TECHNIQUES FOR ASSESSING SHINGLE COMMUNITIES

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Summary

Vegetated shingle is an internationally important habitat whose distribution is globally restricted, and largely limited to north west Europe, Japan and New Zealand (UK Biodiversity Group, 1999a). However, it is well represented in the BAR Region, particularly on the English side of the eastern Channel coasts. Despite its significant ecological importance, existing recording evaluation systems for the habitat are poor. For example, in the UK, the National Vegetation Classification System (NVC) (Rodwell, 1991), used by the statutory conservation bodies in their selection of sites for national and international designation, only characterises two strandline communities (typical of sand or fine shingle substrates) and one vegetation assemblage from coastal shingle (Rodwell, 2000). Surveys of vegetated shingle within the Region are limited and generally restricted to surveys specific to developments or planning applications (e.g. Ryland, 1999, 2000 & 2001). As such no coherent baseline data exists by which to assess the vegetated shingle resource and its relative biodiversity value. The aim of this study was therefore to undertake a pilot baseline survey of the main areas of vegetated shingle in East Sussex using a simple, repeatable technique and to assess their relative biodiversity value.

Forty four sites were surveyed, covering more than 61 hectares (Fig. 3). For each site, a list of vascular plants present was complied and relative abundance was recorded. Where possible, sites were matched to four community classifications; shingle community (Sneddon & Randall, 1993), broad shingle community (Williams & Cooke, 1993), NVC (Rodwell, 2000) and Habitats Directive Annex I habitat (92/43/EEC; European Commission, 2003). *Crambe maritima* (Sea Kale) and *Glaucium flavum* (Yellow Horned-poppy), characteristic species of pioneer shingle communities (Williams & Cooke, 1993) were recorded from approximately half of the sites surveyed. Of the sites surveyed, 22 of the 44 sites surveyed showed at least some similarities to pre-defined shingle communities. Those that did not were generally sites that had been subject to extensive disturbance by e.g. coastal defence, development or recreational pressure. *Teucrium scorodonia* (Wood Sage), a species that has been recognised as indicative of ancient shingle ridges on Dungeness (Ferry *et al*, 1990) was recorded from five sites, four of which were located on some of the few remaining areas of natural shingle from the Crumbles, Eastbourne, possibly indicating its former environmental interest prior to development. Previous techniques for ranking relative quality (Williams & Cooke, 1993) were found to be unsuitable for this study. However, alternative techniques were trialled and will be further developed during later phases of the BAR project.

Many of the sites surveyed are outside designated areas and therefore receive no direct form of protection. The baseline data collected during this survey provides a useful tool for assessing the relative biodiversity value of shingle on the East Sussex coast. Lessons learnt during this survey will be extended to the rest of the BAR Region during subsequent phases of the Project.

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Introduction

The eastern Channel coasts of England and France are of significant ecological importance for their natural habitats. Of particular relevance to the BAR project are maritime cliffs, sand dunes and coastal vegetated shingle. Fig. 1 shows the general distribution of coastal types within the BAR Region. These habitats are listed on Annex I of the European Communities 'Habitats Directive' (92/43/EEC) as being "natural habitat types of community interest whose conservation requires the designation of Special Areas of Conservation" (European Community, 1992). England and France are also signatories to the Convention on Biological Diversity (CBD) signed at the Rio Earth Summit in 1992. The CBD sets out a comprehensive strategy for sustainable development with three main aims; the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (Secretariat of the CBD, 2000). The responsibility to implement the CBD lies with the individual countries. The UK Government's response to the CBD was to produce a UK Biodiversity Action Plan (UK BAP) (Department of Environment, 1994) which describes the UK's resources and commits a detailed plan for their protection. Maritime cliff and slope, coastal sand dunes and coastal vegetated shingle are all listed as priority habitats under this plan as they meet some or all of the selection criteria; habitats for which the UK has international obligations, habitats at risk, for example those with a high rate of decline, habitats for which more than 40% of the north east Atlantic resource is in the UK and/or habitats which are important for rare species. Specific national Habitat Action Plans (HAPs) with targeted actions were produced for these habitats in 1999 (UK Biodiversity Group, 1999a). These habitats are also qualifying criteria for the designation of nationally important Sites of Special Scientific Interest (SSSIs) for their biological value (Nature Conservancy Council, 1989).

Fig. 1. The BAR Region illustrating the distribution of the main coastal types.

Of these coastal habitats, it could be argued that vegetated shingle is the most important within the BAR Region. Shingle is a globally restricted coastal sediment type largely restricted to north west Europe, Japan and New Zealand (UK Biodiversity Group, 1999a). Two shingle habitats are listed on Annex I of the EC Habitats Directive; H1210 *Annual vegetation of drift lines* and H1220 *Perennial vegetation of stony banks*. H1210 has a wide distribution in the European Union, and has been recorded from Mediterranean coastlines in southern Europe to the coasts of Sweden and Finland (Joint Nature Conservation Committee, 2004a). It is estimated that 30% of the coastline of England and Wales is fringed by shingle, most of which forms simple fringing beaches where the shingle is mobile and vegetation is restricted to temporary and mobile strandline communities (UK Biodiverity Group, 1999a). In contrast, there are only a few extensive examples of H1220 in Europe and the UK hosts a significant part of the European resource (Joint Nature Conservation Committee, 2004a). A survey of the major vegetated shingle structures in the UK (Sneddon & Randall, 1993) estimated 5000 hectares of the habitat in England, the largest areas being in the north west, south and south east, with those in the north west being largely associated with beaches fringing sea lochs (Doody, 2003). The BAR Region is a particular stronghold for vegetated shingle; Dungeness in East Sussex and Kent is the largest shingle structure in the UK with over 2000 hectares of shingle (UK Biodiversity Group, 1999a). However, despite the importance of the habitat, existing recording evaluation systems are poor.

In the UK, there are standard techniques for surveying and classifying terrestrial habitats. At the most basic level are Phase 1 surveys (Nature Conservancy Council, 1993a & 1993b). Phase 1 aims to provide a relatively rapid record of semi-natural vegetation and wildlife habitat over large areas of the countryside to benefit nature conservation and to inform development planning. It is a hierarchical classification system based on intuitive definitions of habitats and principally records vegetation, augmented by reference to topographic and substrate features. In terms of the coastal habitats of interest to the BAR project, sand dunes and maritime cliffs are relatively well represented. There are seven listed Phase 1 categories for sand dunes, and two categories and four sub-categories for maritime cliffs. In contrast, there are only two categories for shingle; H3 Shingle/gravel above the high-tide mark, and H5 Strandline vegetation. H3 includes a target to note any vascular plants or lichen vegetation that may occur but does not highlight any of the characteristic communities. H5 is described as an open community on the drift line characterised by species such as *Cakile maritima* (Sea Rocket), *Honckenya peploides* (Sea Sandwort), *Rumex crispus* (Curled Dock), *Salsola kali* (Prickly Saltwort), *Atriplex* (Orache) species and *Beta vulgaris* ssp. *maritima* (Sea Beet, syn. *Beta vulgaris*). There is a target to note whether the substrate is shingle or rock, implying that the habitat may not be restricted to shingle beaches.

At the next level of detail is the National Vegetation Classification (NVC) system (Rodwell, 1991). This provides an empirical classification of vegetative habitats based on phytosociological associations, derived from samples taken from around the whole of the UK. Volume 5 classifies maritime communities (Rodwell, 2000) and includes three strandline and shingle vegetation communities; SD1 *Rumex crispus – Glaucium flavum* shingle community (within which two sub-communities are recognised), SD2 *Honckenya peploides – Cakile maritima* strandline community and SD3 *Matricaria maritima – Galium aparine* strandline community (*Matricaria maritima* syn. *Tripleurospermum maritimum*). Of these, SD2 and SD3 are described as being dominated by ephemeral, nitrophilous herbs, making a brief and often fragmentary appearance during the growing season on beach-top sands and fine shingle where organic detritus has been dumped along the shoreline. Furthermore, SD3 has a predominantly northern distribution. SD1 occurs on coarser sediments, specifically sharply-draining pebbles and gravels beyond the reach of all but exceptional tides. SD1 is therefore the only assemblage characterised from coastal shingle (Rodwell, 2000). In contrast, there are 16 sand dune communities (excluding SD1, 2 and 3) and 12 maritime cliff communities classified in the NVC.

In the UK, the NVC is the main system used to classify terrestrial habitats for the selection of biological SSSIs and has also been used to interpret EC Habitats Directive Annex I habitats. SD1 is accepted as being comparable with H1220. H1210 is less easy to classify using the NVC and can include SD2 and SD3, forms of MC6 (*Atriplex prostrata* – *Beta vulgaris* ssp. *maritima* sea-bird cliff community), and other vegetation types not described in the NVC, for example, monospecific stands of *Atriplex* spp. (Joint Nature Conservation Committee, 2004b). In providing guidance on monitoring designated sites, the Joint Nature Conservation Committee (JNCC) list typical species for both vegetated shingle Annex I habitats as follows: H1210 *H. peploides*, *Cakile maritima*, *Atriplex prostrata* (Spear-leaved Orache), *A. glabriuscula* (Babington's Orache), *A. laciniata* (Frosted Orache), *S. kali*, *Tripleurospermum maritimum* (Sea Mayweed) and *Polygonum oxyspermum* (Ray's Knotgrass); H1220 *R. crispus*, *Crambe maritima* (Sea Kale (*C. maritima*)), *Glaucium flavum* (Yellow-horned Poppy), *Silene uniflora* (Sea Campion, syn. *S. maritima*), *B. vulgaris* ssp. *maritima*, *Lathyrus japonicus* (Sea Pea) and *Picris echioides* (Bristly Oxtongue).

A study of the vegetation of shingle structures in Britain aimed to assess the applicability of existing NVC categories to shingle communities and, where appropriate, to extend the NVC by highlighting any new communities identified (Sneddon & Randall, 1993a, 1993b, 1994a, 1994b). TWINSPAN analysis of quadrat data from shingle sites around the UK produced six major divisions (Table 1) and the detailed description of 124 shingle communties with 22 sub-communties.

Table 1. Major divisions of the shingle vegetation classification. Divisions are listed in order broadly from the most landward to the most seaward vegetation types (after Sneddon & Randall, 1993a).

1. Scrub communities	1a. *Prunus spinosa* communities 1b. *Rubus fruticosus* communities 1c. *Ulex europaeus* communities	
2. Heath communities	2a. Wet heaths 2b. Dry heaths	 2b.i. *Pteridium aquilinum* 2b.ii. *Calluna vulgaris* communities 2b. iii. Moss-rich communities
3. Grassland communities	3a. Saltmarsh-influenced grasslands 3b. *Agrostis stolonifera* grasslands 3c. *Arrhenatherum elatius* grasslands 3d. *Festuca rubra* grasslands 3e. Mixed grasslands 3f. Sandy grasslands	
4. Mature grassland communities	4a. Mature grasslands	4a.i. Mature grasslands – *Festuca rubra* 4a.ii. Mature grasslands – *Dicranum scoparium* 4a.iii. Mature grasslands – *Arrhenatherum elatius*
	4b. Less mature grasslands	4b.i. Less mature grasslands pure shingle 4b.ii. Less mature grasslands saltmarsh influence
5. Secondary Pioneer communities	-	-

6. Pioneer communities	6a. *Honckenya peploides* dominated communities 6b. *Senecio viscosus* dominated communities 6c. *Beta vulgaris* dominated communities 6d. *Raphanus maritimus*[1] dominated communities 6e. Herb-dominated pioneer communities 6f. *Silene maritima* dominated pioneer communities	

The above studies of Rodwell (2000) and Sneddon & Randall (1993) excluded Dungeness as it was subject to a three year mapping project aimed at providing a classification of the shingle communities of Dungeness based on the NVC scheme and a sufficiently detailed classification for use in field mapping of the vegetation (Ferry *et al*, 1990). The study revealed 18 distinguishable vegetation types, two of which could possibly have been further subdivided and several that are believed to be unique to the Dungeness shingle system.

