Slapton Sands and Hallsands, Devon

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Both Slapton Sands and Hallsands lie on the east-facing coastline of Start Bay, south of the Dart estuary and Torbay (see (Figure 6.2) for general location). Though they are distinct sites both in location and in their geomorphological features (Figure 6.6), their relationship to the past and present-day processes is intrinsically linked. This common introduction describes their setting and the debate about their origins. Site-specific details are contained in the individual site descriptions that follow.

Start Bay was described by Hails (1975a-c) as an asymmetrical embayment, about 60 km^2 in area, similar in form to many bays elsewhere for which the term 'zeta-curved bay' is frequently used. The coastline transects Lower Devonian rocks, which strike east-west and form an intermittent series of cliffs. Between Hallsands and Pilchard Cove a sequence of barrier beaches forms the main feature. These beaches are composed predominantly of granules and small pebbles (i.e. between –1 and –4 phi, with flint a dominant grain type (Gleason *et al.,* 1975). There are four main beaches, Hallsands, Beesands, Slapton Sands and Blackpool Sands, all formed of shingle coarsening to cobbles in the south. Beesands and Slapton include barrier beaches, between 100 m and 140 m wide at high tide, which impound lagoons. The crest of the barriers is generally at about 6.0 m OD ± 0.5 m. The ridges become narrower and lower towards the south, in the same direction as sediments become coarser. Worth (1904) and Hails (1975a–c) also recognized a sharp decline in sediment size offshore immediately away from the coast. Although the offshore slope varies near the beaches, depths of –14.5 m OD are encountered by 600 in offshore. There are short lengths of coast protection works at Beesands, Torcross and Blackpool Sands, but these may have little effect on the overall sediment budget of the beaches. In contrast, the commercial removal of about 640 000 tonnes of gravel at Hallsands between April 1897 and December 1902 has had a much greater impact (Worth, 1907).

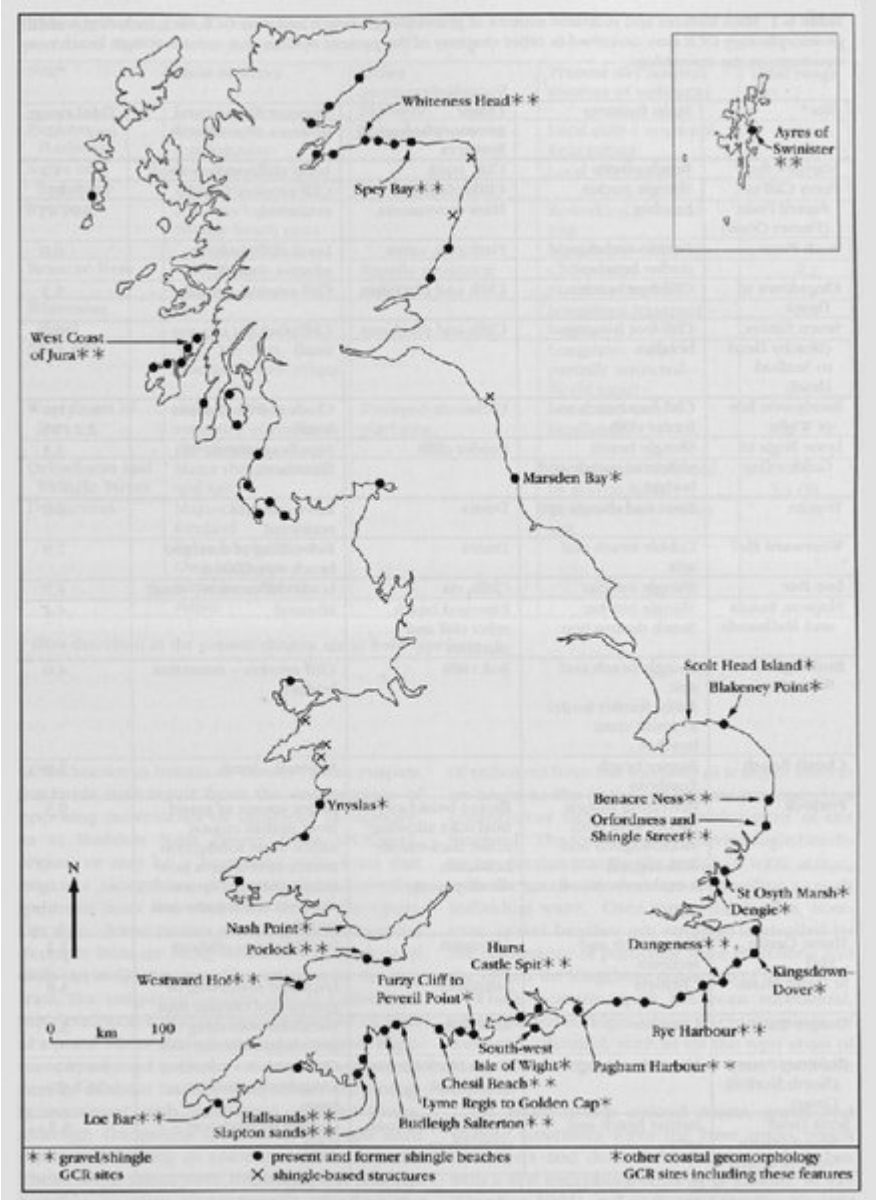
Kelland and Hails (1972) have described in some detail the submerged form of Start Bay and its offshore deposits. Between 0.5 km and 3 km offshore, there is a pronounced break of slope in the bedrock slope that forms the seabed at an average depth of –42 m OD. This has been interpreted as an ancient coastline that may have been exposed during periods of lower sea level during the Pleistocene Epoch. Opposite the central part of Slapton Ley, there is a second break in the bedrock slope at about 28 m depth. An offshore bank, known as 'Skerries Bank', extends north-eastwards for over 6.5 km and appears to be linked to Start Point. Its maximum height is –4.8 m OD, but for most of its length the crest lies between –7.5 m to –9.0 m OD. Waves from all directions, except north-east, are liable to break on the bank, and it is responsible for significant refraction of waves inshore (Figure 6.7).

