East Sussex Vegetated Shingle Management Plan

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Contents

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Summary

Until recently shingle habitats have been much overlooked and little understood, with a limited amount of studies being carried out on sites around the country.

Since 2001 a range of shingle projects have been undertaken in East Sussex. Driven by the County Council, these projects have aimed to carry out a programme of work to better understand shingle sites across the county. The information gathered has assisted in the development of a survey method for the habitat, supplied an overview of shingle sites around the county and their relative biodiversity values, and helped in the monitoring of those sites.

The current project (East Sussex Vegetated Shingle Project) was established with support from the SITA Trust. The project aimed to build upon the current data pool for the habitat, evaluate shingle sites, raise public awareness of the importance of the habitat, and create a management plan, offering appropriate advice to local authorities, landowners, site managers and other interested parties. With the aid of volunteers the project gathered and collated data from 384 shingle vegetation surveys across the length of the county. This data was used to assess the current value and status of every major shingle structure along the East Sussex coastline (with the exception of Rye Harbour Nature Reserve, the Midrips and the Wicks, which are all at the eastern end of the county, in Rye Bay).

The East Sussex Vegetated Shingle Management Plan is the culmination of the SITA Trust project. Its purpose is to offer guidance and indicate the most beneficial approach to the management, protection and/or restoration of shingle sites in East Sussex.

1. Introduction

When discussing extinction we often think in historical timescales; the Great Auk (*Pinguinus impennis*), the Woolly Mammoth (*Mammuthus primigenius*), and of course the Dodo (*Raphus cucullatus*). However extinction is most definitely a current problem, with species being lost at a higher rate than we've ever experienced in recorded history. Some scientists have estimated that extinction levels are now thousands of times higher than the normal background extinction rate (Novacek & Cleland, 2001; Thomas *et al*, 2004). These estimates are likely to be a worst case scenario, however it cannot be disputed that we are currently losing more species than ever before.

Our ecosystem is finely balanced, each species sharing a close link with at least one other, and when a species is lost, it can have dramatic and devastating implications for many more. These implications are further compounded when a habitat comes under threat, often having a negative impact on a wide range of species.

In 1992, 172 nations (including the UK) gathered together for the Earth Summit in the city of Rio de Janeiro. The summit aimed to confront issues such as climate change, the appropriate management of hazardous waste, sustainability and the importance of biological diversity. At this summit the UK along with many other nations, signed the Convention on Biological Diversity (CBD), which recognised the importance of biodiversity and encouraged participating nations to produce and implement strategies which would protect national biodiversity levels.

Following this convention the UK developed an action plan to safeguard national biodiversity levels 'Biodiversity: the UK Action Plan' (1994). It covered a wide variety of species and habitats and this early document was the forerunner of today's Biodiversity Action Plans (UK BAP, 2008a).

European Union (EU) nations made a further commitment to protect biodiversity levels at the Gothenburg Summit in 2001. This was closely followed by the World Summit on Sustainable Development held in Johannesburg in 2002. Both conferences, with the aid of participating nations agreed to halt or seriously reduce the loss of biodiversity by 2010 (Fitzsimons *et al*, 2007). As a result of these conferences the Natural Environment and Rural Communities (NERC) act was introduced in 2006. The act placed a duty on all public authorities to consider biodiversity in every decision made (Defra, 2008).

Vegetated shingle is an extremely rare habitat, which displays both ecological and geomorphological interest (Green & McGregor, 1990), but has a very limited global range. With the many pressures shingle habitats currently face (e.g. development, sea defence works, enrichment and increased recreational use) they are under serious threat of extinction. Many of the habitat's flora and fauna are shingle specialists and would also be lost should the habitat diminish further. As such, the habitat has been identified as a priority under the UK BAP, its presence is a selection criterion for the identification of SSSIs, and 2 shingle habitats are listed on Annex II of the habitats directive.

The East Sussex Vegetated Shingle Project was established to gather information which would aid in the successful evaluation and monitoring of shingle sites, and would assist in the production of management guidance for shingle habitats across the county. By producing this information our aim is to help landowners and land managers fulfil their obligations to protect the county's remaining shingle resources and aid future habitat restoration and expansion projects.

2. Shingle definitions

Coastal habitats are dynamic environments, dominated by waves and storm events. They are constantly changing and these changes often manifest as forms of erosion, but can also take on the form of accretion (addition to the land), such as the development of shingle beaches.

Almost one third of the British coastline is fringed by structures with an important shingle component, 3,500km of which is comprised of pure shingle (Sneddon & Randall, 1993). It has been estimated that approximately 6,100 ha of this is vegetated shingle, which includes 5,300 ha in England, with 700 ha found in Scotland, 110 ha in Wales and 50 ha located in Ireland. The most significant of these structures are generally found in the north-east of Scotland, and in the south and south-east of England.

A large proportion of the East Sussex coastline (approx 45km) is comprised of shingle structures of some description.

Global distribution

Shingle structures are mainly limited to areas of extreme latitude, and other regions affected by Pleistocene glaciation. This limited range indicates the role that ice sheets played in the creation of the clastic materials which now form many of the world's shingle structures.

The composition of these structures often reflects local geology, with stones such as granite, quartzite, flint and chert being common to their own geological regions. This factor can have a massive impact on the availability and durability of shingle deposits.

Shingle matrix properties

Shingle beaches are formed in exceptionally high energy environments often making them very transient. The sedimentary deposits which help to create shingle structures are constantly being moved under the influence of longshore drift. The composition of shingle beaches encourages particular types of floral species and allows the structures to act as very effective natural sea defences.

Shingle material is classified as stones ranging from 2mm to 200mm in diameter (Scott, 1963; Pye, 2001). In East Sussex shingle deposits are generally comprised of a mixture of flint eroded from chalk cliffs and sedimentary material dating back to the last glacial period (Crofts, 1974).

Shingle matrices can vary greatly from pure shingle, to a mixed matrix of shingle with sand, clay or organic components. The range and levels of material within a shingle matrix may have a distinct effect on the stability of the structure and the development of floral communities.

The size range of clastic material within a matrix can differ from site to site and throughout a particular site. Larger clasts are generally found further inland, with smaller sediment such as gravel and sand being more commonly found closer to the foreshore. Sediment grading is also evident within shingle ridge structures, and these can often show a marked difference in particle size between ridge crests and lows (Randall & Fuller, 2001). These variations can have a large impact on beach morphology, stability, hydrology and the development of floral communities, as many shingle species appear to favour beaches with a well mixed shingle matrix, containing a healthy level of fine fraction material (Scott, 1963; Walmsley & Davey, 1997b).

3. Shingle structures

There are five recognised shingle structures, fringing beaches, shingle spits, cuspate forelands, shingle bars/barriers, and off shore barrier islands. Of these, fringing beaches and cuspate forelands are the most common to East Sussex.

Many factors govern the formation of shingle structures; the shape of the coastline, tidal movement, weather patterns and levels of accessible shingle deposits. Variations in these factors may act as catalysts contributing to the formation of a range of structures.

Fringing beach

A fringing beach (see figure 3.1) is a narrow strip of shingle material in contact with and running parallel to the coastline. Often occurring at the base of cliffs and in areas where anthropogenic barriers such as sea walls are dominant (obstructions which prevent the natural landward migration of shingle deposits). Fringing beaches are generally extremely transient environments which experience large annual fluctuations of shingle material. The majority of shingle beaches in East Sussex fall into this category.

Cuspate Foreland

Cuspate forelands are much larger masses of shingle, forming triangular protrusions which extend seawards (see figure 3.2). Cuspate forelands are generally formed in areas where bi-directional wave action pushes shingle to a point where it converges into one structure. One of the best examples of a cuspate foreland can be found at Dungeness (Kent & East Sussex).

Shingle spit

A spit (see figure 3.3) is a strip of shingle which develops outwards from the coast, in areas where the coastline changes direction suddenly. Spits often display recurved hooks at their distal ends, which is an indication of bi-directional wave action impacting the structure. Shingle spits can frequently be found in the vicinity of harbours (Pagham, West Sussex) and estuaries, where abrupt direction changes are common.

Shingle Bar/Barrier

Bars or barriers (see figure 3.4) are geomorphologically similar to shingle spits, with the exception that these structures extend across the length of a bay or estuary. Good examples of shingle bars/barriers include Chesil Beach (Dorset) and Cemlyn Bay (Anglesey).

Offshore Barrier Island

Offshore barrier islands are formed in areas where a large accumulation of shingle material is deposited offshore (see figure 3.5), and may be a precursor to the formation of a sand dune system. Examples of this type of structure can be found at Culbin Bar (Morayshire) and Scolt Head (Norfolk).

Figure 3.1 Fringing shingle beach - Bulverhythe, East Sussex (Tim Smith © 2008).

Figure 3.2 Cuspate foreland - Dungeness, Kent & East Sussex (courtesy of Henry Law © 2005).

Figure 3.3 Shingle spit - Pagham Harbour, West Sussex (courtesy of the South Downs Coastal Group).

Figure 3.4 Bar/Barrier - Chesil Beach, Dorset (adaptation of press image, courtesy of Dr Ian West).

Figure 3.5 Offshore Barrier Island - Scolt Head, Norfolk (courtesy of the National Education Network).

4. Shingle structures as a form of coastal protection and flood defence.

In recent years climate change has become a serious concern and most of us have now witnessed its effects. Weather patterns have become more erratic, sea temperatures are rising and polar ice sheets are retreating (Houghton *et al*., 2001; Robinson *et al*. 2005). This has lead to an increase in sea level rise, and the possibility of an increase in regularity and severity of storm events. These factors add to the issue of erosion and will likely amplify the problem.

In the UK, issues of coastal protection and flood defence have always been of primary importance. The geology of the East Sussex landscape makes it particularly susceptible to coastal erosion with the county's soft chalk cliffs eroding at a rate of between 0.5 - 1m per annum (Dornbusch, 2002).

Shingle beaches offer a natural form of protection for numerous areas of our coastline and for generations they have helped to protect our homes, businesses and many areas of natural importance. The composition and structure of the beaches allows them to act as very efficient sea defences, reducing the impact of storms, effectively absorbing wave energy and protecting coastal areas from the threat of erosion and flooding. However with growing coastal development and the introduction of anthropogenic coastal defences such as groynes, breakwaters and sea walls, the natural processes of shingle migration have been disrupted, severely reducing the efficiency of shingle beaches to act as a natural line of coastal defence.

The processes of longshore and offshore movement often impact upon beach volumes which can have an effect on available shingle supplies. Recent studies have also indicated that loss of shingle materials through in-situ abrasion may be a major factor in the reduction of available sedimentary materials (Dornbusch *et al*., 2002). These sedimentary supplies are finite and with limited levels of naturally occurring shingle material being added on an annual basis, this presents a serious problem for our coastline.

The annual addition of shingle material, through chalk cliff erosion, to current shingle deposits can vary depending on the area surveyed. However it is generally a small proportion of overall shingle deposits and has been estimated at 4610 ± 890m³ per annum, for the entire East Sussex coastline (Dornbusch, 2002).

In comparison it has been estimated that East Sussex beaches lose some 5.7% of shingle (per annum), through natural erosion. Wave height and energy appear to be the main contributing factors to pebble abrasion (Dornbusch *et al*., 2002) and with continued erratic weather patterns increasing the severity and frequency of large storm events, this figure is likely to increase.

The natural addition of shingle material to existing deposits has previously helped to minimize the annual loss of materials through longshore drift, erosion and abrasion. Unfortunately some of our current coastal protection schemes have been implemented to limit the erosion of our chalk cliffs, further reducing the annual addition of shingle materials to the beach.

5. Vegetated shingle

Vegetated shingle is a globally rare and threatened habitat and the UK holds a significant proportion of European shingle resources (approx 6100ha). Despite its apparent abundance around the south coast of Great Britain, shingle rarely occurs outside of north-west Europe, Japan and New Zealand.

The development of vegetated shingle communities is generally dependant upon three main factors; structure stability, matrix composition and the availability of freshwater and nutrients. Shingle flora shows a preference for stable beaches with a well mixed or fine fraction matrix (Scott, 1963; Fuller, 1987; Doody & Randal, 2003). Studies have indicated that shingle structures which contain a high level of fine fraction material allow for a more successful build up of nutrients within the matrix and are much more effective at seed capture (Fuller, 1987; Walmsley & Davey, 1997b). Fuller (1987) also showed a positive link between the content of fine sedimentary materials within a shingle matrix and its capability for water retention.

Shingle beaches can be extremely transient structures, and begin their existence as barren landscapes devoid of life. Despite this some floral species find the challenge of beach colonisation an attractive one. After all shingle beaches can offer real benefits to those species able to survive on them (i.e. limited competition from other species, room for expansion and minimal loss through herbivorous damage). As floral communities develop the landscape of the beach begins to change, thus encouraging further species into the environment (e.g. invertebrate, avian). Shingle habitats are often home to many specialist floral species which are unable to survive anywhere else. These specialists are well adapted to life within this harsh environment and when given the opportunity can develop into wide ranging, vibrant and exceptionally beautiful floral communities. Shingle vegetation also increases the stability of beaches and limits sedimentary movement, helping to protect our homes, businesses and other environmental interests from flooding and coastal erosion.

Because of its rarity vegetated shingle is recorded as a priority habitat under the UK's Biodiversity Action Plan (BAP). The UK BAP has recorded ten species which share a close association with areas of shingle and have been recognised as rare or threatened (UK BAP 2008b). These species include the Toadflax Brocade moth (*Calophasia lunula*), the White Spot moth (*Hadena albimacula*), the Brown-banded Carder Bee (*Bombus humilis*), the Large Garden Bumble Bee (*Bombus ruderatus*), the Short-haired Bumble Bee (*Bombus subterraneus*), the Leafhopper (*Aphrodes duffieldi*), Red Hemp-nettle (*Galeopsis angustifolia*), Stinking Hawks-beard (*Crepis foetida*), Sea Lavender (*Limonium* spp.) and the Small-flowered Catchfly (*Silene gallica*). Of these Red Hemp-nettle, Sea Lavender, Stinking Hawks-beard, the Toadflax Brocade moth, and the White Spot moth, can be found in East Sussex.

Shingle habitats are extremely important to a range of other species including ground nesting birds such as terns (*Sterna* spp.) and the Ringed Plover (*Charadrius hiaticula*), and waders like the Oystercatcher (*Haematopus ostralegus*) and curlews (*Numenius* spp.). These species often nest directly on the shingle or visit the beach to forage for food (Cadbury & Ausden, 2001). A wide variety of invertebrate species rely on shingle habitats (Shardlow, 2001), for example the wolf spider and the jumping spider, both ground hunting specialists that do not build webs. Some species such as the scuttle fly *Megaselia yatesi* have only recently been discovered living approximately a metre below the surface of some shingle beaches. This indicates just how much we still have to learn about this beautiful and fascinating environment.

Primary succession

Primary succession is a process which occurs in areas devoid of an initial layer of soil and is the most basic form of ecological succession (Walker & Del Moral, 2003). Shingle beaches are one of the very few habitats which experience primary succession. In such a harsh environment, the small amounts of soil which eventually build up are often generated through detritus from decaying plant matter and biological debris washed on to the beach.

Community zonation

At first glance shingle beaches can appear to be very barren and desolate places. But under the right circumstances, shingle can build up beyond the reach of the waves and floral communities may begin to develop.