On a more local level, a preliminary assessment of vegetated shingle sites in East and West Sussex was carried out (Ryland, 1993) using aerial photographs to identify possible areas of vegetated shingle. The list produced was further refined during field visits, and for those sites considered to be of greatest interest, a species list was produced and quadrat data was collected where appropriate (Williams & Cooke, 1993). The baseline for significant interest was the presence of a recognisable pioneer community, generally characterised by *C. maritima* and *G. flavum*. TWINSPAN analysis of the quadrat data identified six end groups (Fig. 2) which represented three basic types of community; pioneer, intermediate and established. The definitions of these three community types are as follows (Williams & Cooke, 1993; Ryland, 1999). Pioneer communities (Groups 1 and 4) are species poor and occur furthest down the beach where shingle is more prone to disturbance. *C. maritima*, *R. crispus*, *B. vulgaris* ssp. *maritima*, *G. flavum* and *A. prostrata* are characteristic. Intermediate communties (Groups 2 and 5) retain some of the pioneer species, but in addition support species such as *Plantago lanceolata* (Ribwort Plantain), *Senecio jacobaea* (Common Ragwort), *Cerastium fontanum* (Common Mouse-ear), *Arenaria serpyllifolia* (Thyme-leaved Sandwort) and *Sonchus oleraceus* (Smooth Sowthistle). Established communities (Groups 3 and 6) have a closed turf, often bryophyte and lichen rich, characterised by a range of species including *Festuca rubra* (Red Fescue), *Pilosella officinarum* (Mouse-ear-hawkweed, syn. *Hieracium pilosella*), *Medicago lupulina* (Black Medick) and *S. uniflora*.

[1] *Raphanus maritimus* syn. *Raphanus raphanistrum* ssp. *maritimus*

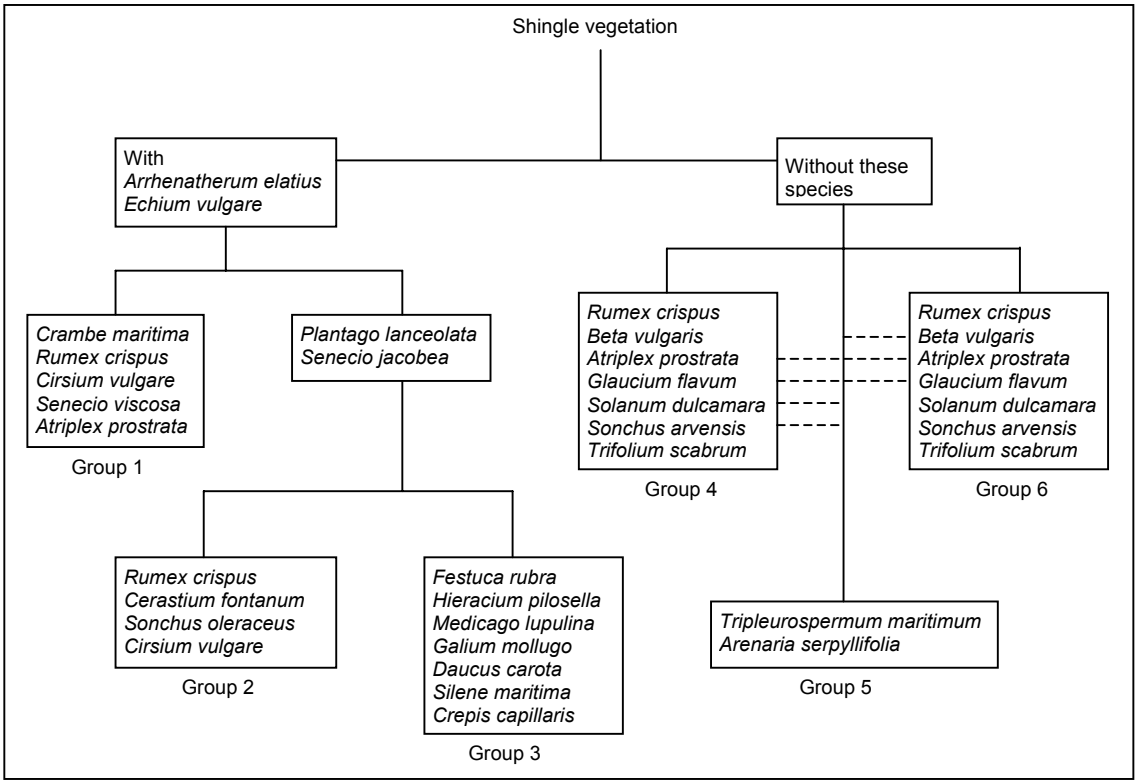

Fig. 2. Vegetated shingle community types (after Williams & Cooke, 1993).

Due to the difficulties in recording and classifying shingle habitats described above, there is relatively little baseline data available on the distribution of coastal vegetated shingle in the UK. As part of a project to describe the size, location and quality of the main coastal habitats in Great Britain (saltmarshes, sand dunes, vegetated shingle, sea cliffs, strandlines, 'reclaimed' land and maritime islands) commissioned by the Nature Conservancy Council in 1987, a survey of shingle structures was carried out (Sneddon and Randall, 1993b, 1993a, 1993b). However, the surveys were restricted to plant communities found on stable or semi-stable shingle structures, and therefore excluded many of the fringing shingle beaches found within the BAR region. Indeed, the only shingle structures surveyed within the region were Rye Harbour (East Sussex) and Walmer (Kent) (Sneddon and Randall, 1994b). On a regional level, some site specific surveys have been carried out, particularly for designated sites (e.g. Ferry *et al*, 1990; Ryland, 1993; Williams & Cooke, 1993; Clark & Finch, 1996a & 1996b). In addition, English Nature hold detailed information on most groups of plants and animals for SSSIs, and the Sussex and Kent Biodiversity Record Centres maintain databases of known environmental information. Other survey information has been collected on a piecemeal basis, largely as a result of planning applications (e.g. Technitas, 1988) or in relation to coastal defence works (e.g. Ryland, 1999, 2000, 2001). The surveys detailed in this report, together with surveys undertaken by Rye Harbour Nature Reserve staff and consultants in the Rye Bay area (B. Yates, pers. comm.), comprise the first comprehensive survey of coastal vegetated shingle in East Sussex.

The collection of basic data on coastal habitats is an important first step in identifying the most ecologically significant sites, and establishes a baseline for monitoring and understanding the impact of management practices and developments on them (Sneddon and Randall, 1993a). The JNCC have produced guidelines for monitoring sites designated for coastal vegetated shingle (Joint Nature Conservation Committee, 2004b) to ensure they are in favourable condition. The guidelines recommend the montoring of specific targets relating to a series of attributes including habitat extent, physical structure (functionality and

sediment supply), vegetation structure (zonation of vegetation), vegetation composition (characteristic species) and negative indicators. However, much of the vegetated shingle recource within the BAR region has no statutory protection and is therefore not monitored. Williams and Cooke (1993) attempted to identify and rank the relative value of all areas of significant vegetated shingle along the Sussex coast, concentrating on non-SSSI sites, to prevent damage to those sites during emergency coastal defence works. Relative value was assessed using four criteria; number of species recorded, area of vegetated shingle, number of community types present and rare plant records. Whilst the coverage was wider than stuatutory sites, the majority of areas surveyed were designated as Sites of Nature Conservation Importance (SNCIs) and therefore of local significance. Also, the criteria for assessing value were limited, relying on an ability to assign community types, and did not take account of sites with potential for restoration given sympathetic management.

In England, the Countryside and Rights of Way Act 2000 (HMSO) provides a statutory basis for biodiversity conservation, and places a duty on government to protect and enhance biodiversity. As stated above, coastal vegetated shingle is listed as a priority habitat under the UK BAP (Department of Environment, 1994), and it is incumbent upon Government departments in carrying out their functions to have regard to conserving biological diversity. This applies to all areas of vegetated shingle, whether they are designated or not. Fundamental to protecting and enhancing vegetated shingle is a sound understanding of the habitat in terms of its distribution and appropriate management for its protection.

There has been significant, direct and irreversible loss of shingle habitat in the UK (Doody, 2003). Aggregate extraction has resulted in the severe alteration of morphology and vegetation or almost total destruction of major parts of the feature, whilst industrial plant, defence infrastructure and other developments have been built on shingle structures, destroying vegetation and ridge morphology (UK Biodiversity Group, 1999a). Other factors that affect vegetated shingle include sea defence and coastal protection, sediment supply, natural mobility, recreational use and garden escapes (UK Biodiversity Group, 1999a; Doody, 2003; pers. obs.). Within the UK BAR region, approximately 43% of the surface of Dungeness has been adversely affected by impacts ranging from vehicular damage to gravel extraction (Fuller, 1985; Doody, 2003), whilst virtually all of the 160 ha site, the Crumbles in East Sussex, has been completely destroyed by gravel extraction, housing developments and visitor pressure (Doody, 2001, 2003). Guidelines have been produced for engineers and developers working on vegetated shingle to offset damage (Hatcher, 2002; Doody, 2003), and an A5, waterproof, colour identification guide has been jointly produced by the East Sussex Coastal Biodiversity Project and the West Sussex Vegetated Shingle Project to help contractors working on site to avoid vegetated shingle communities. The BAR project has also put considerable emphasis on public participation events to raise awareness about the importance of vegetated shingle and how local communities can help to protect and enhance the habitat.

Given the importance of the UK Channel coasts for vegetated shingle in a European context, it was decided that Phase 1 of BAR would concentrate on establishing a simple protocol for surveying vegetated shingle. Lessons learnt could then be extended to the rest of the BAR Region in later phases of the Project.

Aims

To establish a technique for surveying coastal vegetated shingle and assessing relative biodiversity value that can be used by non-specialists.

Objectives

- To undertake a baseline ecological survey of the main areas of vegetated shingle in East Sussex using a relatively simple and repeatable method.
- To use survey data to identify shingle community types.
- To assess relative biodiversity value of surveyed sites.
- To involve volunteers in the survey work to validate survey methodology and raise awareness of the importance of vegateted shingle as a natural habitat.

Method

The surveys reported here covered the majority of the East Sussex coast (from Newhaven to Cooden Beach). Whilst survey information from Rye Bay has not been included in this report, close liaison was maintained with the Rye Bay team throughout to ensure consistency of approach.

Nomenclature throughout follows Stace (1997 & 1999).

Survey technique

Sites were initially chosen from Ordnance Survey (OS) maps. Aerial photographs and knowledge of the area were used to refine this list of sites to those that were likely to have at least some vegetation. Once on site, the chosen survey areas were further refined using easily recognisable landmarks such as groynes, roads, piers etc. Once finalised, polygons were digitised around each of these areas using the Geographical Information System (GIS) ArcView and the area in hectares (ha) was calculated.

