

COASTAL ECOSYSTEM MANAGEMENT

Introduction

The Sefton coast near Southport is one of Britain's largest dune systems (Figure 1). The Ainsdale portion of this is composed of the Ainsdale and Birkdale Sandhills Local Nature Reserve (LNR) and the Ainsdale Sand Dunes National Nature Reserve (NNR). The area covers approximately 7 sq. km of the 22-km long Sefton coast dune system.

Ainsdale Dunes is an excellent example of a psammosere (a plant succession on a sand dune complex). It is a delicate ecosystem with many rare species of plants and wildlife. The dune system is near to one of the most densely populated parts of the country (Figure 2). The dunes are subject to a number of pressures,

Figure 1: Location of the Sefton coast and Ainsdale Dune systems in the North West

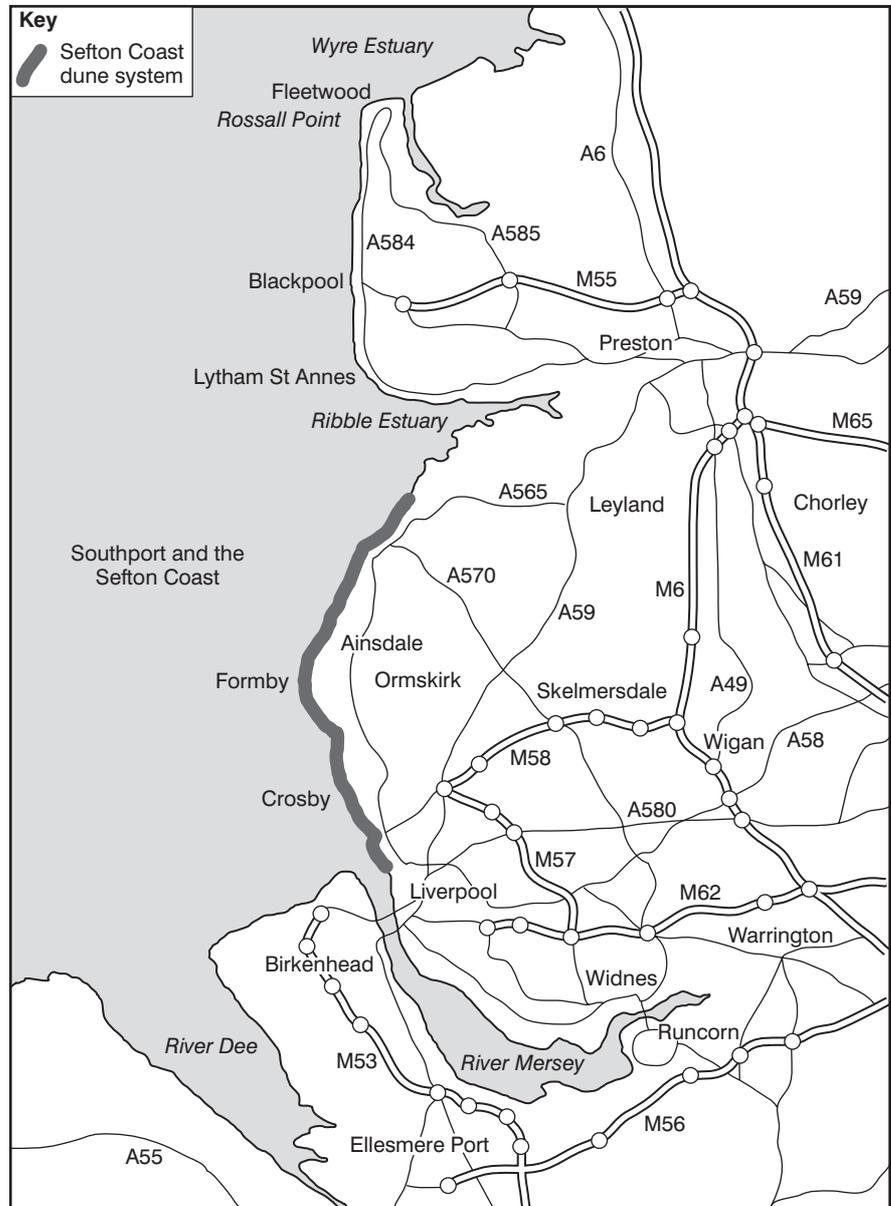
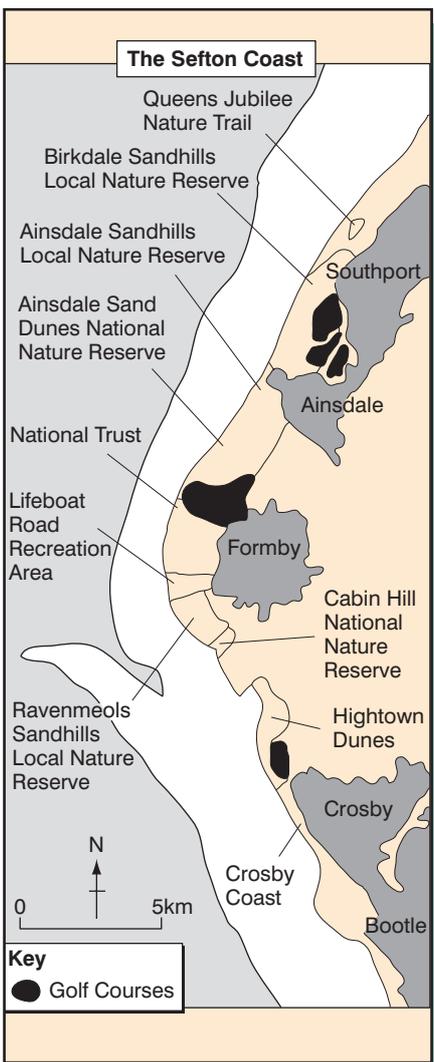