Initially communities are ephemeral and consist of an annual plant known as Orache (*Atriplex* sp.). Often difficult to identify to species level, due to similarities amongst species and a propensity toward hybridisation (Taschereau, 1988), this genus colonises the beach quickly frequently forming a green haze along the foreshore. Detritus from this initial community begins the process of forming a thin layer of soil on the beach, encouraging further communities to develop.

Further inland pioneer species begin to colonise the beach, these include Sea-kale (*Crambe maritima*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* spp. *littoreus*) and Sea Pea (*Lathyrus japonicus*). Flora within this zone generally forms in patches with large areas of bare shingle dividing them. Plants colonising the pioneer community help to bind the shingle together and contribute to the process of beach stabilisation. Detritus from these species also help to add to the thin layer of soil present on the beach.

As the shingle stabilises a more complex established community can develop and the variety of shingle plants increases. Established communities often continue to display pioneers such as Sea-kale (*Crambe maritima*), Yellow Horned-poppy (*Glaucium flavum*) and Curled Dock (*Rumex crispus* spp. *littoreus*). But these are interspersed with a range of other species including bryophytes, lichens and a variety of grasses, Gorse (*Ulex europaeus*), Blackthorn (*Prunus spinosa*), Hawthorn (Crataegus spp.), and many other vascular plants. These are the rarest communities, often taking hundreds of years to develop. Unfortunately established communities are also the first to be lost to pressures such as agriculture and development.

Over time, following a build up of soil within the environment, areas of vegetated shingle can succeed in to grassland, heath, scrub and eventually woodland (Randall & Sneddon, 2001). These environments can form rich and valuable habitats within their own right and have been used for agriculture, development and other human activity.

Hydrology

When managing an area of shingle it is important to understand the hydrological processes of the beach, how they change and how those changes can impact on floral communities.

Many shingle beaches have a fresh water table beneath their surface and where the sea connects with the beach a mixing of saline and fresh water often occurs. Saline water however, cannot easily penetrate the fresh water table and so at the point where the two meet, saline water underlies the fresh ground water. Separation between the two continues as tidal changes occur, causing the fresh water table to rise twice a day in conjunction with tidal movement. This raising of the fresh water table is a main source of water for many of the species which inhabit the beach.

It has been recognised that shingle structures are very efficient at retaining water and limiting evaporation. Within shingle structures, stones just a short depth below the surface (0.3m), are often found to remain damp throughout the day (Burnham & Cook, 2001). This ability to retain water within the matrix is a vital component in the development of rich floral communities (Fuller, 1987).

6. Pressures

Shingle beaches are formed in a dynamic environment which is heavily influenced by tidal movement, climate and changing weather patterns. They are currently under threat from a range of both natural and anthropogenic pressures. These pressures can be extremely damaging to areas of shingle and the communities which exist on them and may also reduce their effectiveness as natural coastal defence barriers.

Areas of shingle are generally harsh environment which few species are capable of enduring. This presents many difficulties for floral species hoping to colonise shingle sites, however some plants have successful adapted to cope with the habitats ever changing conditions.

Natural pressures

Some of the natural pressures faced by shingle species include the risk of inundation from the sea, desiccating salt spray, high winds, a frequently shifting substrate, the risk of burial under shingle deposits, wide ranging temperature changes and a lack of fresh water and nutrients.

Shingle species have evolved some rather interesting adaptations to cope with these issues. Sea-kale (*Crambe maritima*) and Yellow Horned-poppy (*Glaucium flavum*) both have a very long tap root which can grow up to 2 meters (in Sea-kale: Scott & Randall, 1976). These roots can be driven down through the shingle to allow the plant access to fresh water supplies. Sea Campion (*Silene uniflora*) has closely packed leaves which help to protect the plant from the high winds common to coastal areas. Stonecrop (*Sedum* spp.) has very succulent leaves which help the plant with water retention. Both have very extensive root systems which help to bind the loose shingle and stabilise the beach. Many shingle plants have developed very thick, waxy leaves and others are often very prostrate or develop in mat like forms to protect themselves from the elements.

Anthropogenic pressures

The man made pressure experienced by shingle habitats can have a much more damaging effect than any natural pressure. Many of the coastal activities we undertake (i.e. development, sea defence works, water abstraction and recreation) can often have an impact on our shingle beaches.

Aggregate extraction:

Gravel extraction has been a long running problem for shingle beaches, generally extracted for use in sea defence works and other areas of the construction industry.

Onshore excavation can have a massive impact on beach morphology (both through the removal of materials and the damage caused by work undertaken with heavy machinery) and can have a damaging effect on floral communities, sometimes destroying large areas of vegetation.

Development:

It is understood that the need for development is important, particularly in this climate of continuing and rapid populations rise. However it is also important to consider the repercussions of anthropogenic development in the long-term. The use of long term erosion risk maps in planning can help to avoid catastrophes such as the loss of homes and communities through flooding.

Coastal areas in the south east are popular places to live and work, and development is widespread. Development on areas of shingle is also very common and areas such as Eastbourne, Bexhill and Hastings all have developments which impact (directly or indirectly) upon shingle structures. In fact much of the coastline of East Sussex has experienced some form of development on or near to shingle structures.

Development can have a devastating effect on beach morphology, can damage or destroy whole plant communities and can severely impact natural processes, negatively influencing

the movement of shingle along the coast. Coastal development also increases the demand for coastal defence and can lead to habitat loss through coastal squeeze (see below).

Sea defences:

Sea defences and sea defence works can also have an extremely negative impact on shingle beaches. Some sea defence structures such as groynes and breakwaters disrupt or prevent the natural flow of shingle materials along the coast. Others such as sea defence walls can limit the addition of fresh flint supplies and/or prevent the landward migration of shingle habitats (known as “coastal squeeze”).

Enrichment:

Enrichment is caused by the addition of nutrient matter to a substrate (such as that produced through garden waste, dog fouling and litter). Shingle species are highly tolerant to the lack of nutrients within their environment. Addition of nutrients to the habitat encourages the development of non-specialised species which out compete the highly adapted shingle plants.

The best way to combat this issue is often by educating user groups. Informing people of the habitat’s importance, and the damage that increased nutrient levels may have, can often be achieved by talking with local community groups, holding educational events and displaying information on interpretation boards and warning notices around the site.

Invasive species:

Unlike shingle species many plants thrive on higher nutrient levels, and so when nutrients are added to a site, these species can establish themselves and spread quickly. Another source of invasive species comes from garden escapes. These may originate from adjacent gardens or garden waste dumped on shingle sites.

It is recommended that site managers instigate a program of invasive species removal in combination with educational activities to raise public awareness in the local community and general public; this could include talks and events to raise awareness, and interpretation boards and warning signs around the site.

Public access:

Disturbance through visitor numbers is a common occurrence on most shingle beaches. Public awareness of the significance of shingle structures is generally quite low and the habitat is often overlooked or misunderstood. This lack of understanding can lead to problems of vegetation trampling and enrichment due to an increase in littering and dog fouling. Direct disturbance may also have a negative impact upon ground nesting birds such as the Ringed Plover (*Charadrius hiaticula*).

It is important to find a balance between public access and the protection of shingle habitats. A lack of awareness can often be overcome with the aid of appropriate interpretation material and promotion of the habitat through a program of talks and guided walks.

Consideration should also be given to limiting public access to sensitive areas of the site and helping others to understand the importance of the habitat through strategic use of interpretation and other informational boards.

Vehicular access:

Any vehicular access on shingle sites can be extremely damaging to both beach morphology and the vegetation communities present. Consequently this damage can have a negative impact on the invertebrate and avian species which rely on shingle habitats.

Damage to the surface of a shingle structure can change the shape of a beach and in turn beach dynamics (i.e. the impact of tyres on the beach can create mini shingle ridges, often causing water to pool in lows and destroying vegetation). Vehicles damage shingle surfaces through compaction, which can have an impact on beach vegetation, structure and hydrology (as compaction of the substrate can change the beaches ability to retain and disseminate water). Vehicular access may add to the enrichment of an area increasing nutrient levels

through deposits of oil, fuel and other foreign materials which build up within tyre treads and elsewhere. The evidence of vehicular disturbance can be seen for many years after its occurrence, and these scars can have a negative impact on the development of future floral communities (Doody & Randall, 2003).

It is important to restrict access to shingle sites and prevent vehicular use unless absolutely necessary. Vehicular access can be limited by use of appropriate measures (gates, fencing, concrete bollard etc.) and by educating site user groups.

7. Shingle Surveys

Undertaking surveys is an important part of any site management program; the data gathered can help site managers to effectively monitor changes and recognise positive or negative trends within communities.

Surveys should be carried out twice a year, once at the beginning and once towards the end of the growing season. It is important to repeat surveys on an annual basis, at a fixed location. This will provide a comprehensive and up to date pool of information, making it easier to identify changes.

The aim of this document is to help site managers to manage shingle sites in such a way as to protect and/or enhance the habitat, thereby helping organisations to fulfil their biodiversity duties (see Introduction).

To achieve this aim, a comprehensive survey of shingle sites across East Sussex (Telscombe to Winchelsea) has been carried out with the aid of volunteers. The technique used was developed through the Interreg III Beaches At Risk project (Fitzsimons *et al*., 2007). This technique facilitates the assessment of relative biodiversity values for shingle sites, based upon an evaluation of factors including the presence or absence of indicator species, the size of a site, shingle characteristics and the potential for habitat expansion. The technique also provides valuable information regarding current pressures on the site (survey methodology and a sample survey form are attached as Appendix A). A comprehensive shingle species identification guide is also attached as Appendix B.

The following chapter describes some general management techniques which can be applied to a variety of sites under a variety of circumstances as appropriate. Chapter 9 describes all beaches surveyed in detail and outlines recommended management information.

8. Habitat Management Advice

Appropriate habitat management can vary immensely from site to site, but is essential in the battle to protect shingle structures and the species which inhabit them. Many of the problems faced by shingle beaches are universal and possible solutions to these are discussed below.

Note: It is critical that site managers review each site on an individual basis as different areas will have their own issues based on site geomorphology, species interest (floral, avian and invertebrate) and usage. For advice on individual beaches, please see chapter 8.

Shingle vegetation is hardy and the best management is often to do nothing. However particularly sensitive areas may benefit from limited public access. In particular, vehicular access should be restricted wherever possible. Consideration should also be given to the removal of invasive species, seed collection, habitat restoration and the management of successional changes to a site.

Removal of invasive species:

Invasive species can have a huge impact on habitats and the flora within them, often changing the dynamic of the environment until the habitat is unrecognisable from its original form. In most cases it is beneficial to remove invasive species before they can have an irrevocable effect on the habitat.

For many invasive species removal is often a simple task of pulling the plant (roots and all), from the ground and disposing of it appropriately. However this is not always the case, in such circumstances it is advisable to seek out further information on individual species before work commences.

When carrying out this task you should give some thought to limiting the spread of the invasive species, this may include; the full and complete removal of plants (as some species can regenerate from small root fragments), the removal of invasive species before flowering/seeding occurs as removal after this time can result in the unintentional spreading of seed, and working with local communities to limit the effects of garden waste/garden escapes.

In some instances species may require control or removal through the use of chemical compounds. It is important to seek professional advice and/or obtain any relevant pesticide licences before using chemical compounds for species removal. When selecting a compound for this task it is crucial to carefully review data regarding all available products, understand their environmental impact, and where possible review data from similar projects. The removal of invasive species, using pesticides, has been undertaken with some success at Rye Harbour Nature Reserve. Species such as Red Valerian (*Centranthus ruber*), Bramble (*Rubus fruticosus* agg.), and Sea Buckthorn (*Hippophae rhamnoides*), have all been controlled by spot spraying or weed wiping with glyphosate.

When deciding upon an appropriate course of action to take in the removal of invasive species, it is vital to weigh up the need for species removal, against the damage which removal techniques may have upon the remaining habitat.

Seed collection:

Seed collection is an essential step in creating a viable stock of species available for future restoration projects.

Several factors should be considered when carrying out a program of seed collection:

- appropriate collection times;
- amounts of seed collected;
- sustainable collection methods;

- appropriate long-term storage for seeds.

Any seed collection should be carried out in accordance with the Botanical Society of the British Isles (BSBI) code of conduct (**http://www.bsbi.org.uk/Code_of_Conduct.pdf**). It may be necessary to seek consent from Natural England if collection is to be carried out on a designated site. It should also be noted that some species are protected by law.

Habitat restoration:

In certain areas habitat restoration projects may be required to bring shingle sites into favourable conditions.

Several studies have been carried out relating to the restoration of shingle plant communities (Fuller, 1987; Walmsley & Davey, 1997a, b & c). These studies have shown that shingle species display a preference for sites with a well mixed shingle matrix (containing a good level of fine fraction material), an available water source and an area large enough and stable enough for floral community development, traits which were similarly acknowledged by Scott (1963).

In 1997, Walmsley & Davey undertook studies to compare two restoration techniques. Data was recorded for both a seed sowing method and the transplantation of container grown plants. These studies were inconclusive, species such as Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Pea (*Lathyrus japonicus*), and Sea Holly (*Eryngium maritimum*), demonstrated a mixed response to both methods.

Seed sowing is often the most accessible approach to habitat restoration as it requires a limited investment of time and manpower, and can be successful in encouraging species growth. With this in mind it is vital to have an available seed bank stock. If purchasing seed do so from a reputable supplier and check species authenticity before sowing. If undertaking seed collection it is important to follow BSBI guidelines in order to protect existing communities (see above). Where possible it is important to source seed from local floral communities, providing species representative of the area.

In 2002 a restoration project was undertaken on a shingle site at East Stream (TQ 695 060), to mitigate coastal defence work. The site was surveyed and seed was collected prior to works taking place, seeds were then scattered following completion of the works. The results of this project were extremely positive and within a year several shingle species had re-established successfully (Dr. Kate Cole pers. com.).

Species for restoration projects should be chosen carefully and research into appropriate species for the area is vital, as introduction of a foreign species will change the dynamic of the site or cause damage to current communities.

Close links with local community groups can be of great benefit when undertaking restoration projects, and for ongoing site management.

Management of successional changes:

Habitat succession can present a real problem for site managers, particularly on large sites. Successional changes may mirror the character of the surrounding area, being influenced by species common to neighbouring habitats. These changes can also be influenced by site morphology, available nutrient levels, the types of communities currently in development, and the availability of space for habitat growth/expansion.

Successional change may be guided or limited with a range of management techniques. For example grazing can limit the growth of some species which may help to guide successional development towards a heath or grassland habitat (Randall, 2004). The removal of scrub species (hawthorn, blackthorn, buckthorn etc.) can help to limit the effects of succession into scrub & woodland habitats.

At both Dungeness and Rye, grazing has traditionally been used with some success. Historical data right up to the 1960's suggests that grazing of livestock was a common

practise in both areas and results of this can still be seen in the gradation of vegetation from the landward edges of these sites down to the shore line. In both cases distinct lines can be drawn showing the Successional changes from woodland, down through scrub, grassland and finally in to vegetated shingle communities.

Tourism & Public Access:

Limiting public access to particularly sensitive areas can be vital to the protection of some species. Floral, avian and invertebrate species can all benefit from the seasonal or annual demarcation of sensitive areas.