For each polygon, a list of vascular plants was compiled and a relative abundance was applied to each by estimating percentage coverage using the DAFOR scale (**D**ominant >75%, **A**bundant 51-75%, **F**requent 26-50%, **O**ccasional 11-25%, **R**are 1-10%). Plants were identified to species or subspecies level wherever possible, but some could only be identified to the generic level. The percentage of bare shingle was also estimated for each polygon. Any signs of damage or disturbance, e.g. grazing, vehicle tracks or litter, were noted for each site, as was the management history where known.

The survey team was led by T. Youghusband (TY) and consisted of a small group of volunteers; J. Simmes (JS), W. Meadway (WM), P. Davys (PD), J. Morley (JM), D. Vinall (DV) and E. Low (EL). All were amateur botantists recruited from the local community through public participation events and articles in local papers and other publications. Their combined expertise was such that the majority of species encountered could be identified to at least generic and usually specific level with a high degree of confidence. If there was any doubt over species identification, records were verified by the Botanical Society of the British Isles (BSBI) Watsonian Vice County Recorder for East Sussex (P. Harmes).

Once surveyed, the list of species for each site was sorted into descending order of abundance, and where possible, sites were matched to four community types; shingle community (Sneddon & Randall, 1993a), broad shingle community (Williams & Cooke, 1993), NVC (Rodwell, 2000) and Habitats Directive Annex I habitat (European Commission, 2003). As these community types are based on the constant presence or dominance of particular species or suites of species, in assigning community types to the survey sites, those species which were recorded as Dominant or Abundant (or Frequent if no species was present at above 75% cover) were considered in the first instance, with additional species being considered as key associates if necessary.

Eleven species were chosen as being indicative of shingle sites (B. Yates and P. Harmes, pers. comm.), and their distribution along the coast was mapped. The species were *C. maritima*, *A. prostrata*, *G. flavum*, *Galeopsis angustifolia* (Red Hemp-nettle), *S. uniflora*, *Geranium robertianum* (Herb-Robert), *B. vulgaris* ssp. *maritima*, *Sedum acre* (Biting Stonecrop), *Sedum anglicum* (English Stonecrop), *Crithmum maritimum* (Rock Samphire) and *Teucrium scorodonia* (Wood Sage).

Relative value of sites

Notable species

The International Union for the Conservation of Nature (IUCN, now the World Conservation Union) have devised a number of criteria for assessing the conservation status of species into a series of categories; extinct (EX), extinct in the wild (EW), critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT) and data deficient (IUCN, 2001, cited in JNCC, 2004c). In addition to the IUCN criteria, species are defined as Nationally Rare (NR) if they occur in 15 or fewer hectads (10 km squares) in Great Britain, and Nationally Scarce (NS) if they occur in 16-100 hectads (JNCC, 2004c; Plantlife, 2004). In the UK, vascular plants have been assessed against these criteria by Wigginton (1991). More recently, the distribution of all vascular plants in the UK have been mapped (Preston *et al*, 2002) allowing rarity status to be assigned. For the current study, a combined list of all species recorded during the survey was compiled (Appendix 1). Any listed as fitting the above described IUCN criteria were noted, and Preston *et al* (2002) was used to assess national status. In addition, some species which did not fit any of the above criteria but were recorded in relatively few hectads and/or have a predominantly coastal occurrence were selected as notable species.

Shingle habitat score

To assess the relative quality of sites, a list of 27 species was selected based on the combined expertise and local knowledge of B. Yates and P. Harmes. The list included characteristic species such as *C. maritima* and *G. flavum* that are seldom found on non-shingle sites, as well as rare species whose distribution in East Sussex is known to be restricted to shingle, e.g. *Lactuca saligna* (Least Lettuce) and *Lathyrus japonicus* (Sea Pea). Each of these species was then assigned a positive score, comprising the inverse of the number of 10km^2 occurrences thoughout the UK derived from the New Atlas of British and Irish Flora (Preston *et al*, 2002). Three of the species chosen, *G. robertianum*, *Solanum dulcamara* (Bittersweet) and *T. scorodonia* were assigned arbitrary scores of 0.005, which equals that of *C. maritima*, as they occur on substrates other than shingle and therefore had high values. However, they were included as *G. robertianum* has a subspecies *maritimum* which is adapted to living on shingle and similarly *S. dulcamara* has a coastal variety *marinum*. *T. scorodonia* has no such maritime variety but it was included as it is recognised as an indicator of ancient shingle ridges (Ferry *et al*, 1990).

Negative species were also chosen to give an indication of any detrimental impacts on the site. *Centranthus ruber* (Red Valerian) and *Cerastium tomentosum* (Snow-in-summer) are both alien species that first colonised shingle species as garden escapes and are now spreading rapidly. *Urtica dioica* (Common Nettle) was included as an indicator of enrichment. The negative indicator species were assigned arbitrary scores of -0.01. The indicator species are listed below in Table 2. The final score was muliptlied by 100 to give an easily manageable figure by which to compare the relative value of sites. A perfect site, i.e. one that supports all the listed positive species and features and none of the negative species and features, would achieve a score of 66.31 (Table 2).

Table 2. Table used to ascertain relative shingle habitat score. No. of 10 km^2 occurrences taken from Preston *et al* (2002).

Species/Feature	**No. of 10km^2 occurrences**	**Inverse/score *arbitrary value**
Anisantha madritensis	56	0.018
Arenaria serpyllifolia ssp. *Leptoclados*	704	0.001
Armeria maritima	1002	0.001
Atriplex glabriuscula	456	0.002
Carduus tenuiflorus	324	0.003
Crambe maritima	185	0.005
Echium vulgare	725	0.001
Galeopsis angustifolia	91	0.011
*Geranium robertianum**	2450	0.005*
Glaucium flavum	184	0.005
Jasione montana	688	0.001
Lactuca saligna	3	0.333
Lathyrus japonicus	29	0.034
Lepidium ruderale	256	0.004
Linaria vulgaris	1676	0.001
Petrorhagia nanteuilii	5	0.200
Sagina maritima	403	0.002
Sedum acre	1784	0.001
Sedum album	1373	0.001
Sedum anglicum	851	0.001
Senecio viscosus	1404	0.001
Silene uniflora	750	0.001
*Solanum dulcamara**	1828	0.005*
Teesdalia nudicaulis	216	0.005
*Teucrium scorodonia**	2115	0.005*
Tripleurospermum maritimum	690	0.001
Vulpia ciliata ssp. *Ambigua*	80	0.013
Invasive alien species	**(the scores below are arbitrary)**	
Centranthus ruber	-0.01	
Cerastium tomentosum	-0.01	
Urtica dioica	-0.01	
Perfect shingle habitat score		**66.31**

Results

In total, 44 polygons comprising 61.11 ha were surveyed during the field seasons of 2003 and 2004. A summary of the locations is given below in Table 3.

Table 3. Location and size of survey sites in East Sussex

Site ID	Location	Mid point of site (OS grid reference)	Area (ha)
1.1	Tide Mills east, landward of footpath, Newhaven	TQ 4603 0017	3.05
1.2	Tide Mills east, seaward of footpath, Newhaven	TQ 4614 0006	1.95
1.3	Tide Mills west, seaward of footpath, Newhaven	TQ 4539 0023	6.15
1.4	Tide Mills west, landward of footpath, Newhaven	TQ 4567 0024	1.36
2.1	Seaford Bay, Dane Road to Martello Tower, Seaford	TV 4815 9870	2.32
2.2	Seaford Bay, Martello Tower to Hawks Brow, Seaford	TV 4865 9831	1.73
2.3	Seaford Bay, Martello Road to Cliff Gardens, Seaford	TV 4859 9845	1.61
3.1	Cuckmere Haven west, east of cable hut	TV 5147 9772	0.08
3.2	Cuckmere Haven west, shingle ridge	TV 5160 9771	0.52
3.3	Cuckmere Haven west, around saline lagoon	TV 5154 9774	0.45
3.4	Cuckmere Haven east, top shingle ridge	TV 5193 9764	1.70
3.5	Cuckmere Haven east, north facing shingle slope	TV 5184 9769	0.71
3.6	Cuckmere Haven east, landward base of slope	TV 5176 9774	0.95
3.7	Cuckmere Haven east, flat area behind ridge	TV 5188 9773	2.59
4.1	Holywell, treatment works to access path	TV 6020 9699	0.57
4.2	Holywell, access path to café	TV 6034 9722	1.15
5.1	Eastbourne seafront, café to outfall	TV 6048 9739	0.10
5.2	Eastbourne seafront, outfall to Silverdale Road	TV 6082 9773	1.56
5.3	Eastbourne seafront, Silverdale Road to Wish Tower	TV 6125 9808	0.36
5.4	Eastbourne seafront, Wish Tower to Pier	TV 6158 9863	0.74
5.5	Eastbourne seafront, Pier to the Redoubt	TV 6204 9935	1.26
6.1	Eastbourne sailing club, Redoubt to Channel View Road	TQ 6257 9995	2.62
6.2	Eastbourne sailing club, Channel View Road to Sovereign Park	TQ 6313 0040	1.95
7.1	Pevensey, Bay View caravan park access track	TQ 6491 0262	0.35
7.2	Pevensey, Bay View caravan Park, seaward of houses	TQ 6496 0262	0.23
7.3	Pevensey, Martello Tower to Bay View Caravan Park	TQ 6477 0236	1.38
8.1	Pevensey Sailing Club west	TQ 6495 0278	1.23
8.2	Pevensey Sailing Club north	TQ 6491 0290	1.19
8.3	Pevensey Sailing Club east	TQ 6505 0292	1.71
9.1	Sandcastle Hotel, Pevensey, seaward of Grey Tower Bungalows	TQ 6518 0308	0.54
9.2	Sandcastle Hotel, Pevensey, caravan park to Courtlands Lodge	TQ 6532 0336	2.8
9.3	Sandcastle Hotel, Pevensey, access path	TQ 6528 0360	0.29
10.1	Coast Road, Normans' Bay, seaward of caravan park	TQ 6778 0518	3.51
10.2	Coast Road, Normans' Bay, Aquarius to Driftwood	TQ 6840 0546	2.10
11.1	Pevensey Bay, EA Depot, Herbrand Walk	TQ 6950 0602	0.46
11.2	Pevensey Bay, Herbrand Walk	TQ 6987 0612	3.32

Site ID	Location	Mid point of site (OS grid reference)	Area (ha)
11.3	Pevensey Bay, chalk bank, EA depot	TQ 6944 0598	0.10
11.4	Pevensey Bay, Herbrand Walk sluice	TQ 6941 0595	0.40
11.5	Pevensey Bay, landward of Herbrand Walk	TQ 6967 0608	0.62
11.6	Pevensey Bay, east of sluice	TQ 6925 0592	1.71
11.7	Pevensey Bay, shingle ridge east of EA depot	TQ 6930 0588	1.49
12.1	Cooden Beach, Herbrand walk, seaward of houses to Cooden Drive roundabout	TQ 7080 0640	1.55
12.2	Cooden Beach, 233 to 279 Cooden Drive	TQ 7110 0646	0.24
12.3	Cooden Beach cliffs, Beaulieu Road	TQ 7155 0656	0.41
Total area			**61.11**