Kelland and Hails (1972) identified in Start Bay three lithological sub-environments as a result of grain-size analysis: 'barrier', 'bay' and 'bank' deposits. The barrier deposits consist mainly of gravels that occupy a narrow zone from the front of the barrier beaches to about 200 m offshore, except near Torcross Point and Limpet Rocks where they extend 500 m seawards. Flint and chert (40%) and quartz (46%) comprise most of these sediments, other materials including mica-schist, slate and shale, as well as rhyolite, felsite, granite, and quartz porphyry. The bay deposits are mainly medium- to fine-grained sands, with varying proportions of silt, and whole and comminuted shells.

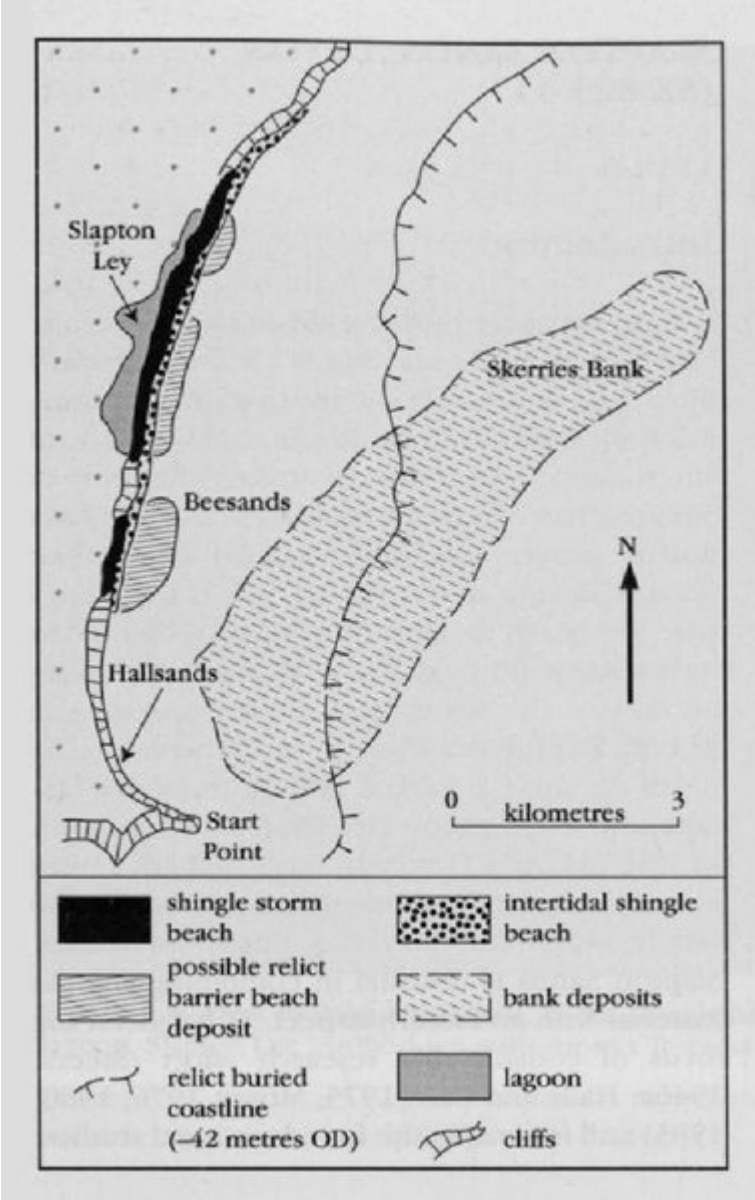
Hails suggested that the Skerries Bank occupied its present-day position during the later part of the Holocene transgression. During the past 5000 years or so ephemeral barriers were probably constructed, destroyed and submerged and only rather limited amounts of gravel were transported landwards across the floor of Start Bay. Today, no new material is entering the bay, either alongshore or from offshore. As a result, the Bay was considered by Hails (1975a) to be a closed system under present-day conditions. Hails' analysis showed that both Hallsands and Beesands are located at points in the bay where wave energy is focused during north-easterly storms (Figure 6.7). This, combined with high spring-tides and five years of large-scale extraction of gravel, can probably be blamed for the 1917 Hallsands disaster (see GCR site report, below).