The trampling of vegetation is very damaging to shingle habitats and can change or even destroy the plant communities present. This in turn can have an impact on the invertebrate communities able to survive within the habitat. For example Toadflax (*Linaria* spp.) can be common to some shingle sites and is the preferred food plant of the Toadflax Brocade Moth (*Calophasia lanula*), a species which is in decline. The loss of this plant from a site can have an effect on the dynamics of the plant communities present but can also have a damaging impact on invertebrates and other species.

Often the avian species present at shingle sites are ground nesting or spend part of their time foraging on or near to the shingle. Limiting access to preferred or known nesting areas, can allow these species to nest successfully.

The demarcation of sensitive areas can be achieved by erecting permanent or temporary fencing around important sections of the site and may help to protect against the issues mentioned above. Any demarcation should be accompanied by appropriate information/interpretation to educate the public as to the need for the restriction.

Boardwalks can also be an effective way of limiting damage (through trampling) to beach structure and vegetation. These structures, which have been successfully trialled at Walmer beach in Kent, can help to guide visitors away from direct contact with the substrate and any vegetation present.

Vehicular access:

Vehicular access is often extremely damaging to shingle structures and plant communities and should be limited wherever possible. Evidence of vehicular access can often be seen at shingle sites and damage caused to the surface of shingle structures can remain evident for many years.

Obstructions (gates, fences, concrete blocks etc) can be erected at access points around the site to limit vehicular activity. Again it is important to educate others on the impact that vehicular activity can have on areas of shingle, by erecting signs across the site.

In situations where vehicular access is essential (sea defence works, restoration projects etc.), compaction and damage to vegetation can be serious issues. Temporary metal trackways can be placed on the surface of the beach and may help to limit vehicular impact. These trackways can have a bleaching effect on the vegetation beneath them however they will protect beach morphology and shingle vegetation can often recover quite quickly. When vehicular access is required it is also advisable to restrict this to a pre-agreed area.

Waste control and management:

Consideration should be given to the erection of litter and/or dog bins across sites if appropriate. The strategic use of signage can help to educate site users and keep waste to a minimum.

Working closely with local action groups can also help to reduce site waste, e.g. through regular beach cleans. This has been successfully introduced at several sites across East Sussex including West Beach, Tide Mills and Eastbourne. Encouraging local groups to set up such projects raises awareness within the local community, encourages site ownership, and is a sustainable approach to site management.

Management of coastal defence projects:

Many area of shingle are regularly recharged and re-profiled by the EA (Environment Agency) or partner organisations. The work carried out is important in helping to retain beach levels for flood defence.

The traditional hard engineering approach to sea defences often tampers with the natural processes of shingle movement and migration (Coates *et al*., 2001). A better understanding of natural coastal processes and a recognition that defences must be sustainable in the long-term (in light of climate change) means that government policy has changed and that alternatives to hard engineering should be sought wherever possible.

In some areas man made defences are being removed in favour of natural solutions. However, due to a reduction in available sedimentary deposits (and other factors), it is likely that some areas will need a continuing program of beach replenishment work. There is also a need to maintain defences in areas where homes and businesses are at risk.

If coastal defence works are to be carried out in a sensitive area advice should be sought from the Environmental Advice Team (ESCC), on how to avoid or minimise damage, prior to the commencement of works. Some general information is available in the “Guidelines for good practise when working on beaches with vegetated shingle” attached as Appendix C. Colour identification “Cab Cards” are also available to help contractors and engineers to recognise and avoid shingle communities (see Appendix D). These have been designed to be printed, laminated and made available on site.

In some cases, where building work is required or where it would be difficult to limit vehicular access, the top 30cm of shingle should be removed and stored, to be replaced upon completion of the works. This helps retain the local seed bank within the shingle and encourages habitat re-establishment following the works. Advice should be sought from the ESCC Environmental Action Team on when this might be appropriate.

It may be possible to offer workers guided walks to increase their awareness of the habitat and help them identify important areas. It may also be necessary to mark sensitive areas. Such activities should be agreed prior to work commencing

9. Evaluations and advised management

The county evaluation section displays data collected from shingle sites across East Sussex (during 2008 surveys) including relative biodiversity values for shingle sites across the county (see figure 9.1.1), mean transect lengths for each of those sites (see figure 9.1.2) and species presence/absence at each site (see table 1).

The beginning of each section displays information regarding the parish in which a particular site is located. This is to help the reader to develop an understanding of local processes and pressures which may impact upon a site.

Individual site evaluations include information such as beach location, length, width, area, site designation and biodiversity value. Each section also includes a site description, species list, information regarding the current management of the site, and recommended management.

For graphical representations of specific site data including individual transect locations and evaluations, vegetation cover and species distribution information, please see Appendix E.

Site managers and/or landowners are advised to carry out a regular program of site surveys and monitoring. This data will help to expand current data pools, and will assist in the continued evaluation of shingle sites. The information gathered may help to identify changes within a site, thereby assisting in any future maintenance and/or restoration projects.

Note: Rye Harbour Nature Reserve, the Midrips and the Wicks were excluded from the current project area as the vegetation there is well known. The Nature Reserve, established in 1970, is home to the largest single area of shingle within the county of East Sussex, and is designated as a Special Area of Conservation (SAC) and a Special Protection Area (SPA) for its shingle habitat and associated communities. The site, which is located towards the far eastern end of the county, supports a variety of shingle species including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*). Of particular note are Red Hemp-nettle (*Galeopsis angustifolia*), Sea Pea (*Lathyrus japonicus*), Least Lettuce (*Lactuca saligna*) and Stinking Hawks-beard (*Crepis foetida*). Ephemeral, pioneer and established communities are all represented at the site, and levels of succession towards the rear of the reserve include areas of grassland and scrub. The reserve is home to many breeding bird species including terns (*Sterna* spp.), Gulls (*Larus* spp.), and waders e.g. the Oystercatcher (*Haematopus ostralegus*) and the Ringed Plover (*Charadrius hiaticula*).

County evaluations

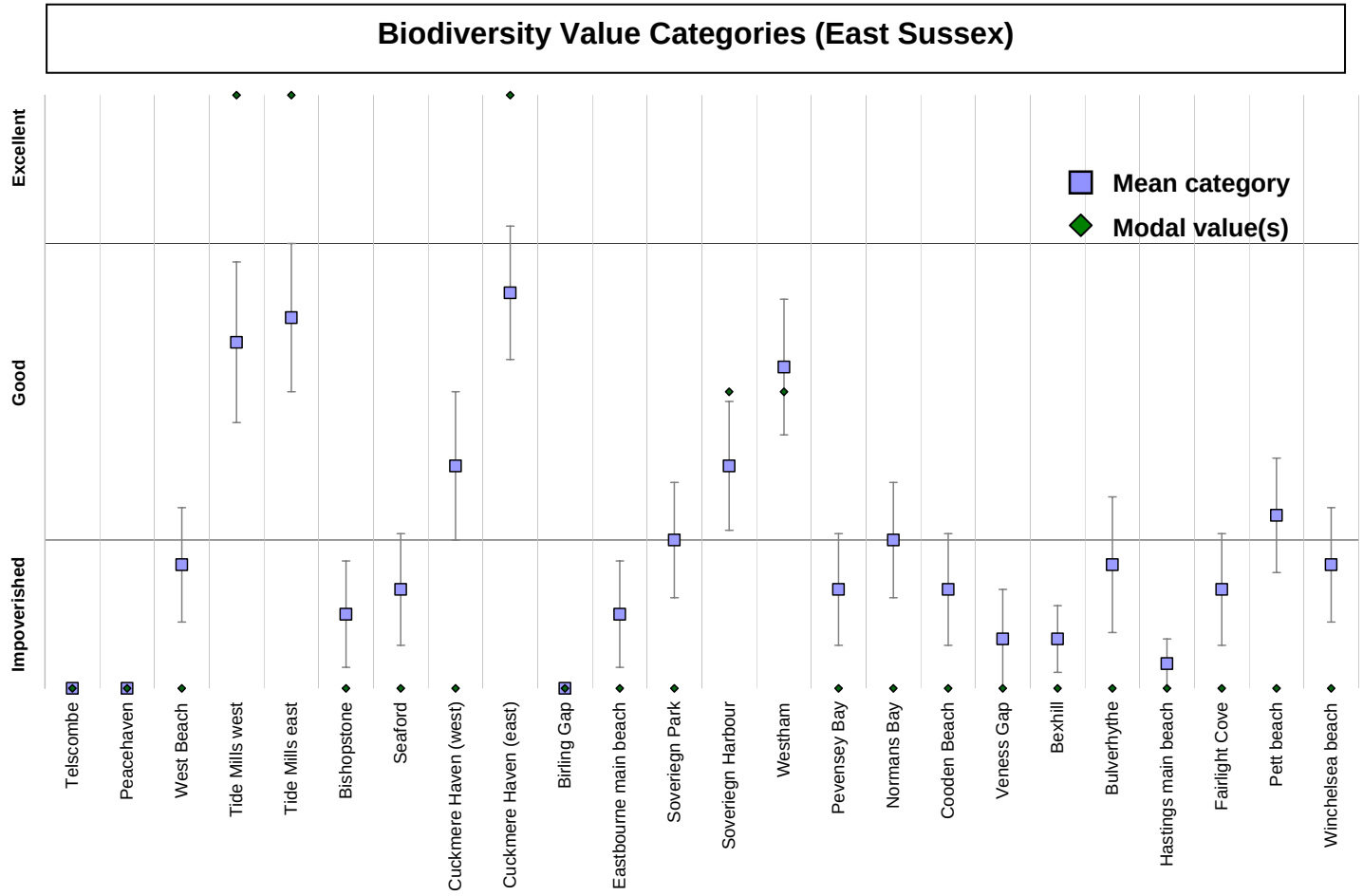

Figure 9.1.1 Biodiversity values for shingle sites across East Sussex including mean category ± SEM and modal value(s)

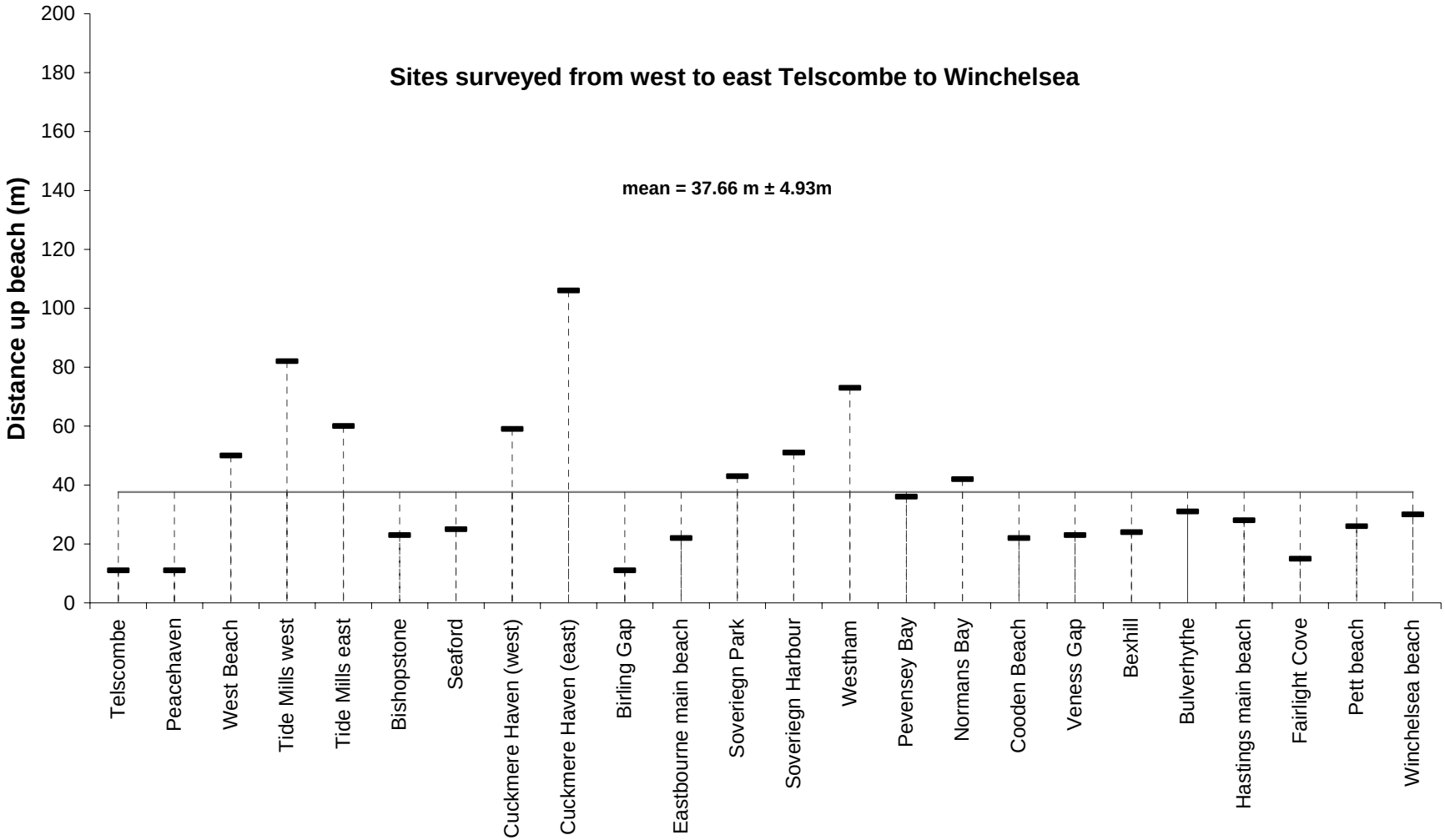

Figure 9.1.2 Shows mean transect lengths for shingle sites across East Sussex.