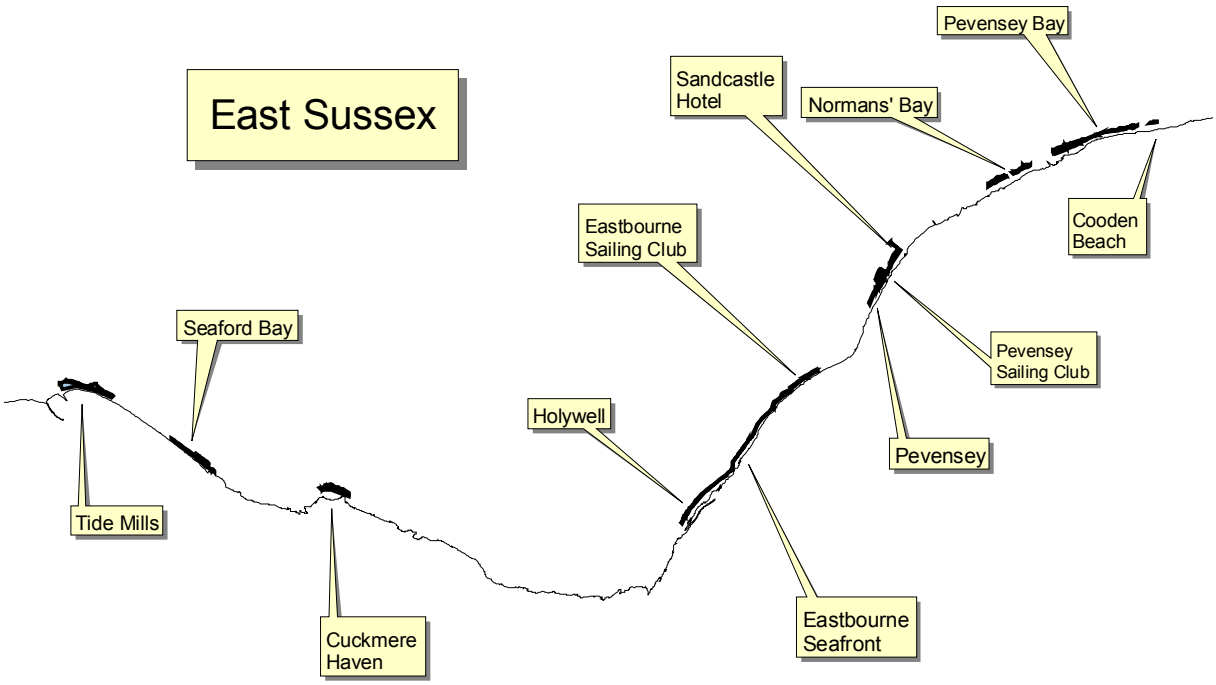

Fig. 3. Location of survey sites in East Sussex, Newhaven to Cooden Beach.

Notable species

Table 4 below lists all those species recorded during the current survey that meet IUCN criteria for rarity (JNCC, 2004c), were NS or NR, or otherwise deemed to be notable by the author.

Table 4. Notable species recorded during survey. Number of hectads (10 km squares) and comments are taken from Preston et al (2002).

Species	Common Name	No. hectads	Comments	Status
Polygonum maritimum	Sea Knotgrass	9	Prostrate perennial herb of sand, shingle or shell beaches, growing above the limit of the highest tides with other strand-line and foredune plants. Lowland. Recent spread (since 1990s) correlating with run of mild winters and hot summers.	EN
Chenpodium vulvaria	Stinking Goosefoot	16	Foetid, often prostrate annual of disturbed, nutrient rich soil on sandy shingle beaches, sand dunes and coastal cliffs where soil enriched by sea bird droppings. Lowland. Declined dramatically before 1930, perhaps because of change from horse to tractor power and declining use of dung as a fertiliser. By 1930, virtually confined to coastal habitats, and here continued to decline for reasons which are unclear.	VU
Cynosurus echinatus	Rough Dog's-tail	43	Annual grass naturalised on open sandy soils. Lowland. Recorded in wild since 1778.	NS
Frankenia laevis	Sea Heath	26	Saltmarshes and saltmarsh-sand dune transitions, especially where firm sand or silt overlies coarser grained material; also rarely on shingle beaches and chalk sea-cliffs.	NS
Galeopsis angustifolia	Red Hemp-nettle	91	Annual of arable land, waste places and open ground on calcareous substrates, including limestone pavements and scree; also on eskers and on coastal sand and shingle.	NS
Hippophae rhamnoides	Sea-buckthorn	50 (native) 352 (alien)	Stabilised sand dunes and coastal banks. Native only in eastern coastal habitats (including Kent).	NS?
Matthiola sinuata	Hoary Stock	80	Short-lived perennial, well-naturalised on sea-cliffs, shingle and other habitats by the sea, and occasionally inland where it is more obviously a garden escape. Lowland. Has been considered to be native but not recorded in the wild until 1808.	NS
Verbascum lychnitis	White Mullein	24	Biennial or occasionally short-lived perennial herb of dry, usually calcareous soil occurring in rough pastures, recently cleared woodland, on railway banks, tracksides and road verges and in quarries and waste places. Lowland.	NS
Armeria maritima	Thrift	1002	Perennial herb of sea cliffs, stone walls, stabilised shingle and saltmarsh.	Notable
Aster tripolium	Sea Aster	558	Perennial herb of low elevations in ungrazed/lightly grazed saltmarshes, muddy sea banks, tidal river banks, brackish ditches.	Notable
Atriplex littoralis	Grass-leaved Orache	308	Annual of open sandy/salty places near sea. Saltmarsh driftlines, estuarine banks, sea walls.	Notable
Atriplex portulacoides	Sea Purslane	278	Muddy or sandy saltmarshes, commonly fringing intertidal pools and creeks.	Notable
Beta vulgaris ssp. *maritima*	Sea Beet	453	Coastal rocks and cliffs, saltmarsh driftlines, sea walls, and on sand and shingle beaches, favouring nutrient enriched sites such as sea bird cliffs and coastal paths popular with dog walkers.	Notable
Cakile maritima	Sea Rocket	435	Annual, predominantly found on sandy seashores and fore-dunes. Often frequent along winter storm tide-line where there is a good source of nutrients. Rarer on shingle beaches.	Notable
Catapodium marinum	Sea Fern-grass	372	Annual of dry bare places by the sea, rock crevices, grassy banks, cliff-tops, sand dunes and stabilised shingle. Artificial habitats include quarries, walls, pavements and railway ballast.	Notable
Crambe maritima	Sea Kale	185	Perennial herb of shingle and boulder beaches, very occasionally found on dunes (but only where these overlay shingle) and on cliffs.	Notable

Species	Common Name	No. hectads	Comments	Status
Crithmum maritimum	Rock Samphire	273	A fleshy perennial herb of spray-drenched rock crevices and ledges on sea-cliffs, coastal rocks and on stabilised shingle; also in maritime grassland and artificial habitats like harbour walls and stone sea defences.	Notable
Elytrigia atherica	Sea Couch	321	Margins of brackish creeks, saltmarshes, saltmarsh-sand dune transitions and on shingle banks and sea walls.	Notable
Geranium robertianum	Herb-Robert	2450	NB The number of hectads given is for the species and not the subspecies *maritimum*. Range of soil types except those that are strongly acidic. Habitats include woods, hedgerows, walls, shaded banks, limestone pavements, screes and coastal shingle.	Notable
Glaucium flavum	Yello-horned Poppy	184	Short-lived perennial herb of shingle banks and stony beaches. Also, more rarely, amongst loose rock and on eroding cliffs of sand and clay and bare tops of chalk cliffs.	Notable
Glaux maritima	Sea Milkwort	790	Perennial herb forming dense colonies on moist saline soils, including saltmarshes, strandlines, damp shingle, wet sand, brackish dune slacks, aerobic mud and spray drenched rock crevices.	Notable
Lavatera arbora	Tree-mallow	189	Rarely native more than 100m from the coast. Usually grows in shallow, nutrient enriched soils, occurring most frequently amongst vegetation in sea bird roosts and on ground enriched by garden waste. Plants killed by severe frost therefore restricted to mild micro-climates near the sea.	Notable
Limonium binervosum agg.	Rock Sea-lavender	133	Group of perennial herbs comprising 9 species and numerous infraspecific taxa, many of which are British and Irish endemics. Coastal habitats including sea-cliffs, dock walls, shingle banks and saltmarshes.	Notable
Limonium vulgare	Common Sea-lavender	169	Perennial herb of ungrazed or lightly grazed saltmarshes, occasionally also growing amongst nearby rocks and on the stonework of sea-walls. Lowland.	Notable
Raphanus raphanistrum ssp. *maritimus*	Sea Radish	287	Biennial or perennial herb found in open coastal grassland, sand dunes, shingle, cliffs and disturbed ground by the sea, Lowland.	Notable
Salicornia agg.	Glassworts	348	Annuals in a variety of coastal habitats, including saltmarshes, sand, muddy shingle, creeks and brackish fields behind sea walls.	Notable
Salicornia ramosissima	Purple Glasswort	153	Usually found in middle and upper zone of saltmarshes, in closed *Puccinellia maritima* (Common Saltmarsh-grass) swards, salt-pans, creeks, drift-lines, firm sand and muddy shingle and behind sea-walls in open areas of brackish grazing marsh.	Notable
Seriphidium maritimum	Sea Wormwood	153	Aromatic perennial herb occurring in upper, drier parts of saltmarshes, on shingle, sea-cliffs, waste ground and walls close to the sea, by brackish dykes of drained estuarine marshes and on banks of tidal rivers. Lowland.	Notable
Silene uniflora	Sea Campion	750	Perennial herb occurring on rocky sea-cliffs from lowest zone of vascular plants to cliff-top grassland, on seaside walls, shingle banks and drift-lines. Can tolerate high levels of enrichment and can be abundant on cliff-tops adjoining sea-bird colonies.	Notable
Spergularia marina	Lesser Sea-spurrey	549	Annual of saltmarshes, sea-walls, muddy shingle, brackish grazing pastures and the base of coastal cliffs.	Notable
Suaeda maritima	Annual Sea-blite	383	Annual found in middle and lower parts of saltmarshes, often with *Salicornia* spp. Early colonist of intertidal mud and sand flats, sometimes also occurring higher up in salt-pans and drift-lines, on shell and shingle banks, and in thinly vegetated brackish areas behind sea-walls. Lowland.	Notable
Teucrium scorodonia	Wood Sage	2115	Perennial herb of well-drained, acidic to mildly calcareous mineral soils, occurring in a wide range of habitats including woodland, hedgerows, scrub, heaths, limestone grassland and pavement, mountain ledges, dunes and shingle, and amongst bracken.	Notable

Species and community types

1.1 Tide Mills East, Newhaven, landward of footpath TQ 4603 0017

Date of visit: 27 June 2003

Surveyors: TY, JS, WM, PD, JM, DV

Site Description: Area 3.05 ha, 75% bare shingle. Area surveyed ran from the east of the Mill Drive path to the disused buildings.

Management history: Previously a mill, a hospital and army training area during World War II, and was therefore subject to heavy vehicular traffic. Designated as a SNCI by Lewes District Council in 1992. Heavily used by dog walkers and popular as a recreational resource.

Damage/disturbance: Trampling and enrichment from dog faeces.

Habitat description: A relatively high percentage of bare shingle and the presence of species such as *C. maritima* and *G. flavum* indicates this is a secondary pioneer community. The high total number of species is an indication of the high level of disturbance and enrichment.

Notable species: *Salicornia* agg., *B. vulgaris* ssp. *maritima*, *C. maritima*, *G. flavum*, *C. maritimum*, *A. portulacoides*, *L. vulgare* and *P. maritimum*. Also *L. vulgare* as it is a known larval food plant of the BAP and Red Data Book 3 (RDB3) species *Calophasia lunula* toadflax brocade moth (UK Biodiversity Group, 1999b; Clancy, 2001).

