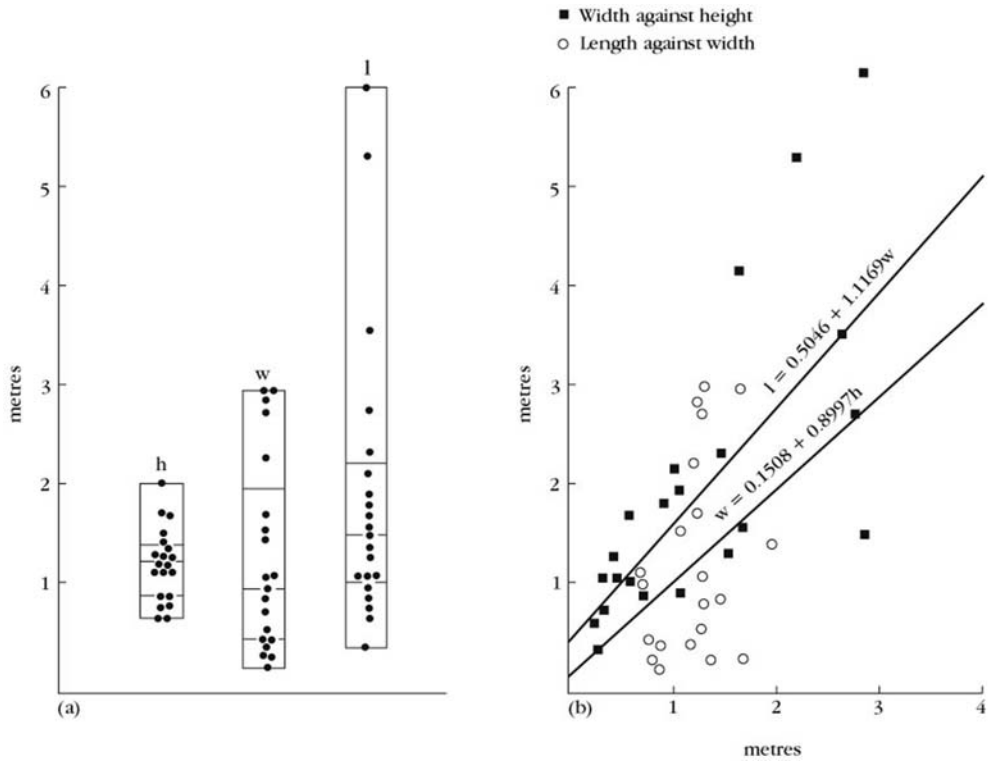

Figure 7.6: Cave relationships at Redend Point, South Haven Peninsula GCR site (see Figure 7.4 for location). (a) Cave height, h; width, w; length, l. (b) Relationships between cave height (h), and w and l.

It remains unclear why there was a sudden onset of dune-building in the 17th century as envisaged by Diver (1933), nor is there any explanation of the wide intertidal area that formed a base for them. The Treswell map shows an earlier sand spit enclosing an inlet that now forms the southern part of Little Sea. The early history of the site is therefore far from clear, despite the detailed historical record. Further investigation is required of both the sub-dune surface and the sedimentation processes in the South Haven area.

One of the rare prograding beaches of southern England, largely nourished by seabed sources of sand, this site has been well documented and its history since the 16th century has been described. A series of sub-parallel dune ridges are the major features. The site also includes low cliffs which were protected by the growth of the dunes at Studland and have since been re-exposed to marine action. The dunes are often quoted as an example of ecological succession, the sequence of dune ridges being characterized by a change inland from dune plants such as lyme-grass *Leymus arenarius* and marram *Ammophila arenaria* to heath species and finally oak scrub. Much of the site is a National Nature Reserve because of its ecological features, but the geomorphological characteristics of the site are a key component. In particular, it is one of the very few east-facing dunes on the English Channel coast.

Conclusions

This site is important because, unusually in southern Britain, it is prograding, and the sequence in which it developed has been well documented. Furthermore, the sediment budget for the beach suggests that much of the sand is derived from offshore, also a relatively unusual feature of beaches in southern Britain. It contrasts with many other British dune systems in lying in an area dominated by offshore winds.

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