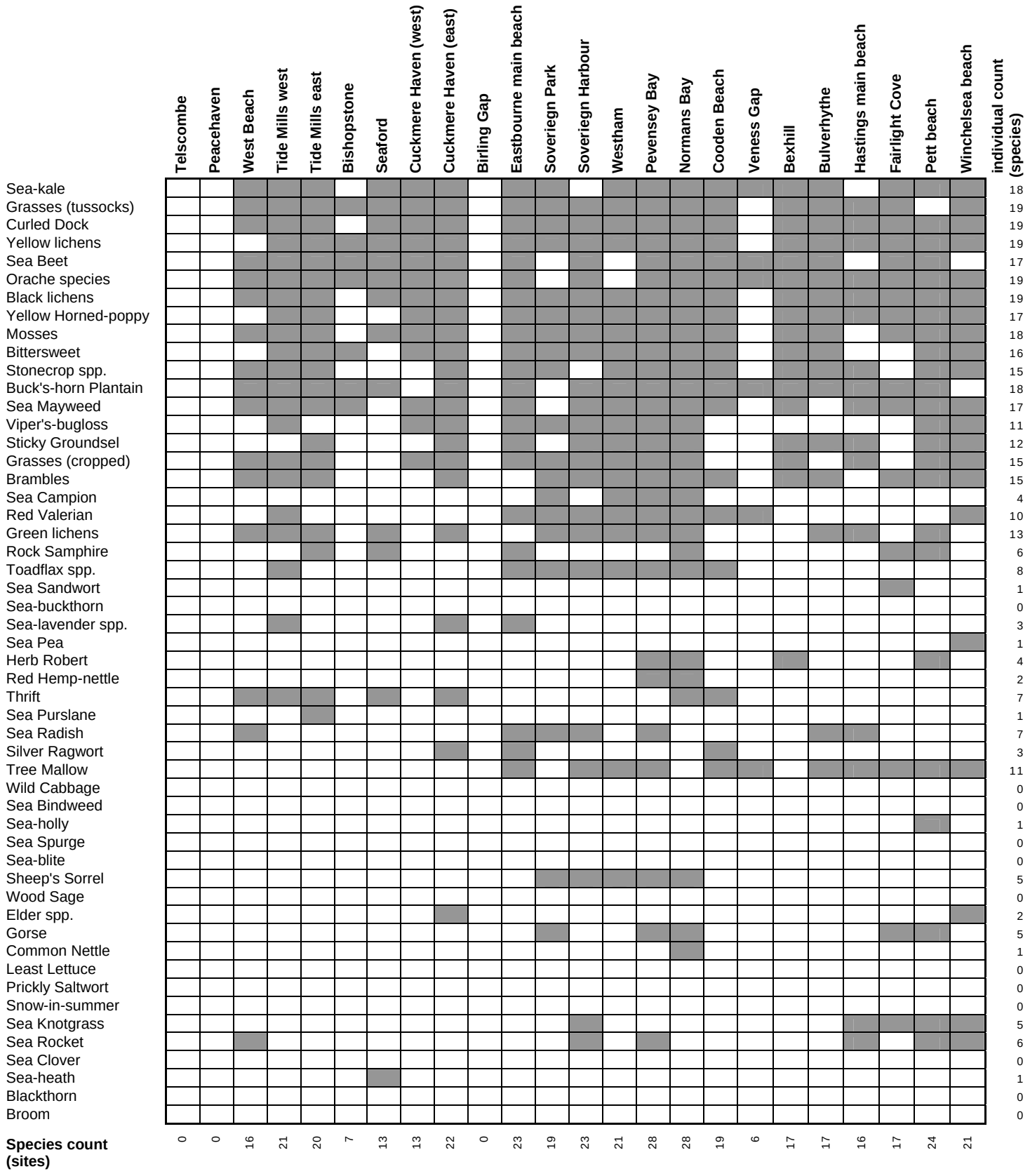

Table 1 Species count for shingle sites across East Sussex. Species presence is denoted by a grey square. Totals columns display counts for species per site and number of site at which each species was recorded.

Site evaluations and management advice

Figure 9.2.1 shows the full extent of the parish of Telscombe.

Parish:	Telscombe
Parish extent:	(TQ 383, 018) to (TQ 401, 010)
Beach Surveyed:	Telscombe

Telscombe is a parish located to the west of Newhaven, and has a population of around 13,000. Telscombe village is thought to have been in existence during the Roman period, and the parish church (St Laurence) dates back to the 10th century. The area around Telscombe is well developed, exhibiting both residential and commercial properties.

Telscombe beach

Figure 9.2.2 Shows the location of Telscombe beach

Beach surveyed:	Telscombe
Beach extent (approx):	(TQ 383, 018) to (TQ 401, 010)
Beach length (approx):	1.1 km
Beach width (max):	30 m
Beach area (approx):	1.5 ha
Site designation:	SSSI (the beach and bordering chalk cliffs fall within the boundaries of the Brighton to Newhaven Cliffs SSSI)
Biodiversity Value:	Impoverished

Telscombe

The area exhibits signs of a relatively new shingle beach (in geological terms), being mainly comprised of recently eroded shingle materials. The shingle matrix consists largely of cobbles mixed with some pebbles. Small pockets of shingle are visible at high tide here, with no noticeable vegetation being present.

Telscombe beach shows little promise for future expansion, as this section of coastline is extremely transient and offers little time for vegetation to develop. Future beach development is also hampered by the chalk cliffs (skirted by anthropogenic sea defences) found along the length of this sector. These structures limit the annual addition of shingle materials to the beach and negate any possibility of landward migration. This situation is unlikely to change in the near future due to the high level of residential and commercial development within the area.

Management advice: None

Figure 9.3.1 shows the full extent of the parish of Peacehaven.

Parish:	Peacehaven
Parish extent:	(TQ 401, 010) to (TQ 431, 001)
Beach Surveyed:	Peacehaven

The settlement of Peacehaven came into existence during the early part of the 20th century. Since its conception the parish has become a well developed area of the Sussex coastline, encompassing both residential and commercial properties and boasting a population of approximately 13,200.

Peacehaven beach

Figure 9.3.2 Shows the location of Peacehaven beach

Beach surveyed:	Peacehaven
Beach extent (approx):	(TQ 401, 010) to (TQ 428, 002)
Beach length (approx):	1.2 km
Beach width (max):	30 m
Beach area (approx):	1.5 ha
Site designation:	SSSI (the beach and bordering chalk cliffs fall within the boundaries of the Brighton to Newhaven Cliffs SSSI)
Biodiversity value:	Impoverished

Peacehaven

The area exhibits signs of a relatively new shingle beach (in geological terms), being largely comprised of recently eroded materials. The shingle matrix consists mostly of cobbles mixed with some pebbles. Only very small pockets of shingle are visible at high tide, with no noticeable vegetation being present.

Bordering cliffs and coastal protection structures restrict the development of shingle communities, limit the addition of further shingle material to the beach and will prevent any landward migration of shingle materials, limiting the overall development of this beach. This situation is unlikely to change in the near future due to the high level of residential and commercial development within the area.

Management advice: None

Figure 9.4.1 shows the full extent of the parish of Newhaven.

Parish:	Newhaven
Parish extent:	(TQ 431, 001) to (TQ 458, 001)
Beach Surveyed:	West beach
	Tide Mills (west)

Newhaven is a highly developed parish located along the banks of the river Ouse, with a population of approximately 12,000. Newhaven town is located several miles south of Lewes, and displays a historical importance due to its strategic location at the mouth of the river. The area is home to many residential and commercial properties and is the location of the county's main port.

West Beach

Figure 9.4.2 Shows the location of the shingle site at West Beach.

Beach surveyed:	West Beach
Beach extent (approx):	(TQ 443, 999) to (TQ 447, 998)
Beach length (approx):	650 m
Beach width (max):	120 m
Beach area (approx):	2.2 ha
Site designation:	SSSI (the beach and bordering chalk cliffs fall within the boundaries of the Brighton to Newhaven Cliffs SSSI)
Biodiversity value:	Impoverished (Areas towards the eastern end on the beach exhibit an improved value).

West Beach

West Beach is a medium sized shingle formation on the western side of Newhaven harbour arm. The site is predominantly comprised of recently eroded shingle material (in geological terms), with a matrix largely consisting of pebbles and gravel with some cobbles. Much of the beach falls within the boundaries of the Brighton to Newhaven Cliffs SSSI. The bordering chalk cliffs also make up part of the Castle Hill Local Nature Reserve (LNR) and are of avian interest, supporting colonies of nesting Fulmars (*Fulmarus glacialis*). Slumps at the base of the cliffs are important for invertebrate species.

The site contains a good range of shingle vegetation including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Stonecrop (*Sedum* spp.), Sea Beet (*Beta vulgaris*), Buck's-horn Plantain (*Plantago coronopus*), Sea Mayweed (*Tripleurospermum maritimum*), Thrift (*Armeria maritima*), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), Sea Rocket (*Cakile maritima*), mosses, and grasses, crustose and foliose lichens. Current floral species and distribution indicate the presence of ephemeral and pioneer communities, both of which display a restricted range.

Other species present include Brambles (*Rubus* spp.) and Common Ragwort (*Senecio jacobaea*).

The location of this site, in relation to the harbour arm, suggests that loss of shingle materials through longshore drift would be minimal, resulting in a relatively stable structure with little chance for expansion. Bordering cliffs and engineered sea defences prevent any chance of landward migration here. The site's isolated location, combined with open vehicular access, can encourage waste

dumping and fly tipping. The size of this site offers an opportunity for some habitat restoration (e.g. removal of waste and other sources of enrichment and reseeding of the areas with typical pioneer species). Negotiations with landowners may help to limit vehicular access, reducing the levels of waste dumped at the site.

A local community group (the West Beach Action Group), carry out annual beach cleans and ecological surveys of the site, and future restoration projects would benefit from their involvement.

Management advice: Limiting vehicular access to the area would reduce compaction and the amount of waste across the site. Removal of waste material from the area could help to improve the habitats environmental value. Interpretation (signs, information boards etc.) would help to inform site users of the habitat's importance, thereby limiting damage from disturbance. Habitat expansion could be achieved by seeding the area with a mixture of shingle pioneer species. The continuation of regular ecological surveys and general site monitoring should be encouraged.

Tide Mills (west)

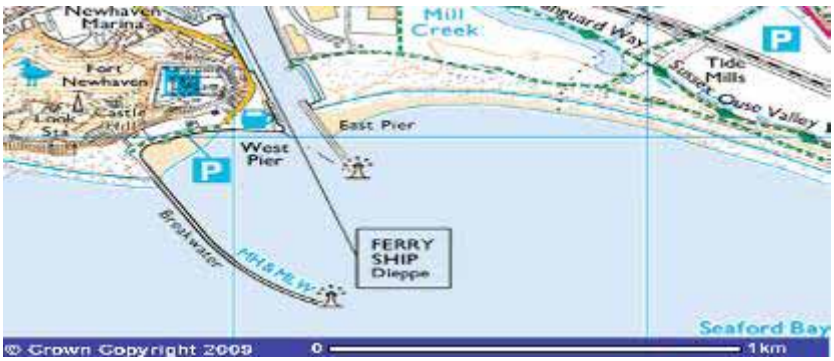

Figure 9.4.3 Shows the location of the shingle site at Tide Mills.

Beach surveyed:	Tide Mills (west)
Beach extent (approx):	(TQ 452, 001) to (TQ 458, 001)
Beach length (approx):	600 m
Beach width (max):	200 m
Beach area (approx):	6 ha
Site designation:	SNCI
Biodiversity value:	Good

Tide Mills

Located at the eastern edge of the mouth of the river Ouse, Tide Mills is a site of much archaeological and ecological interest. From the mid eighteenth to late nineteenth century Tide Mills was the location of a mill complex (powered by tidal movement) and the site still displays the remnants of several mill workers' cottages. The site also contains the remnants of several structures including a First World War Seaplane base.

The site offers protection to habitats further inland, including the Ouse Estuary Nature Reserve which is home to many interesting and important species such as Shelduck (*Tandorna tadorna*), Lapwing (*Vanellus vanellus*) and Great Crested Newt (*Triturus cristatus*).

The beach and surrounding fields exhibit a large avian interest with the presence of species such as Sky Lark (*Alauda arvensis*), Meadow Pipit (*Anthus pratensis*), Greenfinch (*Carduelis chloris*) and Ringed Plover (*Charadrius hiaticula*). Sections of the beach are commonly used as nesting areas by Ringed Plovers, and this activity has been noted over consecutive years.

The site exhibits an extremely good example of a vegetated shingle habitat which extends across the width of the beach. This fringing beach reaches up to 200m inland in some sections, and displays a matrix consisting of a mixture of gravel and pebbles. The site is home to a variety of shingle plants including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Buck's-horn Plantain (*Plantago coronopus*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Thrift (*Armeria maritima*), Stonecrop (*Sedum* spp.),

Common Toadflax (*Linaria vulgaris*), Sea Lavender (*Limonium* spp.), mosses and grasses, crustose, foliose, and fruiticose lichens. Current floral species and distribution indicate the presence of ephemeral, pioneer and established communities.

Other species present include Red Valerian (*Centranthus ruber*) and Spear Thistle (*Cirsium vulgare*), and Common Ragwort (*Senecio jacobaea*).

The site demonstrates levels of succession into areas of grassland and scrub, with a wide variety of characteristic species developing nearby including; Gorse (*Ulex europaeus*), Blackthorn (*Prunus spinosa*), Bramble (*Rubus* spp), Common Teasel (*Dipsacus sylvestris*), and a high level of grass, moss and lichen ground cover.

Shingle in this area is annually recycled and re-profiled to assist in the protection of residential and commercial development around Bishopstone and Seaford. In recent years liaison between the County Council and the Environment Agency has resulted in the agreement and demarcation of important areas thereby aiding in the protection of the beach's varied flora and fauna.

The site presents possibilities for habitat expansion, with some undeveloped areas of land directly behind the beach, which could be used to aid future landward migration of the site.

The Friends of Tide Mills is a local community group dedicated to environmental improvements in and around the site. The group carries out regular beach cleaning activities, biannual ecological surveys, and general monitoring of the site. Future projects would greatly benefit from the group's involvement.

Management advice: Future maintenance of the site could include some form of permanent demarcation, thereby protecting the site from shingle recycling activities. Limiting public access to particularly sensitive sections of the site and preferred nesting areas, should also be considered. Interpretation boards can be found on site however additional material could be considered at key access points. The continued removal of litter and other waste will help to retain the area's environmental value. Habitat expansion could be achieved by extending areas of shingle into sections of open land bordering the rear of the beach and consultations with local landowners may help to achieve this. The continuation of regular ecological surveys and general site monitoring is advisable.

The Environment Agency should continue to liaise with East Sussex County Council to limit any damage caused by beach maintenance work and encourage further species development.

Figure 9.5.1 shows the full extent of the parish of Seaford.

Parish:	Seaford
Parish extent:	(TQ 458, 001) to (TV 516, 976)
Beach Surveyed:	Tide Mills (east)
	Bishopstone
	Seaford
	Cuckmere Haven (west beach)

The parish of Seaford is a well developed area with a population of around 23,000. The parish displays both residential and commercial development. The area is also a popular tourist destination, and is the location for a variety of guest houses, hotels and caravan parks.

Tide Mills (east)

Figure 9.5.2 Shows the location of the shingle site at Tide Mills.

Beach surveyed:	Tide Mills (east)
Beach extent (approx):	(TQ 458, 001) to (TV 466, 997)
Beach length (approx):	900 m
Beach width (max):	100 m
Beach area (approx):	6.5 ha
Site designation:	SNCI
Biodiversity value:	Good

Tide Mills

From the mid eighteenth to late nineteenth century Tide Mills was the location of a mill complex (powered by tidal movement) and the site still displays the remnants of several mill workers' cottages. The site also contains the remnants of several structures including a collection of buildings which once formed part of a hospital complex.

The beach offers protection to habitats further landward, including the Ouse Estuary Nature Reserve which is home to many interesting species such as Shelduck (*Tandorna tandora*), Lapwing (*Vanellus vanellus*) and Great Crested Newt (*Triturus cristatus*). The beach also offers a substantial amount of protection to grassland areas bordering the rear of the site. These areas are particularly important to many bird and invertebrate species including the Sky Lark (*Alauda arvensis*), Meadow Pipit (*Anthus pratensis*), and Greenfinch (*Carduelis chloris*).

The area exhibits an extremely good example of a vegetated shingle habitat which extends across the entire beach. This fringing beach stretches up to 100m in width and displays a matrix consisting of a mixture of pebbles and gravel. The site is home to a wide variety of shingle plants including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Buck's-horn Plantain (*Plantago coronopus*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Thrift (*Armeria maritima*), Stonecrop (*Sedum* spp.), Rock Samphire (*Crithmum maritimum*), mosses and grasses, crustose, foliose, and fruiticose lichens. Current floral species and distribution indicate the presence of ephemeral, pioneer and established communities. The site also exhibits the presence of a pioneer saltmarsh community.