Shingle habitat score: 1.1

Community type:

a) Shingle community: Something like SH27 *Tripleurospermum maritimum – Atriplex prostrata – Rumex crispus* pioneer community but *Atriplex* only occasional and *Crambe* and *Beta* frequent.
b) Broad shingle community: Group 4
c) NVC: SD1
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 5. Vascular plant list and abundance for survey site 1.1.

Species	Common name	Abundance (DAFOR scale)
Crepis capillaris	Smooth Hawk's-beard	A
Picris echioides	Bristly Oxtongue	A
Rumex crispus	Curled Dock	A
Salicornia agg.	Glassworts	A
Tripleurospermum maritimum	Sea Mayweed	A
Beta vulgaris ssp. *maritima*	Sea Beet	F
Crambe maritima	Sea Kale	F
Glaucium flavum	Yellow Horned-poppy	F
Malva sylvestris	Common Mallow	F
Trifolium scabrum	Rough Clover	F
Urtica dioica	Common Nettle	F
Anagallis arvensis	Scarlet Pimpernel	O

Species	Common name	Abundance (DAFOR scale)
Atriplex prostrata	Spear-leaved Orache	O
Bromus hordeaceus	Soft-brome	O
Centaurea nigra	Common Knapweed	O
Cirsium vulgare	Spear Thistle	O
Daucus carota	Wild Carrot	O
Galium aparine	Cleavers	O
Plantago lanceolata	Ribwort Plantain	O
Rubus fruticosus agg.	Brambles	O
Sedum acre	Biting Stonecrop	O
Senecio erucifolius	Hoary Ragwort	O
Sisymbrium officinale	Hedge Mustard	O
Achillea millefolium	Yarrow	R
Agrimonia eupatoria	Agrimony	R
Arctium lappa	Greater Burdock	R
Carduus tenuiflorus	Slender Thistle	R
Convolvulus arvensis	Field Bindweed	R
Crithmum maritimum	Rock Samphire	R
Dipsacus fullonum	Wild Teasel	R
Galium verum	Lady's Bedstraw	R
Atriplex portulacoides	Sea Purslane	R
Hordeum murinum	Wall Barley	R
Limonium vulgare	Common Sea-lavender	R
Linaria vulgaris	Common Toadflax	R
Lycium barbarum	Duke of Argyll's Teaplant	R
Plantago coronopus	Buck's-horn Plantain	R
Polygonum maritimum	Sea Knotgrass	R
Pulicaria dysenterica	Common Fleabane	R
Solanum dulcamara	Bittersweet	R
Sonchus oleraceus	Smooth Sowthistle	R
Sonchus arvensis	Perennial Sowthistle	R
Trifolium repens	White Clover	R
Verbascum thapus	Great Mullein	R
Veronica hederifolia	Ivy-leaved Speedwell	R
Vicia cracca	Tufted Vetch	R
Total number of species		**46**

1.2 Tide Mills East, Newhaven, seaward of footpath TQ 4614 0006

Date of visit: 27 June 2003

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 1.95 ha, 60% bare shingle. Area surveyed was seaward of the Mill Drive path.

Management history: Previously a hospital and army training area during World War II, and was therefore subject to heavy vehicular traffic. Designated as a SNCI by Lewes District Council in 1992. Heavily used by dog walkers and popular as a recreational resource.

Damage/disturbance: Compaction, trampling and enrichment from dog faeces.

Habitat description: A relatively high percentage of bare shingle and the presence of species such as *Crambe maritima* indicate a pioneer community. The presence of a high proportion of trefoils, grasses and stonecrops along the path indicate disturbance and enrichment.

Notable species: *C. maritima*, *B. vulgaris* ssp. *maritima*, *G. flavum*.

Shingle habitat score: 1.8

Community type:

a) Shingle community: Something like SH6 *Silene maritima – Crambe maritima* pioneer community but no *Silene* and *Crambe* abundant.
b) Broad shingle community: No fit
c) NVC: SD1
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 6. Vascular plant list and abundance for survey site 1.2.

Species	**Common name**	**Abundance (DAFOR scale)**
Lotus corniculatus	Common Bird's-foot-trefoil	A
Crambe maritima	Sea Kale	A
Malva sylvestris	Common Mallow	F
Cirsium arvense	Creeping Thistle	F
Rumex crispus	Curled Dock	F
Lepidium draba	Hoary Cress	F
Beta vulgaris ssp. *maritima*	Sea Beet	F
Tripleurospermum maritimum	Sea Mayweed	F
Cirsium vulgare	Spear Thistle	F
Glaucium flavum	Yellow Horned-poppy	F
Sedum acre	Biting Stonecrop	O
Solanum dulcamara	Bittersweet	O
Picris echioides	Bristly Oxtongue	O
Senecio jacobaea	Common Ragwort	O
Plantago lanceolata	Ribwort Plantain	O
Anagallis arvensis	Scarlet Pimpernel	O

Species	Common name	Abundance (DAFOR scale)
Sonchus sp.	Sowthistle sp.	O
Atriplex prostrata	Spear-leaved Orache	O
Sedum album	White Stonecrop	O
Medicago lupulina	Black Medick	R
Hypochaeris radicata	Common Cat's-ear	R
Cerastium fontanum	Common Mouse-ear	R
Potentilla reptans	Creeping Cinquefoil	R
Taraxacum agg.	Dandelions	R
Cochlearia danica	Danish Scurvygrass	R
Convolvulus arvensis	Field Bindweed	R
Ranunculus sardous	Hairy Buttercup	R
Arctium minus	Lesser Burdock	R
Total number of species		**28**

1.3 Tide Mills West, Newhaven, seaward of footpath TQ 4539 0023

Date of visit: 27 June 2003

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 6.15 ha, 70% bare shingle. Large area west of Mill Drove access point to the boundary of the ferry port.

Management history: Previously a hospital and army training area during World War II, and was therefore subject to heavy vehicular traffic. Designated as a SNCI by Lewes District Council in 1992. Heavily used by dog walkers and popular as a recreational resource.

Damage/disturbance: Compaction, trampling and enrichment. Towards the port, the vegetation becomes more ruderal with few characteristic shingle species.

Habitat description: A relatively high percentage of bare shingle and the dominant presence of *C. maritima* indicate a pioneer community.

Notable species: *C. maritima*, *G. flavum*, *B. vulgaris* ssp. *maritima*.

Shingle habitat score: 1.9

Community type:

a) Shingle community: Something like SH9 *Crambe maritima – Solanum dulcamara* pioneer community but *Solanum* rare and *Pastinaca* and *Plantago* abundant.
b) Broad shingle community: No fit
c) NVC: SD1
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 7. Vascular plant list and abundance for survey site 1.3.

Species	**Common name**	**Abundance (DAFOR scale)**
Crambe maritima	Sea Kale	D
Pastinaca sativa	Wild Parsnip	A
Plantago lanceolata	Ribwort Plantain	A
Centaurium erythraea	Common Centaury	F
Daucus carota	Wild Carrot	F
Glaucium flavum	Yellow Horned-poppy	F
Holcus lanatus	Yorkshire-fog	F
Medicago lupulina	Black Medick	F
Ononis repens	Common Restharrow	F
Picris echioides	Bristly Oxtongue	F
Rumex crispus	Curled Dock	F
Sedum anglicum	English Stonecrop	F
Sonchus arvensis	Perennial Sowthistle	F
Beta vulgaris ssp. *maritima*	Sea Beet	O
Echium vulgare	Viper's-bugloss	O
Galium mollugo	Hedge Bedstraw	O

Species	Common name	Abundance (DAFOR scale)
Sedum album	White Stonecrop	O
Trifolium scabrum	Rough Clover	O
Tripleurospermum maritimum	Sea Mayweed	O
Cymbalaria muralis	Ivy-leaved Toadflax	R
Epilobium hirsutum	Great Willowherb	R
Hypochaeris radicata	Common Cat's Ear	R
Linaria vulgaris	Common Toadflax	R
Picris hieracioides	Hawkweed Oxtonuge	R
Plantago coronopus	Buck's-horn Plantain	R
Solanum dulcamara	Bittersweet	R
Total number of species		**26**

1.4 Tide Mills West, Newhaven, landward of footpath TQ 4567 0024

Date of visit: 27 June 2003

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 1.36ha, 55% bare shingle. Site adjacent to large floodplain.

Management history: Previously railway sidings, a hospital and army training area during World War II, and was therefore subject to heavy vehicular traffic. Designated as a SNCI by Lewes District Council in 1992. Heavily used by dog walkers and popular as a recreational resource.

Damage/disturbance: Compaction, trampling and enrichment.

Habitat description: Pioneer community with *Crambe* dominant and *Pastinaca* and *Plantago* abundant.

Notable species: *C. maritima*, *G. flavum*, *B. vulgaris* ssp. *maritima*.

Shingle habitat score: 1.8

Community type:

a) Shingle community: Something like SH9a *Crambe maritima – Solanum dulcamara* pioneer community, *Rumex crispus* sub-community, but *Solanum* rare.
b) Broad shingle community: No fit
c) NVC: SD1
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 8. Vascular plant list and abundance for survey site 1.4.

Species	**Common name**	**Abundance (DAFOR scale)**
Crambe maritima	Sea Kale	D
Pastinaca sativa	Wild Parsnip	A
Plantago lanceolata	Ribwort Plantain	A
Centaurium erythraea	Common Centaury	F
Crepis capillaris	Smooth Hawk's-beard	F
Daucus carota	Wild Carrot	F
Festuca rubra	Red Fescue	F
Glaucium flavum	Yellow Horned-poppy	F
Hirschfeldia incana	Hoary Mustard	F
Holcus lanatus	Yorkshire-fog	F
Medicago lupulina	Black Medick	F
Ononis repens	Common Restharrow	F
Picris echioides	Bristly Oxtongue	F
Rumex crispus	Curled Dock	F
Sedum anglicum	English Stonecrop	F
Sonchus sp.	Sowthistle sp.	F
Agrostis sp.	Bent sp.	O

Species	Common name	Abundance (DAFOR scale)
Beta vulgaris ssp.*maritima*	Sea Beet	O
Galium mollugo	Hedge Bedstraw	O
Juncus gerardii	Saltmarsh Rush	O
Trifolium pratense	Red Clover	O
Tripleurospermum maritimum	Sea Mayweed	O
Cymbalaria muralis	Ivy-leaved Toadflax	R
Epilobium hirsutum	Great Willowherb	R
Hypochaeris radicata	Common Cat's-ear	R
Linaria vulgaris	Common Toadflax	R
Picris hieracioides	Hawkweed Oxtonuge	R
Plantago coronopus	Buck's-horn Plantain	R
Solanum dulcamara	Bittersweet	R
Total number of species		**29**