Figure 2: The Sefton coast



which will be considered in this **Geofile**. There is consequently a need for management to minimise conflict between the various pressures and to conserve the ecology of the area.

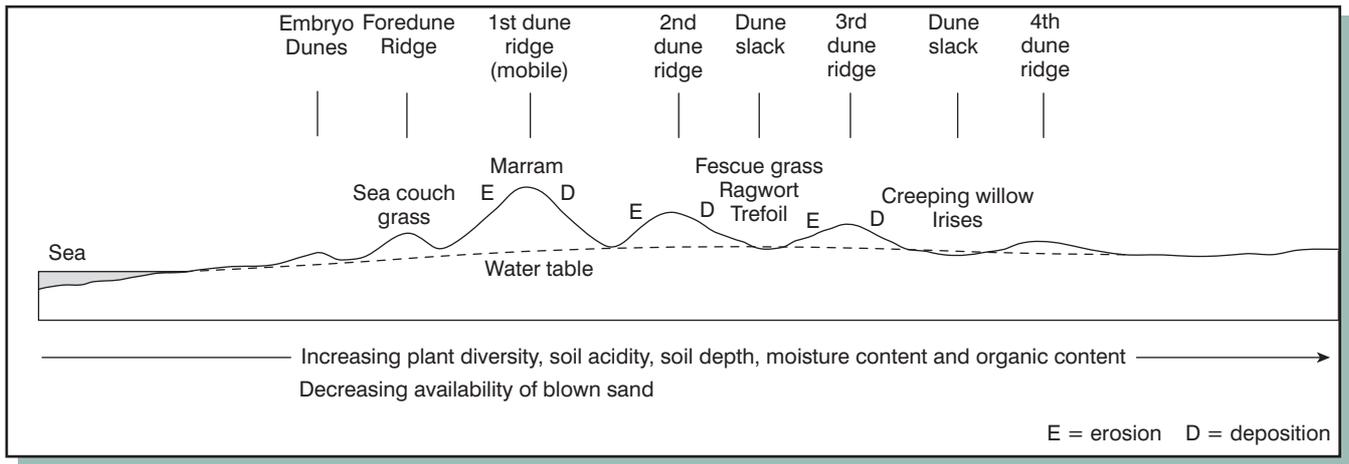
Ecology and environment of the Ainsdale Dunes

The Ainsdale Dunes are typical of a sand dune complex. There are high mobile dune ridges, fixed dunes and dune valleys containing slacks. The slacks are hollows, which are often flooded in winter and provide the habitat for many unusual plants and animals. The complex also provides

an excellent example of the plant succession associated with sand dunes. Figure 3 is a reminder of the main features of a dune complex and some details of the plant succession. The concept of plant succession is covered thoroughly in a number of A-level textbooks.

The area has for many years been recognised as an outstanding area of wildlife interest. As well as being both an NNR and an LNR, a number of other designations have been attached to the area, including Nature Conservation Review Grade 1* site, Geological Conservation Review site,

Figure 3: Main features of a sand dune complex



Site of Special Scientific Interest (SSSI) and, most recently, part of the Sefton coast candidate Special Area of Conservation (cSAC). A high proportion of the area comprises EU fixed dune priority habitat.