The site demonstrates some levels of succession into areas of grassland, and scrub, with a wide variety of characteristic species developing nearby, including Gorse (*Ulex europaeus*), Blackthorn (*Prunus spinosa*), Bramble (*Rubus* spp), Common Teasel (*Dipsacus sylvestris*) and a high level of grass, moss and lichen ground cover.

The small saline lagoon to the rear of the site (TQ 459 001) displays large patches of Sea Purslane (*Atriplex portulacoides*) interspersed with some smaller patches of Glasswort (*Salicornia* spp.). Saline lagoons are nationally rare and have been recognised as a habitat of international conservation importance (UK BAP, 2008c).

Shingle in this area is regularly recycled to assist in the protection of residential and commercial development around both Bishopstone and Seaford. In recent years liaison between the County Council and the Environment Agency has resulted in the agreement and demarcation of important areas thereby aiding in the protection of the beach's varied flora and fauna.

The Friends of Tide Mills carry out regular beach cleaning activities, biannual ecological surveys, and general site monitoring. Future projects would greatly benefit from the groups involvement.

Management advice: Future maintenance of the site could include some form of permanent demarcation, thereby protecting the site from ongoing recycling activities. Consideration should also be given to limiting public access to sensitive areas of the site and preferred nesting areas. The continued removal of litter and other waste will help to retain the site's environmental value. Interpretation boards can be found on site however additional material could be considered at key access points. Undeveloped areas of land bordering the rear of the beach could be used to aid future landward migration of the site. The continuation of regular ecological surveys and general site monitoring is advisable.

The Environment Agency should continue to liaise with East Sussex County Council to limit any damage caused by beach maintenance work and encourage further species development.

Bishopstone beach

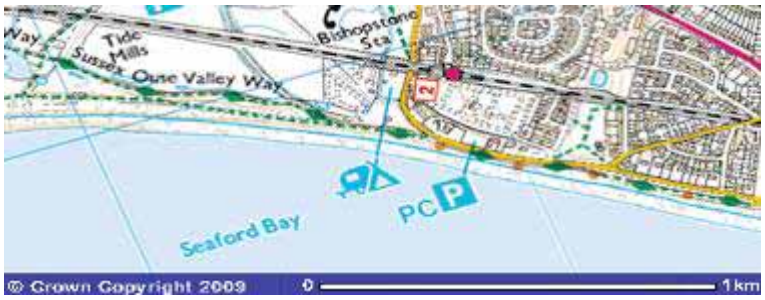

Figure 9.5.3 Shows the location of Bishopstone beach.

Beach surveyed:	Bishopstone
Beach extent (approx):	(TV 466, 997) to (TV 474, 992)
Beach length (approx):	1 km
Beach width (max):	35 m
Beach area (approx):	3.5 ha
Site designation:	None
Biodiversity value:	Impoverished

Bishopstone

Bishopstone is a village located between Newhaven and Seaford, with a small section of fringing shingle beach connected to it. Originally an ancient Saxon settlement, the village and surrounding areas are now favoured by tourists making use of the camping facilities which border the beach. Although tourist pressure is not extensive in the area, public use of the beach is often quite high, particularly during summer months.

The site can reach up to 35m wide in some sections, and the beach matrix exhibits a mixture of gravel and pebbles. The site displays a limited amount of shingle vegetation including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea Mayweed (*Tripleurospermum maritimum*), Bittersweet (*Solanum dulcamara*), Buck's-horn Plantain (*Plantago coronocopus*), some foliose lichens and grasses. This vegetation can be found in small patches along the rear of the beach. Current floral species and distribution indicate the presence of ephemeral and pioneer communities, both of which display a very restricted range.

The site presents possibilities for habitat expansion, with some undeveloped pockets of land directly behind the beach; these include areas around Newhaven & Seaford Sailing Club (NSSC), Buckle Caravan & Camping Park, and open fields to the rear of the beach. These areas could all be used to aid in future restoration and/or landward migration of the site, subsequent to agreement with the landowner. Restoration may include the removal of invasive species, and reseeding of the area with typical shingle species. Such projects would benefit from the introduction of on-site interpretation.

Shingle material for the site is regularly recycled to assist in the protection of developed areas around both Bishopstone and Seaford. Evidence of this work is often found around the site, with some areas displaying a severely compacted substrate, with tyre marks giving a further indication of vehicular disturbance.

Management advice: An increase in interpretation material (signs, information boards etc.) may be beneficial in consideration of the high levels of recreational activity within the area. This could help to increase public awareness of the species found at Bishopstone and connecting beaches, thereby limiting the amount of disturbance across the region. Negotiations with landowners could result in an increase of available space for future landward migration and habitat restoration/expansion projects.

The Environment Agency should continue to liaise with East Sussex County Council to limit any damage caused by beach maintenance work and encourage further species development.

Seaford beach

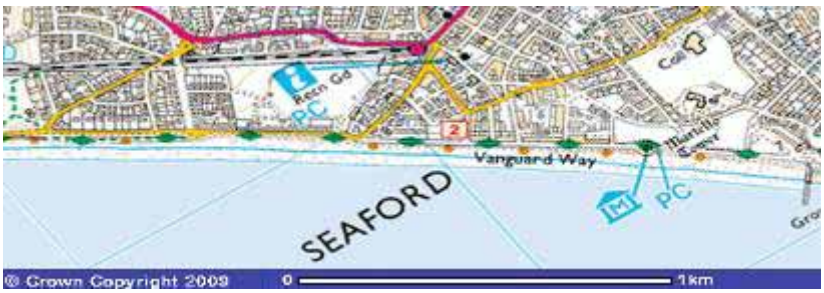

Figure 9.5.4 Shows the location of Seaford beach.

Beach surveyed:	Seaford
Beach extent (approx):	(TV 474, 992) to (TV 488, 981)
Beach length (approx):	1.6 km
Beach width (max):	40 m
Beach area (approx):	7 ha
Site designation:	None
Biodiversity value:	Impoverished

Seaford

Located at the foot of the South Downs, Seaford is a well developed seaside town bordered by a large stretch of fringing shingle beach. The area is populated by many residential and commercial properties, and is home to approximately 22,000 residents. A popular tourist area, the beach often experiences a high level of public usage and is regularly used by water sport enthusiasts. The Martello tower (no.74) located towards the eastern end of the beach is of significant archaeological importance, dating back to the Napoleonic wars.

The site can reach up to 40m wide in some sections, and the beach matrix exhibits a mixture of gravel and pebbles, with some small amounts of sand. The beach displays a range of different shingle species including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Buck's-horn Plantain (*Plantago coronocopus*), Sea Beet (*Beta vulgaris*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Thrift (*Armeria maritima*), Rock Samphire (*Crithmum maritimum*), crustose and foliose lichens, mosses and grasses. Of particular note are several patches of the nationally scarce plant Sea-heath (*Frankenia laevis*), unrecorded at any other site during the 2008 surveys. Despite the variety of species present at the site, the physical range of floral communities is limited. Current floral species and distribution indicate the presence of ephemeral and pioneer communities, both of which display a restricted range.

Shingle recycling is carried on an annual basis, to assist in the protection of developed areas around both Bishopstone and Seaford. Evidence of this work is found across the site, with areas towards the top of the beach often exhibiting a severely compacted substrate, with tyre tracks further indicating vehicular disturbance.

Due to high user levels and the regular recycling of beach materials, possibilities for restoration/expansion of the habitat are limited. Development and anthropogenic sea defences also negate the possibility of any future landward migration.

Management advice: An increase in interpretational materials (signs, information boards etc.) may help to raise public awareness of the shingle species found across the area, thereby limiting the amount of disturbance throughout the region. This could include information relating to rare species such as Sea Heath (*Frankenia laevis*), with Seaford being the only recorded location of the species during the 2008 surveys. The continuation of regular ecological surveys and general site monitoring should be encouraged.

The Environment Agency should continue to liaise with East Sussex County Council to limit any damage caused by beach maintenance work and encourage further species development.

Cuckmere Haven (west beach)

Figure 9.5.5 Shows the location of Cuckmere Haven (west beach).

Beach surveyed:	Cuckmere Haven (west beach)
Beach extent (approx):	(TV 514, 976) to (TV 516, 976)
Beach length (approx):	150 m
Beach width (max):	90 m
Beach area (approx):	1.5 ha
Site designation:	SSSI
Biodiversity value:	Good

Cuckmere Haven (west beach)

Cuckmere Haven is located within the Seven Sisters Country Park SSSI, and the South Downs AONB. The park exhibits a range of habitats including chalk grassland, saltmarsh, saline lagoons and shingle beaches.

The site can reach up to 90m wide in some sections, and the beach matrix exhibits a mixture of gravel, pebbles, and sand. The western side of the haven displays a limited range of shingle species including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Yellow Horned-poppy (*Glaucium flavum*) and Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Beet (*Beta vulgaris*), Sea Mayweed (*Tripleurospermum maritimum*), Viper's-bugloss (*Echium vulgare*), Bittersweet (*Solanum dulcamara*), crustose and foliose lichens, mosses and grasses.

Actively managed as a sea defence, the west beach shows signs of disturbance and severe compaction.

The beach is constantly eroding and requires regular recycling. Under the new flood risk management strategy for the area recycling work will be continued for a period of 15 years after 2011, at which time the area will be left to evolve naturally. Alternative strategies for the estuary including the beach are currently being discussed

Management advice: Appropriate management will be dependant upon the outcome of discussions over the future of the area.

Figure 9.6.1 shows the full extent of the parish of the Cuckmere Valley.

Parish:	Cuckmere Valley
Parish extent:	(TV 516, 977) to (TV 533, 969)
Beach Surveyed:	Cuckmere Haven (east beach)

The parish of Cuckmere Valley is located between Seaford and Eastbourne and sections of the parish are included within the Seven Sisters Country Park, a site of outstanding natural beauty. The focus of the area is agricultural, with a limited amount of residential and commercial growth and a population of fewer than 200.

Cuckmere Haven (east beach)

Figure 9.6.2 Shows the location of Cuckmere Haven (east beach).

Beach surveyed:	Cuckmere Haven (east beach)
Beach extent (approx):	(TV 516, 977) to (TV 521, 974)
Beach length (approx):	600 m
Beach width (max):	125 m
Beach area (approx):	5.5 ha
Site designation:	SSSI
Biodiversity value:	Good

Cuckmere Haven (east beach)

Cuckmere Haven is located within the Seven Sisters Country Park SSSI, and the South Downs AONB. The park exhibits a range of habitats including chalk grassland, saltmarsh, saline lagoons and shingle beaches. Despite a large tourist presence within the park, the beach is relatively undisturbed and in good condition.

The site can reach up to 125m inland in some sections, and the beach matrix exhibits a mixture of mainly pebbles and gravel, with some cobbles. Cuckmere Haven displays a very healthy vegetated shingle beach encompassing many of the plants characteristic of shingle habitats including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Buck's-horn Plantain (*Plantago coronopus*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Thrift (*Armeria maritima*), Sticky Groundsel (*Senecio viscosus*), Stonecrop (*Sedum* spp.), Common Toadflax (*Linaria vulgaris*), Sea Lavender (*Limonium* spp.), mosses and grasses, crustose, foliose, and fruiticose lichens. Ephemeral, pioneer and established communities are all represented here.

The area also displays some negative indicator species such as Silver Ragwort (*Senecio cineraria*), Common Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*).

The site demonstrates levels of succession into areas of grassland and scrub, with a wide variety of characteristic species including, Gorse (*Ulex europaeus*), Elder (*Sambucus nigra*), and Brambles (*Rubus* spp.), with a high level of grass, moss and lichen ground cover.

Behind the beach is a man made saline lagoon which displays a range of wetland flora and fauna. Saline lagoons are nationally rare and have been recognised as a habitat of international conservation importance (UK BAP, 2008c). These lagoons are home to a variety of wildlife and are extremely important for their invertebrate and avian species (Badley & Allcorn, 2006).

The beach here is currently managed by the South Downs Joint Committee (SDJC). With the help of volunteer groups, the SDJC regularly undertake beach cleans to limit litter/ waste at the site.

Management advice: Management of the site is already of a very high standard. Restricting access to sensitive areas of the site may benefit some floral species and encourage ground nesting birds. The continuation of regular ecological surveys and general site monitoring is advisable here.

Figure 9.7.1 shows the full extent of the parish of East Dean & Friston.

Parish:	East Dean & Friston
Parish extent:	(TV 533, 969) to (TV 560, 955)
Beach Surveyed:	Birling Gap

The parish of East Dean & Friston is located between Seaford and Eastbourne and much of the parish fall within the boundaries of the Seven Sisters Country Park. Although mostly agricultural in nature the parish also displays small pockets of residential and commercial development and has a population of approximately 1,500.

Birling Gap

Figure 9.7.2 Shows the location of the beach at Birling Gap.

Beach surveyed:	Birling Gap
Beach extent (approx):	(TV 547, 963) to (TV 557, 956)
Beach length (approx):	900 m
Beach width (max):	25 m
Beach area (approx):	1.2 ha
Site designation:	SSSI (the site falls within the boundaries of the Seaford to Beachy Head SSSI)
Biodiversity value:	Impoverished

Birling Gap

Birling Gap is situated between Seaford and Eastbourne, in the heart of the Seven Sisters Country Park. The landscape surrounding the site is constantly changing and cliff retreat across the area often reaches over 1m per annum (Dornbusch, 2002).

The site can reach up to 25m wide in some sections; however the beach is extremely transient and can be completely lost during storm events. The beach matrix consists predominantly of pebbles, with some small amounts of gravel and cobbles. This fringing shingle beach shows no real vegetation cover with little chance of this changing in the future. Despite its transient nature and lack of vegetation the site is of importance in terms of annual addition of shingle material to the beach.

Management advice: None

Figure 9.8.1 shows the full extent of the parish of Eastbourne.

Parish:	Eastbourne
Parish extent:	(TV 560, 955) to (TQ 649, 025)
Beach Surveyed:	Eastbourne
	Sovereign Park
	Sovereign Harbour

Eastbourne is a widely developed parish; the majority of this is residential although there are also high levels of commercial development within the area. Eastbourne parish is home to approximately 95,000 residents and the area experiences very high levels of tourist activity.

Eastbourne beach

Figure 9.8.2 Shows the location of Eastbourne beach.

Beach surveyed:	Eastbourne
Beach extent (approx):	(TV 601, 969) to (TQ 642, 009)
Beach length (approx):	6 km
Beach width (max):	60 m
Beach area (approx):	21 ha
Site designation:	Areas of SNCI at Holywell and Prince William Parade (with a small section at the far western end of the site falling within the boundaries of the Seaford to Beachy Head SSSI)
Biodiversity value:	Impoverished

Eastbourne

Eastbourne is a well developed area with a long narrow fringing shingle beach which stretches up to 60m wide in some sections. The surrounding area exhibits a high population, and is a popular destination for tourists. The town is also host to a selection of large scale events including an annual air show and international tennis tournament. As a result the beaches around Eastbourne experience a very high level of public activity

Parts of the area display important archaeological interest with the presence of Martello towers along the beach. These structures were originally constructed during the Napoleonic wars to act as a first line of defence in the event of invasion.