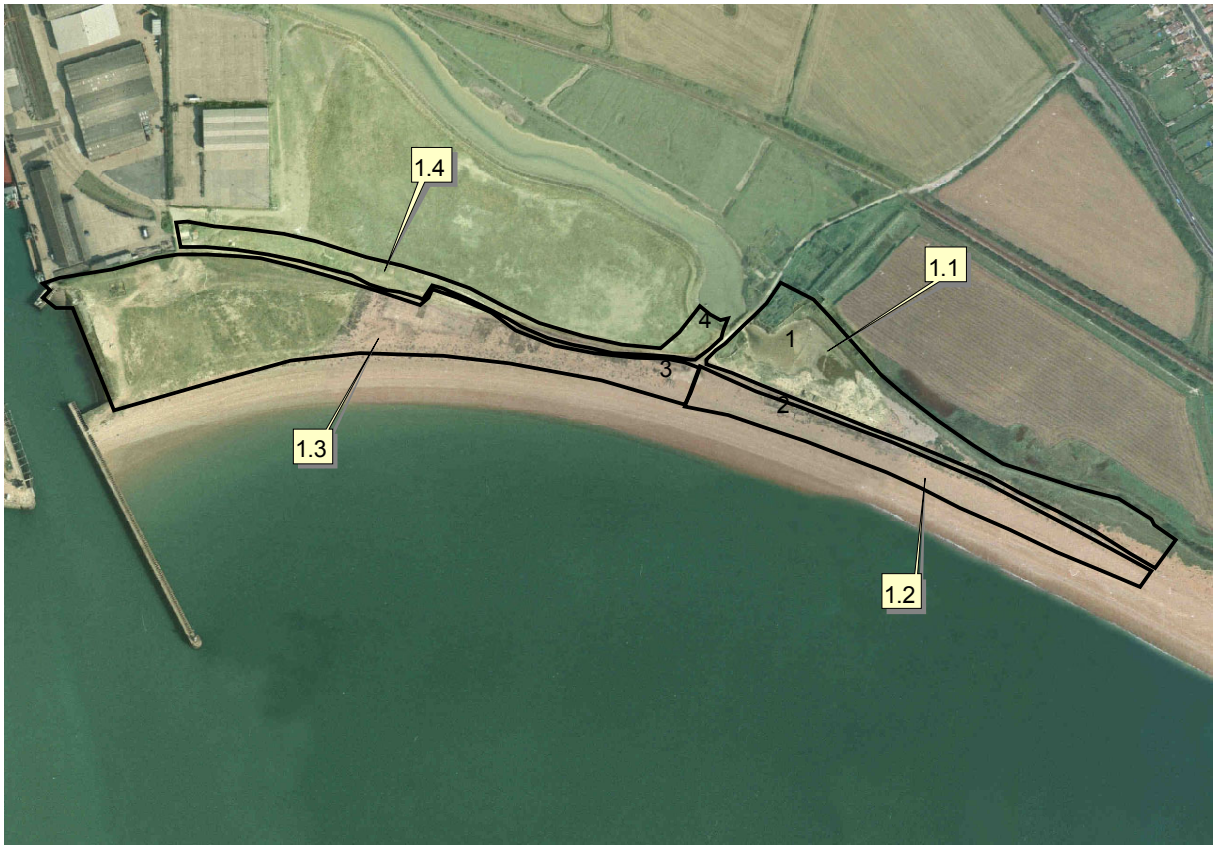

Fig 4. Aerial Photograph of Tide Mills survey sites, 1.1 to 1.4. Scale 1:6000.

2.1 Seaford Bay, Dane Road to Martello Tower TV 4815 9870

Date of visit: 04 August 2003

Surveyors: TY, EL.

Site Description: Area 2.32ha, 98% bare shingle. Long linear survey area adjacent to the promenade.

Management history: Seaford Beach was completely recharged in the 1980s using shingle dredged from offshore. The Environment Agency carry out routine shingle recycling and reprofiling during the winter. A designated bathing beach, the beach is primarily managed as a coastal defence and as a recreational resource.

Damage/disturbance: Severe compaction with increased load of sand and artificial profile with frequent cliffing. Due to the linear nature of the beach and the close proximity to the promenade, the beach is relatively narrow. The sea therefore is able to wash right up to the sea wall during storm events, particularly in the winter.

Habitat description: Damaged pioneer community heavily influenced by shingle recycling with very few shingle species; only *Beta* and *Atriplex*.

Notable species: *B. vulgaris* ssp. *maritima.*

Shingle habitat score: 0.1

Community type:

a) Shingle community: No fit
b) Broad shingle community: No fit
c) NVC: No fit to any shingle community
d) Habitats Directive Annex I: No fit

Table 9. Vascular plant list and abundance for survey site 2.1.

Species	Common name	Abundance (DAFOR scale)
Picris echioides	Bristly Oxtounge	O
Atriplex prostrata	Spear-leaved Orache	O
Tripleurospermum inodorum	Scentless Mayweed	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Tripleurospermum maritimum	Sea Mayweed	O
Dactylis glomerata	Cock's-foot	R
Lotus corniculatus	Common Bird's-foot-trefoil	R
Cerastium fontanum	Common Mouse-ear	R
Cirsium arvense	Creeping Thistle	R
Rumex crispus	Curled Dock	R
Plantago lanceolata	Ribwort Plantain	R
Polygonum aviculare	Knotgrass	R
Lolium perenne	Perennial Rye-grass	R
Total number of species		**13**

2.2 Seaford Bay, Martello Tower to Hawks Brow TV 4865 9813

Date of visit: 04 August 2003

Surveyors: TY.

Site Description: Area 1.73ha, 90% bare shingle. Long linear survey area adjacent to the promenade. Survey area ran from the east of the Martello Tower to the terminal groyne, and beyond to Hawk's brow, encompassing shingle below the chalk cliffs.

Management history: Seaford Beach was completely recharged in the 1980s using shingle dredged from offshore. The Environment Agency carry out routine shingle recycling and reprofiling during the winter. A designated bathing beach, the beach is primarily managed as a coastal defence and as a recreational resource.

Damage/disturbance: Severe compaction with increased load of sand and artificial profile with frequent cliffing. Due to the linear nature of the beach and the close proximity to the promenade, the beach is relatively narrow. The sea therefore is able to wash right up to the sea wall during storm events, particularly in the winter. The chalk cliffs in this area support a significant breeding colony of kittiwakes and are therefore subject to enrichment from the guano.

Habitat description: Damaged pioneer community, heavily influenced by shingle recycling. *Atriplex* was the frequent shingle species present.

Notable species: *B. vulagris* ssp. *maritima.*

Shingle habitat score: 0.1

Community type:

a) Shingle community: No fit
b) Broad shingle community: No fit
c) NVC: No fit to any shingle community although could be likened to MC6 *Atriplex prostrata – Beta vulgaris maritima* sea-bird cliff community.
d) Habitats Directive Annex I: No fit

Table 10. Vascular plant list and abundance for survey site 2.2.

Species	Common Name	Abundance (DAFOR scale)
Atriplex prostrata	Spear-leaved Orache	F
Calystegia sepium	Hedge Bindweed	F
Centaurea nigra	Common Knapweed	F
Holcus lanatus	Yorkshire-fog	F
Hypochaeris radicata	Common Cat's-ear	F
Persicaria maculosa	Redshank	F
Picris echioides	Bristly Oxtongue	F
Poa annua	Annual Meadow-grass	F
Veronica chamaedrys	Germander Speedwell	F
Anagallis arvensis	Scarlet Pimpernel	O
Arctium minus	Lesser Burdock	O
Arrhenatherum elatius	False Oat-grass	O

Species	Common Name	Abundance (DAFOR scale)
Beta vulgaris ssp.maritima	Sea Beet	O
Cerastium arvense	Field Mouse-ear	O
Cirsium vulgare	Spear Thistle	O
Daucus carota	Wild Carrot	O
Festuca rubra	Red Fescue	O
Galium aparine	Cleavers	O
Hypericum perforatum	Perforate St John's-wort	O
Plantago coronopus	Buck's-horn Plantain	O
Plantago lanceolata	Ribwort Plantain	O
Potentilla reptans	Creeping Cinquefoil	O
Tripleurospermum maritimum	Sea Mayweed	O
Tussilago farfara	Colt's-foot	O
Cerastium fontanum	Common Mouse-ear	R
Cirsium arvense	Creeping Thistle	R
Cynosurus cristatus	Crested Dog's-tail	R
Dactylis glomerata	Cock's-foot	R
Leucanthemum vulgare	Oxeye Daisy	R
Lolium perenne	Perennial Rye-grass	R
Lotus corniculatus	Common Bird's-foot-trefoil	R
Polygonum aviculare	Knotgrass	R
Rumex crispus	Curled Dock	R
Senecio jacobaea	Common Ragwort	R
Trifolium repens	White Clover	R
Tripleurospermum inodorum	Scentless Mayweed	R
Total Number of Species		**36**

2.3 Seaford Bay, Martello Road to Cliff Gardens TV 4859 9845

Date of visit: 04 August 2003

Surveyors: TY.

Site Description: Area 1.61ha, 5% bare shingle. This survey site comprised three sections landward of the road along the sea front. They support a low cropped sward of grassland species but were surveyed to ascertain the presence of any coastal species given the close proximity to the beach and therefore the strong maritime influence.

Management history: The exact history of the site is unknown. Land levels are significantly lower than adjacent land. It is likely that the site was seeded with grassland species.

Damage/disturbance: Owned and managed by Lewes District Council as a recreational area, the area is regularly mown throughout the summer. Heavily used by dog walkers and subject to pedestrian traffic.

Habitat description: Grassland community with 39 species. The maritime influence is apparent from the presence of *Atriplex* (frequent) and *Beta* (occasional).

Notable species: *B. vulgaris* ssp. *maritima.*

Shingle habitat score: 0.0

Community type:

a) Shingle community: No fit
b) Broad shingle community: No fit
c) NVC: Grassland community
d) Habitats Directive Annex I: No fit

Table 11. Vascular plant list and abundance for survey site 2.3.

Species	Common Name	Abundance (DAFOR scale)
Poa annua	Annual Meadow-grass	D
Bellis perennis	Common Daisy	A
Holcus lanatus	Yorkshire-fog	A
Lolium perenne	Perennial Rye-grass	A
Taraxacum agg.	Dandelions	A
Trifolium repens	White Clover	A
Veronica agrestis	Green Field-speedwell	A
Atriplex prostrata	Spear-leaved Orache	F
Calystegia sepium	Hedge Bindweed	F
Centaurea nigra	Common Knapweed	F
Picris echioides	Bristly Oxtongue	F
Potentilla reptans	Creeping Cinquefoil	F
Rumex obtusifolius	Broad-leaved Dock	F
Senecio jacobaea	Common Ragwort	F
Veronica chamaedrys	Germander Speedwell	F
Anagallis arvensis	Scarlet Pimpernel	O

Species	Common Name	Abundance (DAFOR scale)
Beta vulgaris ssp.*maritima*	Sea Beet	O
Cardamine sp.	Bitter-cress sp.	O
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Dactylis glomerata	Cock's-foot	O
Lotus corniculatus	Common Bird's-foot-trefoil	O
Plantago lanceolata	Ribwort Plantain	O
Ranunculus repens	Creeping Buttercup	O
Tripleurospermum inodorum	Scentless Mayweed	O
Tussilago farfara	Colt's-foot	O
Cerastium arvense	Field Mouse-ear	R
Cerastium fontanum	Common Mouse-ear	R
Cynosurus cristatus	Crested Dog's-tail	R
Daucus carota	Wild Carrot	R
Festuca rubra	Red Fescue	R
Galium aparine	Cleavers	R
Hypochaeris radicata	Common Cat's-ear	R
Leucanthemum vulgare	Oxeye Daisy	R
Persicaria maculosa	Redshank	R
Plantago coronopus	Buck's-horn Plantain	R
Polygonum aviculare	Knotgrass	R
Rubus fruticosus agg.	Brambles	R
Rumex crispus	Curled Dock	R
Total Number of Species		**39**