Flora (plants)

The seaward side of the dunes as expected is dominated by species like marram grass and sand twitch, which are adapted to the lack of soil and the high salt content of the sand. The areas of slack have common species like creeping willow (*salix repens*) and flag irises. On the inland side, the vegetation grades gradually to trees, including sea buckthorn and birch. The dunes are home to many notable plant species. In summer, marsh helleborine, grass of Parnassus and early marsh orchid are found in the damp slacks. Round-leaved wintergreen and the nationally rare dune helleborine are found in the drier slacks.

Fauna (wildlife)

The dunes attract a variety of wildlife, including reptiles such as sand lizards. The dune slacks are the breeding ground of the rare and protected natterjack toad. Since 1977 a number of ponds have been excavated to provide additional breeding sites for the toads. There are also rabbits and various species of birds.

Pressures on the dunes

The fragile dunes ecosystem and traditional uses of the area such as grazing are under threat from a number of pressures.

Scrub and growth of rank vegetation

The spread of scrub and rank vegetation, in particular, leads to

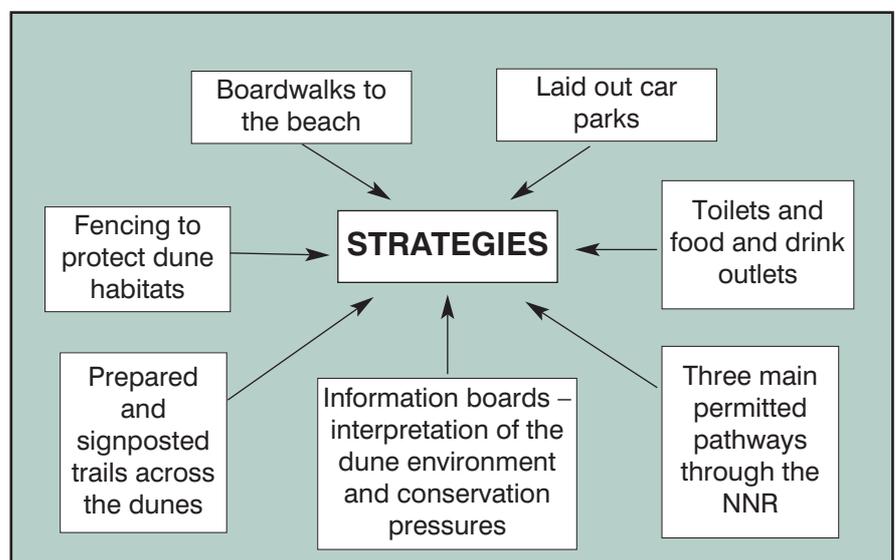
associated problems of soil development and the desiccation of slacks. Scrub invasion includes the establishment of tree and shrub species within the open dune landscape, particularly of non-natives such as pine and sycamore but also the native sea buckthorn and birches. This leads to the development of scrub woodland, a semi-natural habitat but one which results in a loss of valuable open dune habitat. In addition, low woody shrubs, such as creeping willow, have grown tall and dense. Elsewhere, an increase in rank grasses and herbs, particularly brambles, has produced a dense undergrowth in areas not yet affected by scrub. These changes have led to a reduction of bare sand and short turf, and therefore a reduction in the high ground level temperature regimes which are a requirement of many dune species. Outbreaks of myxomatosis since the mid-1950s have significantly reduced rabbit numbers and have played a major role in these habitat changes.

Tourism

The Sefton coast is close to the Merseyside and Greater Manchester conurbations (Figures 1 and 2), as well as other smaller urban areas like Southport and Blackpool. Most visitors are attracted to Ainsdale by the broad sandy beaches and expanses of sand at low tide, and many make short forays into the dunes. Some come to walk the dunes, often exercising a dog. Fewer come for quiet enjoyment, to experience the wild landscape and to observe the wildlife.

Large numbers of visitors inevitably produce pressures on habitats and species, including dune erosion and a loss of habitat quality. Associated activities such as litter, vandalism, fire and the collecting of rare species can cause considerable damage and take up wardens' time which would be better spent on aspects of management. In some circumstances, however, controlled or low trampling pressure can help to maintain short turf habitat and bare sand patches.

Figure 4: Strategies to manage visitor pressure at Ainsdale



Box 1: Vegetation and wildlife management

Monitoring by fixed-point and aerial photography and casual observation has shown that important habitats and species would be lost without active intervention. Site managers have spent 30 years developing techniques to conserve the fixed dune habitats.