The site can reach up to 60m wide in some sections, and the beach matrix consists predominantly of a mixture of gravel and pebbles, with some small amounts of cobbles and sand. The majority of the frontage is managed as an ameinity beach and is subsequently kept clear of vegetation. Ruderal species are often found around access points as a result of enrichment, and these areas are occasionally cleared. Despite this sections of the beach show a good variety of shingle species including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Stonecrop (*Sedum* spp.), Sticky Groundsel (*Senecio viscosus*), Toadflax (*Linaria* spp.), Rock Samphire (*Crithmum maritimum*), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), Sea Lavender (*Limonium* spp.), Tree Mallow (*Lavatera arborea*), mosses and grasses, crustose and foliose lichens. Ephemeral and pioneer communities are present on the site.

Other species present include Red Valerian (*Centranthus ruber*), Silver Ragwort (*Senecio cineraria*), Spear Thistle (*Cirsium vulgare*), Black Knapweed (*Centaurea nigra*), Common Ragwort (*Senecio jacobaea*) and Brambles (*Rubus* spp.).

Holywell (TV 602 969) is an area located at the far western end of Eastbourne beach, in the shadow of the chalk cliffs at Beachy Head. The area is protected by a granite boulder sea defence, and is home to species such as Yellow Horned-poppy (*Glaucium flavum*), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Rock Samphire (*Crithmum maritimum*) and Sea Lavender (*Limonium* spp.).

Landward migration of the beach at Eastbourne is limited by development and coastal defence structures. Regular beach maintenance and visitor access result in severe compaction in some areas.

Local authorities and volunteer groups currently carry out regular beach cleans, helping to reduce the amount of litter and waste in the area.

Management advice: Considering the high degree of public activity on and around the beach, it may be beneficial to increase the level of interpretation material (signs, information boards etc.), within the area. Strategic placement of such material may help to raise public awareness and limit the amount of disturbance caused in vegetated areas.

The removal of invasive species, such as Silver Ragwort (*Senecio cineraria*), and Spear Thistle (*Cirsium vulgare*), and the reseeding of shingle species throughout some of the larger pockets of vegetation may help to increase the range and value of shingle communities within the area. A continuation of beach cleaning activities would be beneficial here. Regular ecological surveys and general site monitoring should be encouraged.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Sovereign Park

Figure 9.8.3 Shows the location of Sovereign Park.

Beach surveyed:	Sovereign Park
Beach extent (approx):	(TQ 634, 006) to (TQ 638, 008)
Beach length (approx):	500 m
Beach width (max):	60 m
Beach area (approx):	2 ha
Site designation:	SNCI
Biodiversity value:	Impoverished/Good

Sovereign Park

Sovereign Park is an area of shingle located to the rear of the main beach, at the eastern end of Eastbourne, close to Langney Point. The park is designated as a SNCI (Site of Nature Conservation Importance) and displays a good range of shingle plants. The park is split into three fenced compartments, with public access being limited to the most westerly compartment, thereby helping to protect the species present.

The site can reach up to 60m wide in some sections, and the beach matrix consists predominantly of pebbles, mixed with some gravel. The park displays a good range of shingle plants including Sea-kale (*Crambe maritima*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Viper's-bugloss (*Echium vulgare*), Stonecrop (*Sedum* spp.), Curled Dock (*Rumex crispus* ssp. littoreus), Sea Campion (*Silene uniflora*), Toadflax (*Linaria* spp.), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), Sheep's Sorrel (*Rumex acetosella*), mosses and grasses, crustose, foliose and fruiticose lichens. Current floral species and distribution indicate the presence of a pioneer community at the site.

Other species include Red Valerian (*Centranthus ruber*), Gorse (Ulex europaeus), Common Ragwort (*Senecio jacobaea*) and Brambles (*Rubus* spp.).

The area shows great potential for the future, as an educational tool and could possibly be used for the introduction of species such as Red Hemp-nettle (*Galeopsis angustifolia*).

Due to its static nature, landward migration of the site is unlikely; however possibilities do exist for an expansion of the park's boundaries, thereby increasing the available space for the future development of shingle species and communities.

Management advice: The removal of species such as Gorse (Ulex europaeus), and Brambles (*Rubus* spp.), will help current shingle species and communities to develop and expand. Consideration could be given to the introduction of further shingle species to the park, thereby increasing the value of the park itself and possibly acting as a site for seed propagation. With the enclosed nature of this micro environment it has the potential to act as a monitoring station, supplying us with an indication of the success of certain species prior to introduction elsewhere. The continuation of regular ecological surveys and general site monitoring should be encouraged.

Sovereign Harbour

Figure 9.8.4 Shows the location of the beach at Sovereign Harbour.

Beach surveyed:	Sovereign Harbour
Beach extent (approx):	(TQ 642, 689) to (TQ 649, 025)
Beach length (approx):	1.5 km
Beach width (max):	120 m
Beach area (approx):	7.5 ha
Site designation:	SNCI (area towards the eastern end of the site)
Biodiversity value:	Good

Sovereign Harbour

Sovereign Harbour is a large and recently completed development in the parish of Eastbourne, containing some commercial properties, with large areas of residential development.

The underlying substrate was originally a large cuspate foreland, known as the Crumbles. The area had developed over several hundred years and supported a range of healthy shingle communities. The development of Sovereign Harbour resulted in the direct loss of most of the shingle structure and the natural communities it supported.

The area exhibits archaeological interest with the presence of Martello towers along the beach. These structures were originally constructed during the Napoleonic wars to act as a first line of defence in the event of invasion.

The majority of the remaining shingle habitat is largely limited to fringing beaches. These can reach up to 120m wide in some sections, and the beach matrix consists predominantly of a mixture of gravel and pebbles, with some small amounts of cobbles and sand. The area currently supports a range of shingle species including Orache (*Atriplex* spp.), Viper's-bugloss (*Echium vulgare*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Sticky Groundsel (*Senecio viscosus*), Toadflax (*Linaria* spp.), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), Tree Mallow (*Lavatera arborea*), Sea Rocket (*Cakile maritima*), Sea Knotgrass (*Polygonum maritimum*), mosses and grasses, crustose, foliose and fruiticose lichens. Ephemeral and pioneer communities are present, but these display a limited range.

Other species present include Red Valerian (*Centranthus ruber*), Sheep's Sorrel (*Rumex acetosella*), Silver Ragwort (*Senecio cineraria*), Brambles (*Rubus* spp.), Common Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*).

The development has reduced the available space for shingle habitat growth and the shingle flora present is limited. The development has also impacted upon the natural flow of shingle material, which continues to have a negative impact on beaches further eastward. The development has resulted in the need for increased beach management along this section of the coastline including beach renourishment and recycling. Such works can often have a negative impact on shingle vegetation.

The lack of space combined with regular replenishment and historic damage has resulted in a limited floral community. Possibilities exist for future restoration projects not only on the beach itself but also within the large pockets of undeveloped shingle towards the rear of the site.

Some parts of the beach suffer from enrichment through dog fouling, litter and other waste. This enrichment encourages invasive species such as Brambles (*Rubus* spp.), Common Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*), which can be found throughout the area. Development prevents the possibility of landward migration.

Management advice: The placement of interpretation materials across the site may help to inform residents and other users of the importance of shingle habitats. Building good working relationships with the local residents association could help to protect remaining resources of the habitat. Involvement of the local community will also help to raise awareness in the area and could have a positive effect on future habitat expansion and/or restoration projects.

Consideration should be given to the restoration/expansion of shingle species/communities located on the pockets of shingle at the northern end of the site. These pockets are substantial in size and are completely disconnected from any tidal influence. With appropriate management, these areas could become a valuable addition to the habitat.

Future restoration projects would include the removal of invasive species e.g. Brambles (*Rubus* spp.), Common Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*), and reseeding of the area with typical shingle species. Restoration project would also benefit from a reduction of waste and other forms of enrichment in the area.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Figure 9.9.1 shows the full extent of the parish of Westham.

Parish:	Westham
Parish extent:	(TQ 649, 025) to (TQ 653, 033)
Beach Surveyed:	Westham beach

Westham is a small parish located between Eastbourne and Pevensey, the area is largely agricultural. With some pockets of residential and commercial development the area has a population of around 5,000. The parish shares close links with several popular tourist destinations, so beach activity can often be high.

Westham beach

Figure 9.9.2 Shows the location of Westham beach.

Beach surveyed:	Westham
Beach extent (approx):	(TQ 649 025) to (TQ 653 033)
Beach length (approx):	850 m
Beach width (max):	180 m
Beach area (approx):	7 ha
Site designation:	None
Biodiversity value:	Good

Westham

Westham displays a short section of fringing shingle beach exhibiting a healthy range of shingle species. Relatively undeveloped, there are a small number of buildings bordering this beach including Pevensey Bay Sailing Club, a collection of old fishery buildings and several homes. The area experiences a high level of tourist interest and activity, sharing close links with several popular tourist destinations.

Much of the area consists of small fringing strips of vegetation; however there is a substantial and valuable region of shingle vegetation encompassing the area around the sailing club. This area is one of the few undeveloped remnants of the crumbles.

The width of the beach ranges from 15m to 180m, and the beach matrix exhibits a mixture of gravel and pebbles. The area supports a range of typical shingle species including Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Bittersweet (*Solanum dulcamara*), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Sticky Groundsel (*Senecio viscosus*), Toadflax (*Linaria* spp.), Sea Campion (*Silene uniflora*), Tree Mallow (*Lavatera arborea*), mosses and grasses, crustose, foliose and fruiticose lichens. Both pioneer and established communities are present here.

Other species present include Red Valerian (*Centranthus ruber*), Sheep's Sorrel (*Rumex acetosella*), and Brambles (*Rubus* spp.).

The area suffer from some enrichment through dog fouling, oil, litter and other waste (discarded fishing nets, pots etc). This enrichment encourages invasive species, such as Red Valerian (*Centranthus ruber*), which can be seen throughout the area.

Shingle in the area is annually replenished and regularly re-profiled to assist in the protection of residential and commercial development in the region.

Management advice: With consideration to the high level of recreational activity within the area, strategically placed interpretation may help to inform user groups of the habitats importance, thereby limiting disturbance and reducing levels of enrichment. Areas of shingle bordering the Pevensey Bay Sailing Club are of a substantial size (up to 180m) and display a healthy shingle habitat, and should be protected. Consultations with landowners may help to protect these areas from any future development. Due to the area's size and available space, there is the potential for expansion of shingle communities.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Figure 9.10.1 shows the full extent of the parish of Pevensey.

Parish:	Pevensey
Parish extent:	(TQ 653, 033) to (TQ 675, 050)
Beach Surveyed:	Pevensey Bay

The parish of Pevensey is little developed with a population of approximately 3,100. The area is a popular tourist location and displays the presence several camping/caravanning sites. The village of Pevensey (home to Pevensey castle), is located approximately one mile north of Pevensey bay.

Pevensey Bay

Figure 9.10.2 Shows the location of Pevensey beach.

Beach surveyed:	Pevensey Bay
Beach extent (approx):	(TQ 653, 033) to (TQ 675, 050)
Beach length (approx):	2.8 km
Beach width (max):	75 m
Beach area (approx):	12 ha
Site designation:	None
Biodiversity value:	Impoverished

Pevensey Bay

Pevensey Bay is fronted by a fringing shingle beach which supports a range of shingle species. This stretch of coastline experience some commercial and residential development and a large number of homes have been built directly along the northern edge of the beach. Pevensey Bay is also a popular holiday destination, and the area experiences a high level of tourist activity. The beach protects the Pevensey Levels SSSI and Ramsar site, an internationally important wetland site.

Martello towers along the beach are of archaeological importance. These structures were originally constructed during the Napoleonic wars to act as a first line of defence in the event of invasion.

The site can reach up to 75m wide in some sections, and the beach matrix exhibits a mixture of gravel and pebbles, with some small amounts of sand. The area supports a wide variety of shingle species including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Bittersweet (*Solanum dulcamara*), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Sticky Groundsel (*Senecio viscosus*), Toadflax (*Linaria* spp.), Herb Robert (*Geranium robertianum* ssp*. maritimum*), Sea Campion (*Silene uniflora*), Tree Mallow (*Lavatera arborea*), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), Sea Rocket (*Cakile maritima*), mosses and grasses, crustose, foliose and fruiticose lichens. Of particular note is the presence of the BAP species Red Hemp-nettle (*Galeopsis angustifolia*). Ephemeral and pioneer communities are widespread and established communities are present in some small pockets.

Other species present in the area include Red Valerian (*Centranthus ruber*), Sheep's Sorrel (*Rumex acetosella*), Gorse (*Ulex europaeus*), Brambles (*Rubus* spp.), Black Knapweed (*Centaurea nigra*), Common Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*).

Areas bordered by Timberlaine Road and Grenville Road show signs of succession into areas of grassland and scrub, with a wide variety of characteristic species including, Gorse (*Ulex europaeus*), Brambles (*Rubus* spp.), and extensive grass, moss and lichen ground cover.

A small pocket of Pyramidal Orchids (*Anacamptis pyramidalis*) has been recorded towards the western end of the parish, where the landward edge of the beach borders the residential properties of Timberlaine Road. There are also unsubstantiated reports of common lizard sightings, from the area.

Development along the northern edge of the beach makes landward migration unlikely. Parts of the area suffer from enrichment through dog fouling, oil from boats, litter and other waste (old fishing nets, pots etc). This enrichment encourages several invasive species, such as Black Knapweed (*Centaurea nigra*), Common Ragwort (*Senecio jacobaea*), Brambles (*Rubus* spp.) and Spear Thistle (*Cirsium vulgare*), which can be seen throughout the area. Garden escapes are also an issue here, particularly in wider areas of the beach which are bordered by residential development.

Shingle in the area is annually replenished and regularly re-profiled to assist in the protection of residential and commercial development in the region.

Management advice: Strategically placed interpretation boards and/or liaison with local community groups could help to raise awareness of the habitats importance. In consideration of the high levels of residential and tourist activity within the area, a regular program of beach cleans would be beneficial.

Wider areas of the beach (particularly those located in central and western sections of the site), which are bordered by residential development, would benefit from the removal of invasive species (e.g. Brambles (*Rubus* spp.) and Spear Thistle (*Cirsium vulgare*)), and garden escapes. Consultations with local residents may help to achieve this. Reseeding the beach with typical shingle species may help communities expand and develop. Some residents have encouraged shingle plants into their gardens, helping to further expand the range of the habitat in the area. Liaison with residents' associations and individuals would help to encourage the continuation of this practise.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

The continued expansion of Red Hemp-nettle (*Galeopsis angustifolia*) in this area is encouraging, and should be monitored.

Figure 9.11.1 shows the full extent of the parish of Bexhill.

Parish:	Bexhill
Parish extent:	(TQ 675, 050) to (TQ 764, 078)
Beach Surveyed:	Normans Bay
	Cooden Beach
	Veness Gap
	Bexhill-on-Sea

Bexhill exhibits a colourful history dating back to the latter part of the 8th century, when it was noted (as Bexelei) within a charter created by King Offa. During the late 16th century survey records show a long shingle bank and bordering lagoon system where the town of Bexhill-on-Sea is now located. The parish (which now makes up a part of Rother district) is large, well developed and located to the west of Hastings. The area displays many examples of both residential and commercial properties and has a population of approximately 41,000.

A popular destination for tourists, the area supports many hotels, guest houses and camping/caravanning sites. This level of tourism can be a major factor when considering the management of shingle beaches within the parish, having an impact on both floral communities and beach morphology.

Normans Bay

Figure 9.11.2 Shows the location of the beach at Normans Bay.