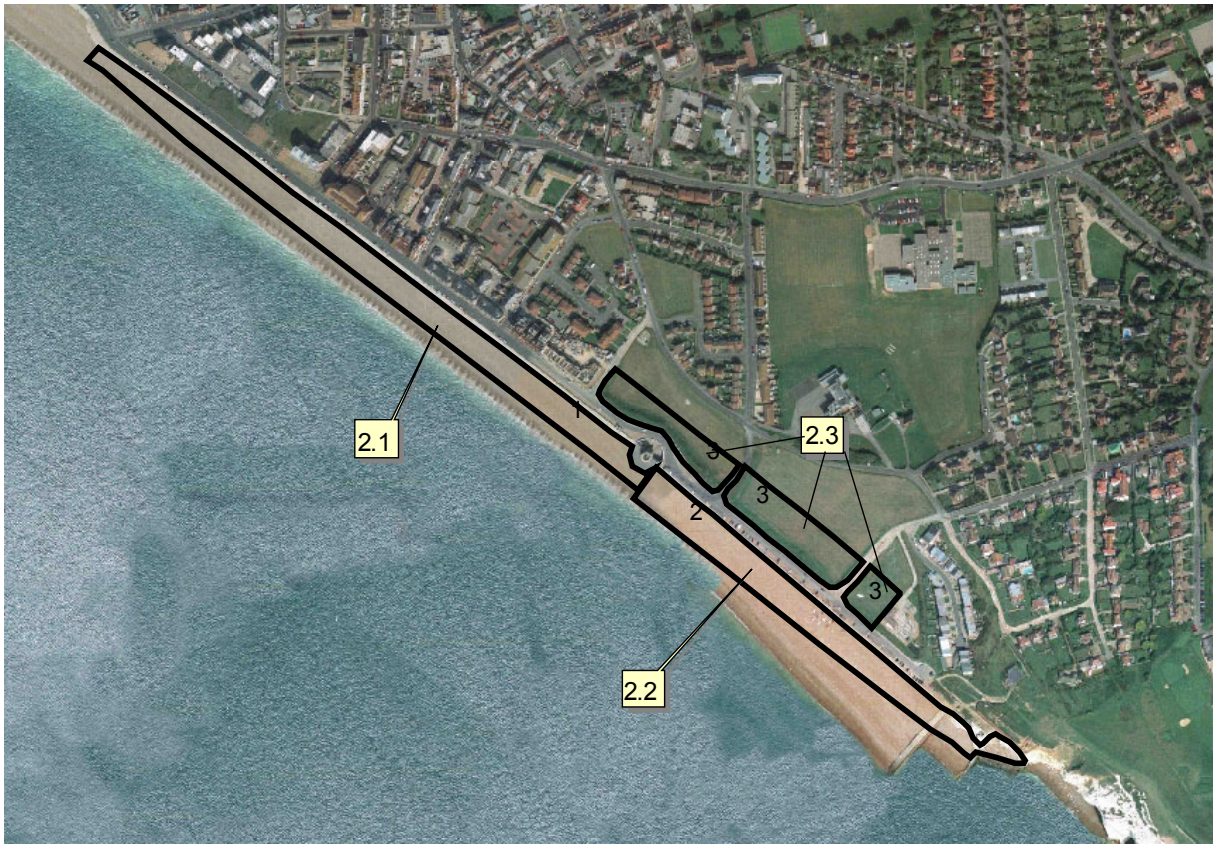

Fig 5. Aerial Photograph of Seaford Bay survey sites, 2.1 to 2.3. Scale 1:6000.

3.1 Cuckmere Haven west, east of cable hut TV 5147 9772

Date of visit: 16 September 2003.

Surveyors: TY.

Site Description: Area 0.08ha, 3-5% bare shingle. A small patch of scrubland at the end of the long distance footpath, the Vanguard Way and the footpath from Seaford Head to the beach.

Management history: The owners of the Coastguard Cottages on Seaford Head have vehicular access along the Vanguard Way and the area is sometimes used for the storage of vehicles during beach recycling works. The site is adjacent to on old cable hut and close to a World War II pill box. The site lies within the Seaford Head Local Nature Reserve and the Seaford to Beachy Head SSSI, designated in 1953.

Damage/disturbance: The site is heavily compacted and enriched as would be expected from the management history above.

Habitat description: Scrub community with 38 species. The strong maritime influence is apparent from the presence of several coastal species including *E. atherica* (abundant) and *B. vulgaris* ssp. *maritima* (occasional).

Notable species: *E. atherica*, *B. vulgaris* ssp. *maritima*, *H. rhamnoides*.

Shingle habitat score: -0.9

Community type:

a) Shingle community: Closest match is SH114 *Hedera helix – Rubus fruticosus – Arrhenatherum elatius* community, particularly in terms of maritime influence, but also some similarities with SH119 *Rubus fruticosus – Arrhenatherum elatius* scrub community.
b) Broad shingle community: No fit
c) NVC: W24 *Rubus fruticosus – Holcus lanatus* underscrub is the closest match to SH119 with less *Holcus lanatus*. There is no clear NVC equivalent to SH114 (Sneddon & Randall, 1993).
d) Habitats Directive Annex I: No fit

Table 12. Vascular plant list and abundance for survey site 3.1.

Species	Common Name	Abundance (DAFOR scale)
Sambucus nigra	Elder	A
Hedera helix	Ivy	A
Elytrigia atherica	Sea Couch	A
Rubus fruticosus agg.	Brambles	F
Rumex obtusifolius	Broad-leaved Dock	F
Beta vulgaris ssp.*maritima*	Sea Beet	O
Prunus spinosa	Blackthorn	O
Silene latifolia	White Campion	O
Daucus carota	Wild Carrot	O
Stellaria media	Common Chickweed	O
Trifolium repens	White Clover	O

Species	Common Name	Abundance (DAFOR scale)
Lotus corniculatus	Common Bird's-foot-trefoil	O
Hypochaeris radicata	Common Cat's-ear	O
Urtica dioica	Common Nettle	O
Senecio jacobaea	Common Ragwort	O
Geranium dissectum	Cut-leaved Crane's-bill	O
Geranium molle	Dove's-foot Crane's-bill	O
Arrhenatherum elatius	False Oat-grass	O
Equisetum arvense	Field Horsetail	O
Galium mollugo	Hedge Bedstraw	O
Tripleurospermum maritimum	Sea Mayweed	O
Cerastium arvense	Field Mouse-ear	O
Carex pendula	Pendulous sedge	O
Anagallis arvensis	Scarlet Pimpernel	O
Plantago lanceolata	Ribwort Plantain	O
Hippophae rhamnoides	Sea-buckthorn	O
Cirsium vulgare	Spear Thistle	O
Achillea millefolium	Yarrow	O
Holcus lanatus	Yorkshire-fog	O
Plantago coronopus	Buck's-horn Plantain	R
Dactylis glomerata	Cock's-foot	R
Bellis perennis	Common Daisy	R
Rumex crispus	Curled Dock	R
Salix caprea	Goat Willow	R
Calystegia sepium	Hedge Bindweed	R
Centaurea nigra	Common Knapweed	R
Arctium minus	Lesser Burdock	R
Dipsacus fullonum	Wild Teasel	R
Total number of species		**38**

3.2 Cuckmere Haven west, shingle ridge TV 5160 9771

Date of visit: 16 September 2003.

Surveyors: TY.

Site Description: Area 0.52ha, 90% bare shingle. Heavily managed and eroding shingle beach to the west of the river mouth. The survey area covered the top of the ridge and the landward slope, and ran along the side of the river to the floodbank.

Management history: Cuckmere Haven has been extensively managed since medieval times. Shingle extraction from the beach occurred until around the 1950s and the area was used as a decoy using World War II. Hard defences at the base of the cliffs below the Coastguard Cottages and a lack of new material being added because of impeded longshore movement have resulted into a heavily eroded beach. The mouth of the river has been fixed in place since the early 1900s and wooden groynes were also put in place at around this time. Shingle is dredged out of the river mouth, recycled to the west beach then reprofiled at least twice a year. The site lies within the Seaford Head Local Nature Reserve and the Seaford to Beachy Head SSSI, designated in 1953.

Damage/disturbance: The site is heavily compacted with high sand content, and heavily disturbed as indicated by the presence of species such as *C. arvense* and *S. jacobaea*.

Habitat description: Pioneer community, heavily influenced by mechanical recharge.

Notable species: *B. vulgaris* ssp. *maritima*, *C. maritima*, *G. flavum*.

Shingle habitat score: 0.1

Community type:

a) Shingle community: Poor SH24 *Rumex crispus – Tripleurospermum maritimum – Glaucium flavum* pioneer community.
b) Broad shingle community: No fit
c) NVC: Poor SD1
d) Habitats Directive Annex I: Poor 1220 Perennial vegetation of stony banks

Table 13. Vascular plant list and abundance for survey site 3.2.

Species	Common Name	Abundance (DAFOR scale)
Anagallis arvensis	Scarlet Pimpernel	O
Beta vulgaris ssp.*maritima*	Sea Beet	O
Cardamine sp.	Bitter-cress sp	O
Centranthus ruber	Red Valerian	O
Cerastium fontanum	Common Mouse-ear	O
Cirsium arvense	Creeping Thistle	O
Lotus corniculatus	Common Bird's-foot-trefoil	O
Plantago coronopus	Buck's-horn Plantain	O
Polygonum aviculare	Knotgrass	O
Rumex crispus	Curled Dock	O
Tripleurospermum maritimum	Sea Mayweed	O
Achillea millefolium	Yarrow	R
Agrostis capillaris	Common Bent	R

Species	Common Name	Abundance (DAFOR scale)
Atriplex prostrata	Spear-leaved Orache	R
Cirsium vulgare	Spear Thistle	R
Crambe maritima	Sea Kale	R
Geranium dissectum	Cut-leaved Crane's-bill	R
Glaucium flavum	Yellow Horned-poppy	R
Holcus lanatus	Yorkshire-fog	R
Potentilla anserina	Silverweed	R
Rubus fruticosus agg.	Brambles	R
Senecio jacobaea	Common Ragwort	R
Stellaria media	Common Chickweed	R
Total number of species		**23**

3.3 Cuckmere Haven west, around saline lagoon TV 5154 9774

Date of visit: 16 September 2003.

Surveyors: TY.

Site Description: Area 0.45ha, 15% bare shingle. The site surveyed comprised the low lying are of shingle around a saline lagoon, backed by concrete tank traps from World War II, and part of the shingle slope.

Management history: Cuckmere Haven has been extensively managed since medieval times. Shingle extraction from the beach occurred until around the 1950s and the area was used as a decoy using World War II. Hard defences at the base of the cliffs below the Coastguard Cottages and a lack of new material being added because of impeded longshore movement have resulted into a heavily eroded beach. The mouth of the river has been fixed in place since the early 1900s and wooden groynes were also put in place at around this time. Shingle is dredged out of the river mouth, recycled to the west beach then reprofiled at least twice a year. The site lies within the Seaford Head Local Nature Reserve and the Seaford to Beachy Head SSSI, designated in 1953.

Damage/disturbance: Relatively little disturbance due to lagoon. Some evidence of rabbit grazing around the edges of the site.

Habitat description: Saltmarsh community on shingle with a high diversity of species (53 recorded)

Notable species: *A. portulacoides*, *S. ramosissima*, *S. maritima*, *A. tripolium*, *B. vulgaris* ssp. *maritima*, *Salicornia* sp., *Cakile maritima*. Also *L. purpurea* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001).