Scrub cutting and clearance

Initially this work was carried out by site managers and volunteers using only hand tools. Priority sites were targeted, but only small areas could be cleared, at a relatively high cost. Cut stumps required herbicide treatment, but this was not always successful and was not deemed environmentally sound. The need for larger-scale operations and more sustainable techniques was clear. Mechanisation of scrub clearance by using bulldozers, excavators or tractors with specialised rakes and grabs enabled large areas to be cleared, and this was often more successful than scrub cutting because the roots were also pulled out. These techniques are expensive though, cause some damage to dune topography, and are not as sustainable and green as site managers would wish. Monitoring studies have confirmed the value of scrub clearance as former dune habitats have returned, usually after a flush of weeds in the first few years.

Mowing

Mowing was used on the NNR in the 1980s to control the height and density of creeping willow in dune slacks, where it was rapidly overwhelming the short, botanically diverse dune turf. Cut material has always been removed to avoid a build-up of nutrients and the development of thatch smothering the seed bank. In some areas, a moss associated with creeping willow has been raked out, as it also smothers the underlying dune slack seed bank. Cuttings were hand-raked and removed off-site by tractor and trailer. Now elsewhere on the coast, forage-harvesters are used to cut and collect vegetation on grassland and heathlands. Cut material can be used to surface paths or be rotted down to a mulch for use elsewhere. Smaller tractors and mowers and lower ground pressure tyres cause less damage to slack topography and therefore microhabitat.

Monitoring has shown an increased botanical diversity in mown slacks, but there are problems associated with mowing. It is not a truly sustainable activity across all areas that require

management. Some areas are just not accessible. Mowing can also cause soil compaction and reduce micro-topography, leading to greater uniformity of swards. Raking cut vegetation can be very labour intensive.

Turf-stripping and excavation

In the drought years of the mid-1970s, many slacks in the NNR were scraped (deepened and cleared), to provide breeding pools for the natterjack toad. It was found that the margins of these scrapes developed a diverse slack flora, which has been monitored over the years. The vegetation succession dictates that without further management, these scrapes will eventually turn to scrub. Continual intervention will be necessary to maintain early stages of succession unless the grazing pressure is relatively intense. Turf-stripping and excavation can recreate early phases of dune succession and may be an important management technique for rare plants such as petalwort. However, some disturbance will be caused to the site with each action, which in the long term could lead to a significant percentage of the site being modified. It is costly and not a green approach. Ideally, in an actively accreting system, scrapes should not be necessary, as natural processes should result in the creation of young embryo slacks.

Grazing

For centuries, rabbits were an important influence on the ecology of the Sefton dunes. Following the outbreak of myxomatosis in the mid-1950s, the balance was lost and the dunes became overgrown, with a loss in value for nature conservation. Domestic grazing was reintroduced onto the Ainsdale Dunes by English Nature in 1990. Domestic grazing by sheep and cattle has proved to be the most successful and appropriate form of vegetation management. It has controlled target species such as creeping willow; there has been an increase in species diversity with a corresponding return to a low structural mosaic of vegetation with bare sand patches. Domestic grazing has encouraged a resurgence in the rabbit population and has successfully maintained early successional stages in scrapes. With increasing knowledge and understanding, adjustments are being made to the grazing regime, to ensure the best possible results are achieved for wildlife. Such is the success of domestic grazing on the NNR that

Sefton Council have approved a grazing trial on 7 ha of the adjacent LNR. This is an open access public area, and the establishment of a grazing project will require the support of local people and visitors alike.

Blowouts

Blowouts create new sandy habitats within the fixed dunes including incipient slacks, especially important for annual plants, specialised invertebrates, natterjack toads and sand lizards. They are an important element of the dynamic processes within the dune system. However, where recreation causes erosion, and particularly where property or infrastructure is threatened, dune restoration techniques are used. Dune stabilisation works have been necessary adjacent to the coastal road, near a holiday village and to prevent sand encroachment onto the railway line.

Species management

Three key species present in the Ainsdale Dunes area are protected by both European and national legislation. These are the natterjack toad, sand lizard and petalwort. Ideally, management aims to conserve these species through broad-scale habitat or process management. However, to ensure their survival, specific measures are taken or considered for each species.

A series of natterjack toad 'key pools' are maintained as breeding pools. This involves some intensive management, including the occasional reprofiling of scrapes to ensure open conditions, with a deepened section to provide water in drought years. Fencing is used to protect pools in areas with high public pressure, and interpretation signs and wardening help to explain the importance of this species.

Sand lizards are most frequent in the transitional mobile/fixed dune habitat near the beach. Therefore there is the potential for disturbance from visitors. To reduce the risk, fencing is erected to protect sensitive sites, and minor paths may be re-routed.

Petalwort is a liverwort which favours conditions found in the early phases of dune slack succession. Grazing, light trampling and disturbance appears to assist the conservation of this species. A management strategy is being developed to address these issues.