Beach surveyed:	Normans Bay
Beach extent (approx):	(TQ 675, 050) to (TQ 697, 060)
Beach length (approx):	2.4 km
Beach width (max):	100 m
Beach area (approx):	14 ha
Site designation:	SNCI (with a small section towards the eastern end of the site falling within the boundaries of the Pevensey Levels SSSI)
Biodiversity value:	Impoverished/Good

Normans Bay

A fringing shingle beach fronts the Normans Bay area, stretching from 15m to 100m in width. The area has some small residential development, with homes directly bordering the northern edge of the beach. Extremely popular as a tourist resort, two large camping and caravanning sites border the beach. The beach here displays a wide variety of shingle vegetation including several healthy patches of Red Hemp-nettle (*Galeopsis angustifolia*). The beach protects the Pevensey Levels SSSI and Ramsar site, an internationally important wetland site.

Of archaeological interest are the Martello towers along the beach. These structures were originally constructed during the Napoleonic wars to act as a first line of defence in the event of invasion.

The site can reach up to 100m wide in some sections, and the beach matrix exhibits a mixture of gravel, pebbles, and sand. The beach at Normans Bay supports a wide variety of shingle vegetation including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Bittersweet (*Solanum dulcamara*), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Sticky Groundsel (*Senecio viscosus*), Toadflax (*Linaria* spp.), Thrift (*Armeria maritima*), Red Hemp-nettle (*Galeopsis angustifolia*), Herb Robert (*Geranium robertianum* ssp*. maritimum*), Sea Campion (*Silene uniflora*), Rock Samphire (*Crithmum maritimum*), mosses and grasses, crustose, foliose and fruiticose lichens. Ephemeral, pioneer and established communities are present.

Other species include Red Valerian (*Centranthus ruber*), Sheep's Sorrel (*Rumex acetosella*), Common Nettle (*Urtica dioica*), Gorse (*Ulex europaeus*), Spear Thistle (*Cirsium vulgare*), Black Knapweed (*Centaurea nigra*), Common Ragwort (*Senecio jacobaea*) and Brambles (*Rubus* spp.).

Larger areas of vegetation at both western and eastern ends of the site, exhibit some succession into areas of heath and scrub, with species including, Gorse (*Ulex europaeus*), Brambles (*Rubus* spp.), and extensive grass, moss and lichen ground cover.

To the rear of the western end of the site is a saline lagoon (TQ 677 052) which supports patches of Sea Aster (*Aster tripolium*). Saline lagoons are nationally rare and have been recognised as a habitat of international conservation importance (UK BAP, 2008c).

Parts of the beach suffer from levels of enrichment through dog fouling, litter and other waste (old fishing nets, pots, waste metals etc). This enrichment encourages several invasive species, such as Red Valerian (*Centranthus ruber*), Common Nettle (*Urtica dioica*), Common Ragwort (*Senecio jacobaea*), Spear Thistle (*Cirsium vulgare*) and Brambles (*Rubus* spp.), which can be seen throughout the area.

Landward migration of the site is largely restricted by residential development and transport links; however some landward migration may be possible in undeveloped areas. Shingle in the area is annually replenished and regularly re-profiled to assist in the protection of residential and commercial development in the region.

Management advice: An increase of interpretation material (signs, information boards etc.) at strategic points would help to raise awareness within the region. In consideration of the high levels of residential and tourist activity within the area, beach cleans would be beneficial here.

Some areas of the beach would benefit from the removal of garden escapes, and invasive species (e.g. Common Nettle (*Urtica dioica*), Common Ragwort (*Senecio jacobaea*), and Spear Thistle (*Cirsium vulgare*)); liaison with local residents would be essential. The removal of invasive species and reseeding with characteristic shingle species could help expand current shingle communities and raise the biodiversity value of the area.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

The continued expansion of Red Hemp-nettle (*Galeopsis angustifolia*) in this area is encouraging, and should be monitored.

Cooden Beach

Figure 9.11.3 Shows the location of Cooden Beach.

Beach surveyed:	Cooden Beach
Beach extent (approx):	(TQ 697, 060) to (TQ 718, 065)
Beach length m (approx):	2 km
Beach width (max):	65 m
Beach area (approx):	7 ha
Site designation:	Cooden Cliffs SNCI encompasses the eastern half of the site (the western end of the site is adjacent to the Pevensey Levels SSSI)
Biodiversity value:	Impoverished

Cooden Beach

Cooden Beach is a small but affluent area fronted by a fringing shingle beach which supports a minimal amount of shingle vegetation. The area has limited pockets of commercial and residential development, and much of the residential development can be found directly bordering the coastline. Despite the obvious problems with coastal development, some residential construction continues.

A popular tourist destination, Cooden Beach supports a large hotel complex and a well used golf course which borders the beach to the north. The beach experiences a high level of recreational activity, with several camping/caravanning sites located in the surrounding area. The beach protects the Pevensey Levels SSSI and Ramsar site, an internationally important wetland site.

Much of the beach at Cooden is devoid of vegetation, although some small pockets of shingle vegetation can be found. The site can reach up to 65m wide in some sections, and the beach matrix exhibits a mixture of gravel and pebbles, with some small amounts of sand and cobbles. The beach supports a limited range of shingle plants including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Bittersweet (*Solanum dulcamara*), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Thrift (*Armeria maritima*), Toadflax (*Linaria* spp.), Tree Mallow (*Lavatera arborea*), mosses and grasses, crustose and foliose lichens. Ephemeral and pioneer communities are both present here.

Other species in the area include Silver Ragwort (*Senecio cineraria*), Red Valerian (*Centranthus ruber*), Common Ragwort (*Senecio jacobaea*) and Brambles (*Rubus* spp.).

Landward migration is prevented by residential development. Recreational pressures are high but the beach remains relatively clear of any litter or waste. The beach is actively managed as a sea defence.

Management advice: Targeted interpretation e.g. walks talks and leaflets, could help reduce damage from recreational pressure. Habitat restoration by reseeding could also be investigated.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Veness Gap

Figure 9.11.4 Shows the location of the beach at Veness Gap.

Beach surveyed:	Veness Gap
Beach extent (approx):	(TQ 718, 065) to (TQ 739, 070)
Beach length (approx):	2 km
Beach width (max):	40 m
Beach area (approx):	7 ha
Site designation:	None
Biodiversity value:	Impoverished

Veness Gap

Veness Gap is a thin strip of fringing beach located to the west of Bexhill-on-Sea. The coastline here is well populated with large areas of residential development bordering the beach.

Sharing close links with several popular tourist areas (Normans Bay, Cooden Beach, Bexhill-on-Sea and Hastings). Veness Gap supports a high level of residential and tourist activity. This leads to problems including disturbance and enrichment.

The beach matrix exhibits a mixture of pebbles and gravel, the range and diversity of floral species in the area is limited. Despite this Veness Gap does exhibit the potential to sustain shingle flora, with much of the area's vegetation being found in thin strips along the back edge of the beach. Several common shingle species can be found here including Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Sea Beet (*Beta vulgaris*), Buck's-horn Plantain (*Plantago coronopus*), and Tree Mallow (*Lavatera arborea*). Limited ephemeral and pioneer communities are present here.

Red Valerian (*Centranthus ruber*) is also present in the area, although the species displays a limited range.

There is little opportunity for landward migration, due to the bordering development and hard sea defences. Shingle in this area is actively managed as a sea defence further limiting the development of any floral species. Due to the current pressures experienced by this beach the chances of habitat development and/or expansion are extremely limited.

Management advice: None

Bexhill-on-Sea beach

Figure 9.11.5 Shows the location of the beach at Bexhill-on-Sea.

Beach surveyed:	Bexhill-on-Sea
Beach extent (approx):	(TQ 739, 070) to (TQ 764, 078)
Beach length (approx):	26 km
Beach width (max):	50 m
Beach area (approx):	10 ha
Site designation:	None
Biodiversity value:	Impoverished

Bexhill-on-Sea

Bexhill-on-Sea is a large coastal town within the parish, first developed towards the latter part of the 19th century. The town and surrounding areas are popular tourist destinations, supporting a variety of hotels, guest houses and caravan/camping sites. Levels of tourism within the area have a direct impact on its fringing shingle beach with issues such as trampling and littering affecting the development of floral communities and impacting on beach morphology.

The site can reach up to 50m wide in some sections, and the beach matrix is a mixture of gravel and pebbles. The beach supports a variety of shingle specialists including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Bittersweet (*Solanum dulcamara*), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Sticky Groundsel (*Senecio viscosus*), Herb Robert (*Geranium robertianum* ssp. *maritimum*), mosses and grasses, crustose and foliose lichens. Ephemeral and pioneer communities are present here.

Other species found in the area include Common Ragwort (*Senecio jacobaea*) and Brambles (*Rubus* spp.).

There is no opportunity for landward migration, due to both anthropogenic and natural barriers (e.g. residential and commercial development, sea defence structures, and sandstone cliffs). Extensive recreational activity in the area results in a high level of disturbance, trampling and compaction on the beach. At the eastern end of the site erosion of the bordering sandstone cliffs has created slumps to

the rear of the beach. Shingle in this area is actively managed as a sea defence and indications of this work can be seen in the levels of compaction across the area.

Management advice: Regular beach cleans would reduce the amount of waste across the site and should therefore reduce enrichment. The involvement of local community groups in such endeavours would be of great benefit.

Some slightly larger pockets of shingle exist towards the eastern end of this site, and these offer the opportunity for limited habitat restoration/expansion (e.g. removal of invasive species including Common Ragwort (*Senecio jacobaea*) and Brambles (*Rubus* spp.) and some reseeding with shingle species). Many of these areas are bordered by beach huts, and involving beach hut owners in future restoration projects would be advisable. Local involvement could help to secure the success of any such project, and raise public awareness and knowledge of the habitat.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Figure 9.12.1 shows the full extent of the parish of Hastings.

Parish:	Hastings
Parish extent:	(TQ 764, 078) to (TQ 871, 111)
Beach Surveyed:	Bulverhythe
	Hastings

The parish of Hastings is a highly developed area of East Sussex, with the presence of many residential and commercial properties. The area displays evidence of prehistoric settlements and the parish has a population of approximately 86,000. The area is a very popular tourist destination and supports many hotels, guest houses and camping/caravanning sites. This increase in tourist activity can be a major factor when considering the management of shingle beaches within the parish and can have an impact on both floral communities and beach morphology.

Bulverhythe beach

Figure 9.12.2 Shows the location of Bulverhythe beach.

Beach surveyed:	Bulverhythe
Beach extent (approx):	(TQ 764, 078) to (TQ 788, 086)
Beach length (approx):	2.5 km
Beach width (max):	50 m
Beach area (approx):	6.5 ha
Site designation:	SNCI
Biodiversity value:	Impoverished

Bulverhythe

An area situated towards the western edge of Hastings Parish, Bulverhythe is bordered by a narrow fringing shingle beach. This beach plays an important role as a natural sea defence for the area, protecting rail and road links as well as many residential and commercial properties.

This shingle beach and bordering cliffs have been designated as an SNCI due to their ecological and geomorphological importance. The site also offers protection to the nearby Combe Haven SSSI, and falls within the boundaries of (the newly formed) Pebsham Countryside Park.

Other important features include the wreck of the *Amsterdam* (designated and protected under the Protection of Wrecks Act, 1973), as well as remnants of a submerged prehistoric forest, both of which can be seen at low tide.

The site can reach up to 50m wide in some sections, and the beach matrix is a mixture of gravel and pebbles, with some small amounts of sand. The area supports a range of shingle plants including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Bittersweet (*Solanum dulcamara*), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Buck's-horn Plantain (*Plantago coronopus*), Sticky Groundsel (*Senecio viscosus*), Tree Mallow (*Lavatera arborea*), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), mosses and grasses, crustose, foliose and fruiticose lichens. Limited pockets of ephemeral and pioneer communities are present here.

Other species found at the site include Common Ragwort (*Senecio jacobaea*), and Brambles (*Rubus* spp.).

Despite the range of species present, communities are limited to widely dispersed patches across the length of the site. Vegetation is impacted by the high level of public usage on the site, regular beach replenishment and recycling, and by limited space.

Bulverhythe experiences high levels of tourist and public activity, adding to the issues of disturbance and enrichment. The length of the beach is bordered by development and hard sea defences, making landward migration impossible. The beach here is actively managed as a sea defence, and experiences regular shingle renourishment and reprofiling.

Management advice: The beach would benefit from the control of invasive species and possibly some reseeding, particularly around areas where beach huts are located. Beach hut owners should be involved in this process to raise public awareness, promote ownership, and support the ongoing protection of the site. Such projects would improve the areas biodiversity value, and help to reflect the areas country park status. Following any such activities targeted interpretation should be included across the area.

Regular beach cleans and site monitoring is recommended here, and liaising with local volunteer groups (beach hut owners, local community groups etc.), could help to achieve this.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Hastings beach

Figure 9.12.3 Shows the location of Hastings beach.

Beach surveyed:	Hastings
Beach extent (approx):	(TQ 788, 086) to (TQ 830, 095)
Beach length (approx):	4 km
Beach width (max):	150 m
Beach area (approx):	14 ha
Site designation:	SNCI area to the east at Rock-a-Nore (with the eastern edge of the site bordered by the Hastings Cliffs (SAC) and the Hastings Cliffs to Pett Beach SSSI)
Biodiversity value:	Impoverished

Hastings

Hastings is a large town bordered by a narrow strip of fringing shingle beach. The area exhibits a high level of both commercial and residential development. Hastings is a popular destination for holiday makers, and the beach is extensively used by tourists and the general public. The area also supports a beach based fishing fleet, located towards the extreme eastern end of the site

The eastern end of the beach borders the Hastings Cliffs Special Area of Conservation (SAC) and the Hastings Cliffs to Pett Beach SSSI, both of which are of great geological and ecological interest. The area supports a variety of habitats including ancient woodland, and maritime grassland, sandstone cliffs and vegetated shingle. These varied habitats support a range of bryophytes, lichens, vascular plants and invertebrates.

The site can reach up to 150m wide in some sections, and the beach matrix is a mixture of gravel and pebbles, with some small amounts of sand. The area supports a range of shingle plants including Orache (*Atriplex* spp.), Stonecrop (*Sedum* spp.), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Buck's-horn Plantain (*Plantago coronopus*), Sea Mayweed (*Tripleurospermum maritimum*), Sticky Groundsel (*Senecio viscosus*), Tree Mallow (*Lavatera arborea*), Sea Radish (*Raphanus raphanistrum* ssp. *maritimus*), Sea Rocket (*Cakile maritima*), Sea Knotgrass (*Polygonum maritimum*), grasses, crustose, foliose and fruiticose lichens. However, despite this range, floral growth is often limited to solitary plants and small patches with a wide dispersal. Limited pockets of ephemeral and pioneer communities are present here.

Despite high tourist numbers in the area, the eastern end of Hastings beach is far less disturbed and the encouragement of shingle habitats here could have a beneficial effect on public awareness of the resource. Some areas towards the eastern end can reach up to 150m in width and present a valuable opportunity for habitat restoration, through reseeding.

Habitat expansion may be possible along some section of the beach, although with such high levels of recreational activity expansion would be limited. Landward migration is prevented by development and by sea defence structures. Shingle in this area is actively managed as a sea defence and indications of this work can be seen in the levels of compaction evident across the area.

Management advice: The strategic placement of interpretation material could benefit some areas of the beach here, and with a large annual turnover of visitors this could help to raise awareness of the habitat on a much wider scale.