Both Hallsands and Slapton Sands thus have origins that depend to a substantial degree on the wave regimes within the bay, the effects of the Skerries Bank and the transgression of a flint-quartz barrier beach which now lacks external sources. The interest of the two sites arises from their 'dosed' nature, the effects of gravel extraction on the coastal sediment budget and coastal erosion, and the development of barrier beaches.

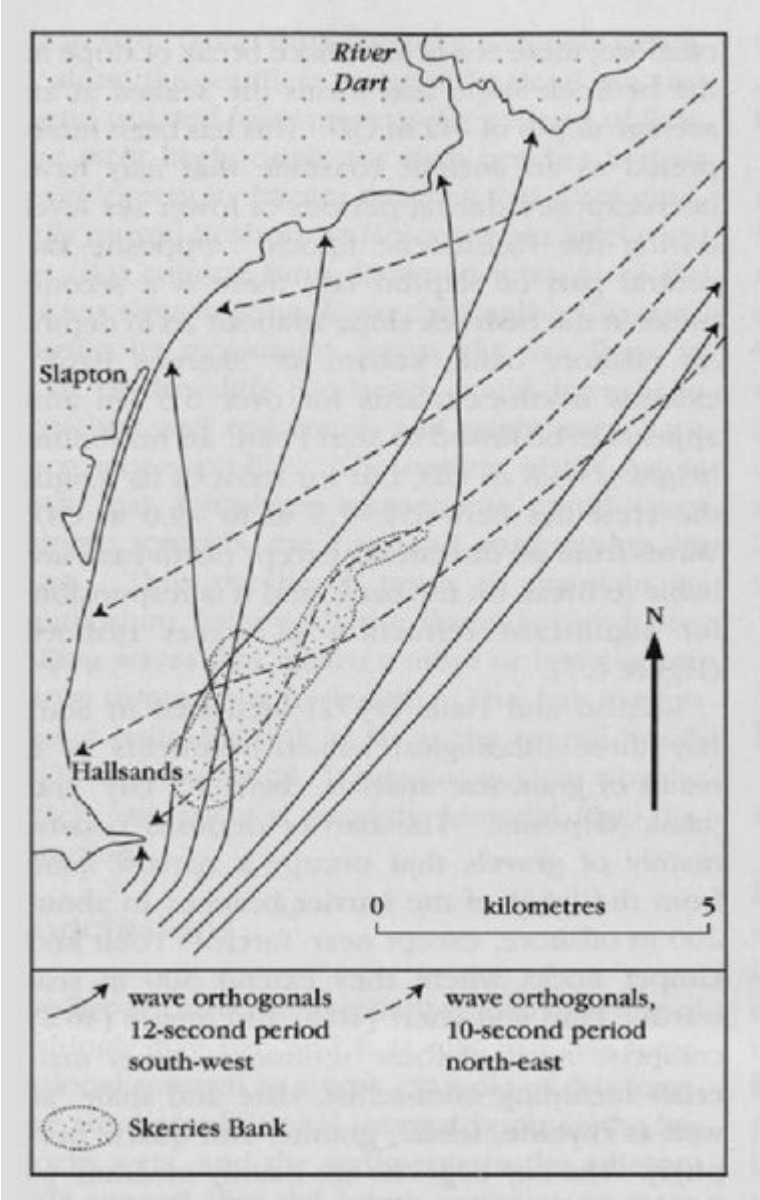
The beaches form a single beach system, but owing to the modification of the coast at Beesands, itself separating a small lagoon from the sea, by the dumping of coastal protection material, this area was excluded from the GCR site boundary. Nonetheless, the continuity of the system is evinced by the consistent reduction in the mean sediment size from south to north.



(Figure 6.2) Coastal shingle and gravel structures around Britain, showing the location of the sites selected for the GCR specifically for gravel/shingle coast features, and some of the other larger gravel structures.



(Figure 6.6) Hallsands and Slapton Sands represent parts of a once-continuous gravel beach. Offshore, there is evidence of buried shorelines and a possible former barrier beach. The present-day shingle beach is separated by rock headlands. (After Hails, 1975a.)



(Figure 6.7) Wave refraction along the coast between Slapton Ley and Hallsands. The Skerries Bank affects waves entering Start Bay from the south-west. Wave energy is concentrated in locations such as Hallsands and Beesands during north-easterly winds. (After Hails, 1975a–c)