Management strategies

Management aims to conserve the range of open sand dune habitats and species for which the area was designated, whilst enabling appropriate public access and

informing and educating those visitors (Gee, 1998; Sefton MBC, 1993).

Management of the NNR is undertaken by English Nature, the statutory wildlife agency for England,

whilst that on the LNR is by Sefton Council, the local authority. This is co-ordinated across the whole Sefton coast by the Sefton Coast Management Scheme. Both agencies have produced management plans for their sites.

Directing visitors

Visitor management at Ainsdale is part of a wider spatial zoning system used on the Sefton coast as a whole. This identifies **honeypot** areas such as Ainsdale beach, closed or permit-only **sanctuary** areas such as the majority of the Ainsdale Sand Dunes NNR, together with a range of partial access and less intensively used sites in between, such as the LNR. This has the advantage of encouraging the majority of people who come to the coast for the beach and associated facilities to be concentrated in a few areas where intensive management can be arranged to accommodate them.

A number of specific facilities and strategies have been used in the honeypot areas as well as in the rest of the dune system (Figure 4). In this way the integrity of the dune system is maintained and pressure is taken off important habitats and species elsewhere on the coast. Ainsdale Dunes are a good example of an access gradient, from high, at Shore Road beach access point in the north, to low, in the centre of the National Nature Reserve.

The quiet situation within the NNR provides a sanctuary for wildlife, whilst allowing access by permit. The restricted access also makes the establishment of domestic grazing possible. With relatively low visitor numbers, stock have not been troubled. Only small interpretation signs, together with articles in the local coastal magazine, guided walks and illustrated talks by the site manager have been required. Access by permit-only visitors, or views from the three main public permitted paths, have generally been sufficient for those wishing to see the NNR fixed dunes. The LNR is open access to public visitors and includes several permitted paths as well as many informal footpaths, particularly towards the beach. Nearer the beach access point, visitor access is more formal, with beach car parking but with information signs and facilities as expected at a busy resort beach. This is supported by boardwalks and interpretation to reduce the impact to the dune and beach area and natural processes, whilst informing and enabling inquisitive visitors to discover more about the wildlife interest of the area.

A warden presence has proved to be important for visitor management and protection of rare species. In future it could be possible to manage sites better from a strategic viewpoint, through, for example, the removal or variation of fencing boundaries and greater liaison between site staff across land ownership boundaries. With careful management, large numbers of visitors can be accommodated, whilst conserving dune wildlife and spreading an important conservation message.

Conclusions

The Ainsdale Dunes have seen more than 30 years of conservation management, which has been gradually modified and improved. The Sefton Coast Management Scheme has worked for 20 years to ensure the best possible co-ordinated management of the coast. Through its guidance, the footpath network and associated signage and interpretation system has been developed and standardised for the coast. It has also enabled greater integration of management actions and encouraged developments such as the proposal for domestic grazing on the LNR. It also assists with monitoring of dune condition across the whole coast and is working to develop management strategies for habitats and species across site boundaries.

The challenge facing managers is to achieve a balance between maintaining and conserving the valuable habitats and wildlife and allowing visitors into such an attractive area. **Sustainable** strategies need to be found which will minimise undesirable impacts on the delicate ecosystem.

Useful sources of information

Gee, M. (1998) 'Ainsdale Sand Dunes National Nature Reserve Management Plan 1998-2003'. Unpublished report, English Nature, Wigan.

Houston, J. (1997) 'Conservation Management Practice on British Dune Systems', *British Wildlife*, 8 (5), pp 297-307.

Sefton MBC (1993) 'Draft Ainsdale and Birkdale Sandhills Local Nature Reserve Management Plan (Parts 1 and 2)'. Unpublished report, Sefton MBC, Southport.

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F O C U S Q U E S T I O N S

1. Define the following terms when used to refer to a tourist environment.
 - a) carrying capacity
 - b) honeypot site
2. Study Figure 1 and estimate how many people would live within an hour's driving time of Ainsdale. Suggest what factors account for the considerable visitor pressure at Ainsdale.
3. Study Figure 4 and suggest how each of the strategies is being used to manage visitors to the dunes.
4. a) What is meant by sustainable management in relation to a tourist site?
 b) Look at each of the strategies listed below which are being used to manage the Ainsdale Dunes. Decide which are the more and less sustainable approaches and explain your choices. Note that some strategies may have both sustainable and non-sustainable elements.
 Grazing by sheep and cattle Mowing
 Scrub cutting and clearance Spatial zoning to control visitors.
5. Outline the difference between protection and conservation, with specific reference to the Ainsdale Dunes. Do you think the dunes should be protected or conserved?