Consideration should be given to the creation of patches of shingle habitat at the eastern end of Hastings beach, possibly with interpretation to inform visitors of the habitat's importance. Restoration of these areas could involve seeding and/or planting with various shingle species.

Discussions with local groups (such as the Hastings Fishermens Co-Operative and the Hastings & St. Leonards Angling Association) may help to raise awareness of the habitats importance. Commercial fishing is an important part of the local economy and such activities often benefit from a healthy local environment. The development of strong links with these and similar groups may also assist in the successful completion of any future restoration/expansion projects.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Figure 9.13.1 shows the full extent of the parish of Fairlight.

Parish:	Fairlight
Parish extent:	(TQ 871, 111) to (TQ 887, 127)
Beach Surveyed:	Fairlight Cove

Fairlight is a rural parish almost completely skirted by a fringing shingle beach. With a population of approximately 1,600 much of the area is dedicated to agriculture, with the majority of residential development being confined to coastal regions of the parish. Fairlight and surrounding areas are popular tourist destination, and support several medium to large caravan/camping sites. This level of tourist activity can be a major factor when considering the management of shingle beaches within the parish and can impact on both floral communities and beach morphology.

Fairlight Cove

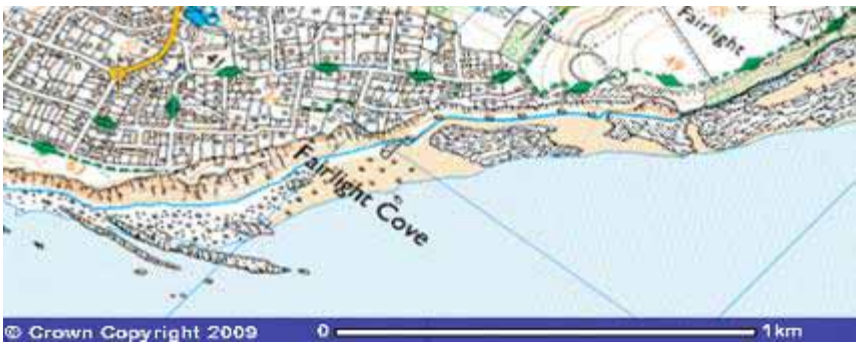

Figure 9.13.2 Shows the location of the beach at Fairlight Cove.

Beach surveyed:	Fairlight Cove
Beach extent (approx):	(TQ 879, 118) to (TQ 884, 124)
Beach length (approx):	520 m
Beach width (max):	25 m
Beach area (approx):	1.1 ha
Site designation:	SSSI (falls within the boundaries of the Hastings Cliffs to Pett Beach SSSI)
Biodiversity value:	Impoverished

Fairlight Cove

Fairlight Cove is a secluded area of the coastline with a fringing shingle beach. The surrounding residential area has a population of approximately 1,600 inhabitants.

The site falls within the boundaries of the Hastings Cliffs to Pett Beach SSSI an area of great geological and ecological interest. This coastal site is highly regarded for its fossil content and supports a variety of habitats including, ancient woodland, and maritime grassland, as well as vegetated shingle. These habitats support a number of bryophytes, lichens, vascular plants and invertebrates.

The beach is essentially static, being bordered by sandstone cliffs to the rear, and fronted by a large granite boulder sea defence. This level of enclosure reduces the impact of longshore drift and allows the beach to maintain its relative position. Development of vegetation on the site is aided by the beach's manufactured stability. The shingle matrix here is well mixed and contains a high proportion of sand (probably due to the surrounding geology).

The beach can reach up to 25m wide in some sections, and the beach matrix is a mixture of gravel and pebbles, with sand. Despite its limited extent, the site displays some interesting communities and shingle species including Orache (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Sea-kale (*Crambe maritima*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Sea Sandwort

(*Honckenya peploides*), Sea Knotgrass (*Polygonum maritimum*), Rock Samphire (*Crithmum maritimum*), Tree Mallow (*Lavatera arborea*), mosses and grasses, crustose and foliose lichens. Limited ephemeral and pioneer communities are present here.

Other species present include Gorse (*Ulex europaeus*), Common Ragwort (*Senecio jacobaea*), and Brambles (*Rubus* spp.).

Lows towards the rear of the beach fill in conjunction with tidal fluctuation and exhibit wetland species such as Rush (*Juncus* spp), Common Reed (*Phragmites australis*) and Sea Purslane (*Atriplex portulacoides*).

The beach's location and bordering sandstone cliffs prevent the possibility of any habitat expansion or landward migration. The site experiences a high level of litter (likely deposited by the tides) including wooden planks, large plastic drums, rope and discarded fishing nets.

Management advice: Due to its inaccessible location, management options for the site are limited. If current sea defences are preserved the habitat should remain stable and shingle species will continue to develop. Consideration should be given to the removal of invasive and scrub species, as available space for floral development is limited, and removal of these species will present shingle flora with an opportunity for expansion. Regular litter clearance would also increase the available area for plant development and reduce enrichment on the site. The site could be used as a source of seed and/or propagules for restoration of nearby areas

Figure 9.14.1 shows the full extent of the parish of Pett.

Parish:	Pett
Parish extent:	(TQ 887, 127) to (TQ 906, 148)
Beach Surveyed:	Pett beach

The entire length of coastline across the parish of Pett is skirted by a fringing shingle beach. The area shows a population of approximately 800 with the majority of the parish being used for agricultural purposes, with limited residential developments being found mainly along the coastline. The beaches of Pett are a popular tourist destination, displaying several medium to large caravan/camping sites. An increase in tourist activity can be a major factor when considering the management of shingle beaches within the parish and can impact on both floral communities and beach morphology.

Pett beach

Figure 9.14.2 Shows the location of Pett beach.

Beach surveyed:	Pett
Beach extent (approx):	(TQ 887, 127) to (TQ 906, 148)
Beach length (approx):	2.6 km
Beach width (max):	65 m
Beach area (approx):	9.5 ha
Site designation:	SSSI (falls within the boundaries of the Hastings Cliffs to Pett Beach SSSI)
Biodiversity value:	Good

Pett

Pett is located to the east of Hastings and is bordered by a fringing shingle beach. The area exhibits a limited amount of development with a small local population. The surrounding area supports several camping/caravanning sites, and is a popular holiday destination. Tourist activity is common and the beach experiences high levels of recreational activity.

Some sections of the beach fall within the boundaries of the Hastings Cliffs to Pett Beach SSSI, a site of geological and ecological interest. This coastal site is important for its fossil content and supports a variety of habitats including woodland, maritime grassland and vegetated shingle. These different habitats support a wide number of bryophytes, lichens, vascular plants and invertebrates.

The beach matrix here exhibits an increased level of sand and small particulate matter, most likely due to the local geology. The western end of the beach is bordered by sandstone cliffs and is well known for its fossil content.

The site can reach up to 65m wide in some sections, and the beach matrix is a mixture of gravel, pebbles and sand. Shingle species include Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Sea Beet (*Beta vulgaris*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Buck's-horn Plantain (*Plantago coronopus*), Herb Robert (*Geranium robertianum* ssp. *maritimum*), Stonecrop (*Sedum* spp.), Sticky Groundsel (*Senecio viscosus*), Tree Mallow (*Lavatera arborea*), Rock Samphire (*Crithmum maritimum*), Sea Rocket (*Cakile maritima*), Sea

Knotgrass (*Polygonum maritimum*), mosses and grasses, crustose, foliose and fruiticose lichens. Ephemeral and pioneer communities are present here, but display a limited range.

Other species present at the site include Gorse (*Ulex europaeus*), Common Ragwort (*Senecio jacobaea*), and Brambles (*Rubus* spp.).

Areas around the Pett Level Caravan Park (TQ 890, 133) supports a range of different shingle species including Viper's-bugloss (*Echium vulgaris*), Yellow Horned-poppy (*Glaucium flavum*), Sea-kale (*Crambe maritima*), Sea Beet (*Beta vulgaris*), and Herb Robert (*Geranium robertianum*). Of particular note is the presence of Sea Holly (*Eryngium maritimum*), with this site being the only recorded location of the plant during the 2008 surveys. Consultation with landowners could result in at least some of the site being restored to a healthy shingle habitat, and the possible expansion of the range of Sea Holly.

Landward migration is limited by hard sea defences, transport links, and some development. Areas of grassland to the north of the beach could be considered for use in future restoration/expansion projects. The beach experiences a high level of recreational activity and pressures such as enrichment and disturbance are common. The eastern end of the beach is actively managed as a sea defence and evidence of this work is often found across the site, with some areas displaying a severely compacted substrate, and tyre marks giving a further indication of vehicular disturbance.

Local community and conservation groups currently carry out regular beach cleans in the area, helping to reduce enrichment across the site.

Management advice: Due to high levels of recreational activity on the site and a lack of potential for landward migration, management advice for the area is limited. Habitat expansion into undeveloped areas around the Pett Level Caravan Park may be possible, and consultations with the landowner could help to achieve this. Further to any habitat expansion in the area, interpretation boards at main access points would be beneficial.

A continuation of beach cleaning activities here would help to reduce the impact of enrichment on the site.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

Figure 9.15.1 shows the full extent of the parish of Icklesham.

Parish:	Icklesham
Parish extent:	(TQ 906, 148) to (TQ 951, 178)
Beach Surveyed:	Winchelsea beach

Icklesham is a parish located towards the eastern end of the county with a population of approximately 2,800. The parish can be dated to around the 8th century and encompasses shingle beaches at Winchelsea (fringing beach) and Rye Harbour (cuspate foreland). The area is predominantly rural with limited pockets of residential development. The beaches here are a popular tourist destination, supporting several medium to large caravan/camping sites. This increase in tourist activity can be a major factor when considering the management of shingle beaches within the parish and can impact on both floral communities and beach morphology.

Winchelsea beach

Figure 9.15.2 Shows the location of Winchelsea beach.

Beach surveyed:	Winchelsea
Beach extent (approx):	(TQ 906, 148) to (TQ 918, 160)
Beach length (approx):	1.7 km
Beach width (max):	35 m (with several larger compartments behind the main beach, reaching up to 150m).
Beach area (approx):	8 ha
Site designation:	SSSI (falls within the boundaries of the Dungeness, Romney Marsh and Rye Bay SSSI)
Biodiversity value:	Impoverished

Winchelsea

Winchelsea is a rural area with limited residential and commercial development. The area is bordered by a fringing shingle beach which extends from 15 to 35 meters, although this expands considerably to the east. The beach matrix has an increased level of sand and small particulate matter most likely due to the surrounding geology of the region.

Winchelsea beach lies within the boundaries of the Dungeness, Romney Marsh and Rye Bay, SSSI, designated for both its ecological and geological interest. The beach is also adjacent to the Dungeness to Pett Levels SPA (Special Protection Area).

The site can reach up to 35m wide in some sections, and the beach matrix exhibits a balanced mixture of gravel, pebbles and sand. Typical shingle species include Orache (*Atriplex* spp.), Sea-kale (*Crambe maritima*), Viper's-bugloss (*Echium vulgare*), Bittersweet (*Solanum dulcamara*), Yellow Horned-poppy (*Glaucium flavum*), Curled Dock (*Rumex crispus* ssp. *littoreus*), Sea Mayweed (*Tripleurospermum maritimum*), Sea Pea (*Lathyrus japonicus*), Stonecrop (*Sedum* spp.), Sticky Groundsel (*Senecio viscosus*), Tree Mallow (*Lavatera arborea*), Sea Rocket (*Cakile maritima*), Sea Knotgrass (*Polygonum maritimum*), mosses and grasses, crustose and foliose lichens. Ephemeral and pioneer communities are present here.

Other species present include Red Valerian (*Centranthus ruber*), Common Ragwort (*Senecio jacobaea*), Elder (*Sambucus nigra*), and Brambles (*Rubus* spp.).

Large areas of shingle surrounding the Rye Bay Caravan Park (TQ 916, 159) exhibit a range of typical shingle species including Sea-kale (*Crambe maritima*), Curled Dock (*Rumex crispus* ssp. *littoreus*), and Bittersweet (*Solanum dulcamara*). Despite the limited number of species, these areas have the potential to support a good shingle habitat. Consideration should be given to undertaking restoration projects in these areas, in consultation with local landowners.

Landward migration in the area is restricted by engineered sea defences, development and transport links. Some habitat expansion would be possible here, particularly in some of the undeveloped areas which border the site. The beach at Wincelsea is actively managed as a sea defence and indications of this work can be seen in the levels of compaction evident across the area.

Management advice: Due to high levels of recreational activity on the site and a lack of potential for landward migration, management advice for the area is limited.

The restoration of areas surrounding the Rye Bay Caravan Park (TQ 916, 159) should be considered. Such restoration may occur naturally with some minimal management (removal of invasive species e.g. Elder (*Sambucus nigra*), and Brambles (*Rubus* spp.), reduction of enrichment, and limiting disturbance). Positive results could also be achieved through reseeding the area with a variety of shingle species. Further to any restoration of the site targeted interpretation could be beneficial. Continued monitoring of the site is essential.

The site would benefit from a continuation of beach cleaning activities in the area, and working with local community groups could help to achieve this.

Organisations carrying out beach management should seek to minimise damage to shingle habitats and should be encouraged to follow guidelines included in Appendix C.

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Further information

Below are some useful sources of further information regarding shingle habitats, shingle species, habitat pressures and threats, restoration advice and site information.

BAR (Beaches At Risk) - BAR project was a transnational collaboration between English and French coastal researchers and managers. The project was set up to assist in research of the erosion of coastal habitats along the coastal regions of England and France. http://www.geog.sussex.ac.uk/BAR/

UK BAP (Biodiversity Action Plan) - The UK Biodiversity Action Plan was set up to assist in the protection of habitats and species within the UK. The UK BAP website contains a range of information regarding shingle habitats, the threats they face and their current status. The site also contains details of other threatened habitats (salt marsh, dune systems etc.) and species (Sea Lavender, Toadflax Brocade moth) which can often share a close relationship with areas of shingle. http://www.ukbap.org.uk/

Natural England - Natural England has produced a comprehensive guide regarding vegetated shingle habitats. The guide includes information about shingle structure and the floral species/communities found upon them, habitat and vegetation management, pressures, restoration approaches, and shingle site information. http://www.english-nature.org.uk/livingwiththesea/project_details/good_practice_guide/shingleCRR/shingleguide/home.htm

Sussex Biodiversity Partnership - The Sussex Biodiversity Partnership was set up to in 1996, to continue work started by the UK BAP on a more local level and to focus on the biodiversity issues of Sussex. In 1998 the first edition of 'from Rio to Sussex action for biodiversity' was completed and became the comprehensive species and habitat action plan for the area. The site currently holds useful information regarding shingle habitats and species along with information about habitats and species which share a close relationship with shingle structures. http://www.biodiversitysussex.org/

Rye Harbour Nature Reserve - Rye Harbour Nature Reserve is home to the largest single area of shingle with the county of East Sussex. The area exhibits some superb examples of shingle floral communities and displays a high level of shingle geomorphological interest. The site encompasses a range of habitats including salt marsh, saline lagoons and reed beds. The nature reserve is important for birds and displays a variety of avian species such as the Little Tern (*Sterna albifrons*), Oystercatcher (*Haematopus ostralegus*), Black-headed Gull (*Larus ridibundus*) and Ringed Plover (*Charadrius hiaticula*). http://www.wildrye.info/