Shingle habitat score: 0.3

Community type:

a) Shingle community: No fit to any shingle communities.
b) Broad shingle community: No fit
c) NVC: *Atriplex portulacoides* dominated habitat similar to SM22 *Halimione [Atriplex] portulacoides – Frankenia leavis* saltmarsh or SM14 *Halimione portulacoides* saltmarsh community.
d) Habitats Directive Annex I: No fit

Table 14. Vascular plant list and abundance for survey site 3.3.

Species	Common Name	Abundance (DAFOR scale)
Atriplex portulacoides	Sea Purslane	D
Salicornia ramosissima	Purple Glasswort	A
Suaeda maritima	Annual Sea-blite	A
Rubus fruticosus agg.	Brambles	F
Alopecurus pratensis	Meadow Foxtail	F
Papaver dubium	Long-headed Poppy	F
Cirsium palustre	Marsh Thistle	F
Plantago media	Hoary Plantain	F
Aster tripolium	Sea Aster	F

Species	Common Name	Abundance (DAFOR scale)
Echium vulgare	Viper's-bugloss	F
Beta vulgaris ssp.*maritima*	Sea Beet	O
Medicago lupulina	Black Medick	O
Bellis perennis	Common Daisy	O
Euphrasia nemorosa	Common Eyebright	O
Ranunculus repens	Creeping Buttercup	O
Foeniculum vulgare	Fennel	O
Equisetum arvense	Field Horsetail	O
Salicornia agg.	Glassworts	O
Juncus inflexus	Hard Rush	O
Cerastium fontanum	Common Mouse-ear	O
Cerastium glomeratum	Sticky Mouse-ear	O
Atriplex prostrata	Spear-leaved Orache	O
Plantago lanceolata	Ribwort Plantain	O
Phleum pratense	Timothy	O
Juncus bufonius	Toad Rush	O
Carduus crispus	Welted Thistle	O
Agrimonia eupatoria	Agrimony	R
Smyrnium olusatrum	Alexanders	R
Carlina vulgaris	Carline Thistle	R
Papaver rhoeas	Common Poppy	R
Cotoneaster sp.	Cotoneaster sp.	R
Cynosurus cristatus	Crested Dog's-tail	R
Ribes sp.	Currant sp.	R
Geranium dissectum	Cut-leaved Crane's-bill	R
Rumex crispus	Curled Dock	R
Iris foetidissima	Stinking Iris	R
Epilobium hirsutum	Great Willowherb	R
Senecio vulgaris	Groundsel	R
Leontodon saxatilis	Lesser Hawkbit	R
Sisymbrium officinale	Hedge Mustard	R
Quercus ilex	Evergreen Oak	R
Lunaria annua	Honesty	R
Tripleurospermum maritimum	Sea Mayweed	R
Oxalis articulata	Pink-sorrel	R
Populus alba	White Poplar	R

Species	Common Name	Abundance (DAFOR scale)
Linaria purpurea	Purple Toadflax	R
Cakile maritima	Sea Rocket	R
Matricaria recutita	Scented Mayweed	R
Pinus sylvestris	Scots Pine	R
Hypericum pulchrum	Slender St John's-wort	R
Cirsium vulgare	Spear Thistle	R
Sedum album	White Stonecrop	R
Achillea millefolium	Yarrow	R
Total number of species		**53**

3.4 Cuckmere Haven east, top of shingle ridge TV 5193 9764

Date of visit: 22 July 2003.

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 1.70ha, 90% bare shingle. A large linear site on the east of the Cuckmere river, running along the top of the shingle ridge, parallel to the mean high water mark, from the access path below Haven Brow to the river.

Management history: Cuckmere Haven has been extensively managed since medieval times. Shingle extraction from the beach occurred until around the 1950s and the area was used as a decoy using World War II. The mouth of the river has been fixed in place since the early 1900s. No coastal defence management is currently carried out on the east side of the river and the beach has a relatively natural profile. The site lies within the Seaford to Beachy Head SSSI, designated in 1953, and the Seven Sisters Country Park. It is managed as a recreational and educational resource.

Damage/disturbance: Pedestrian traffic is significantly higher on the east side than the west and there is evidence of significant rabbit grazing.

Habitat description: Secondary pioneer community with *T. maritimum* and *P. media* abundant.

Notable species: *B. vulgaris* ssp. *maritima*, *E. atherica*, *S. maritimum*, *C. maritima*, *C. maritimum*.

Shingle habitat score: 0.7

Community type:

a) Shingle community: Something like SH27 *Tripleurospermum maritimum – Atriplex prostrata – Rumex crispus* pioneer community and/or SH15 *Beta vulgaris maritima – Rumex crispus* pioneer community although not a close match.
b) Broad shingle community: No fit
c) NVC: SD1a *Rumex crispus – Glaucium flavum* shingle community, typical sub-community and/or SD1 *Rumex crispus – Glaucium flavum* shingle community.
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 15. Vascular plant list and abundance for survey site 3.4.

Species	**Common Name**	**(DAFOR scale)**
Tripleurospermum maritimum	Sea Mayweed	A
Plantago media	Hoary Plantain	A
Beta vulgaris ssp.*maritima*	Sea Beet	F
Sedum acre	Biting Stonecrop	F
Picris echioides	Bristly Oxtongue	F
Plantago lanceolata	Ribwort Plantain	F
Juncus gerardii	Saltmarsh Rush	F
Elytrigia atherica	Sea Couch	F
Seriphidium maritimum	Sea Wormwood	F
Dipsacus fullonum	Wild Teasel	F
Agrimonia eupatoria	Agrimony	O

Species	Common Name	Abundance (DAFOR scale)
Agrostis capillaris	Common Bent	O
Crambe maritima	Sea Kale	O
Prunus spinosa	Blackthorn	O
Rubus fruticosus agg.	Brambles	O
Dactylis glomerata	Cock's-foot	O
Rumex crispus	Curled Dock	O
Arrhenatherum elatius	False Oat- grass	O
Poa annua	Annual Meadow-grass	O
Atriplex prostrata	Spear-leaved Orache	O
Festuca rubra	Red Fescue	O
Sonchus oleraceus	Smooth Sowthistle	O
Daucus carota	Wild Carrot	R
Senecio jacobaea	Common Ragwort	R
Potentilla reptans	Creeping Cinquefoil	R
Leontodon saxatilis	Lesser Hawkbit	R
Galium saxatile	Heath Bedstraw	R
Galium verum	Lady's Bedstraw	R
Crithmum maritimum	Rock Samphire	R
Total number of species		**29**

3.5 Cuckmere Haven east, north facing shingle slope TV 5184 9769

Date of visit: 22 July 2003.

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 0.71ha, 85% bare shingle. A linear site on the landward facing seaward slope, parallel to site 3.4 on the east of the Cuckmere river.

Management history: Cuckmere Haven has been extensively managed since medieval times. Shingle extraction from the beach occurred until around the 1950s and the area was used as a decoy using World War II. The mouth of the river has been fixed in place since the early 1900s. No coastal defence management is currently carried out on the east side of the river and the beach has a relatively natural profile. The site lies within the Seaford to Beachy Head SSSI, designated in 1953, and the Seven Sisters Country Park. It is managed as a recreational and educational resource.

Damage/disturbance: Pedestrian traffic is significantly higher on the east side than the west and there is evidence of significant rabbit grazing.

Habitat description: Secondary pioneer community with *T. maritimum* and *P. media* abundant.

Notable species: *B. vulgaris* ssp. maritima, *C. maritima*, *E. atherica*, *S. maritimum*, *C. maritimum.*

Shingle habitat score: 0.7

Community type:

a) Shingle community: Something like SH27 *Tripleurospermum maritimum – Atriplex prostrata – Rumex crispus* pioneer community and/or SH15 *Beta vulgaris maritima – Rumex crispus* pioneer community although not a close match.
b) Broad shingle community: No fit
c) NVC: SD1a *Rumex crispus – Glaucium flavum* shingle community, typical sub-community and/or SD1 *Rumex crispus – Glaucium flavum* shingle community, although *G. flavum* absent.
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 16. Vascular plant list and abundance for survey site 3.5.

Species	Common Name	Abundance (DAFOR scale)
Tripleurospermum maritimum	Sea Mayweed	A
Plantago media	Hoary Plantain	A
Beta vulgaris ssp.maritima	Sea Beet	F
Crambe maritima	Sea Kale	F
Sedum acre	Biting Stonecrop	F
Picris echioides	Bristly Oxtongue	F
Arrhenatherum elatius	False Oat-grass	F
Plantago lanceolata	Ribwort Plantain	F
Juncus gerardii	Saltmarsh Rush	F
Elytrigia atherica	Sea Couch	F
Seriphidium maritimum	Sea Wormwood	F
Dipsacus fullonum	Wild Teasel	F

Species	Common Name	Abundance (DAFOR scale)
Agrimonia eupatoria	Agrimony	O
Prunus spinosa	Blackthorn	O
Rubus fruticosus agg.	Brambles	O
Dactylis glomerata	Cock's-foot	O
Rumex crispus	Curled Dock	O
Atriplex prostrata	Spear-leaved Orache	O
Festuca rubra	Red Fescue	O
Sonchus oleraceus	Smooth Sowthistle	O
Daucus carota	Wild Carrot	R
Senecio jacobaea	Common Ragwort	R
Potentilla reptans	Creeping Cinquefoil	R
Leontodon saxatilis	Lesser Hawkbit	R
Galium mollugo	Hedge Bedstraw	R
Galium verum	Lady's Bedstraw	R
Crithmum maritimum	Rock Samphire	R
Total number of species		**27**

3.6 Cuckmere Haven east, landward base of slope TV 5176 9774

Date of visit: 22 July 2003.

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 0.95ha, 70% bare shingle. A linear site at the base of the shingle slope, parallel to site 3.5 on the east of the Cuckmere river. An influx of grassland species indicating the influence of the nearby grazing pasture.

Management history: Cuckmere Haven has been extensively managed since medieval times. Shingle extraction from the beach occurred until around the 1950s and the area was used as a decoy using World War II. The mouth of the river has been fixed in place since the early 1900s. No coastal defence management is currently carried out on the east side of the river and the beach has a relatively natural profile. The site lies within the Seaford to Beachy Head SSSI, designated in 1953, and the Seven Sisters Country Park. It is managed as a recreational and educational resource.

Damage/disturbance: Pedestrian traffic is significantly higher on the east side than the west and there is evidence of significant rabbit grazing.

Habitat description: Pioneer community with *R. crispus*, *T. maritimum* and *E. atherica* abundant and *A. elatius* and *C. maritima* frequent.

Notable species: *E. atherica*, *C. maritima*, *G. flavum*.

Shingle habitat score: 0.4

Community type:

a) Shingle community: Something like SH8 *Senecio viscosus* - *Glaucium flavum* – *Rumex crispus* pioneer community (although *Glaucium flavium* only present as a minor associate).
b) Broad shingle community: Group 1.
c) NVC: SD1 *Rumex crispus* – *Glaucium flavum* shingle community.
d) Habitats Directive Annex I: 1220 Perennial vegetation of stony banks.

Table 17. Vascular plant list and abundance for survey site 3.6.

Species	Common Name	Abundance (DAFOR scale)
Rumex crispus	Curled Dock	A
Tripleurospermum maritimum	Sea Mayweed	A
Elytrigia atherica	Sea Couch	A
Arrhenatherum elatius	False Oat-grass	F
Arctium minus	Lesser Burdock	F
Juncus gerardii	Saltmarsh Rush	F
Crambe maritima	Sea Kale	F
Galium aparine	Cleavers	O
Dactylis glomerata	Cock's-foot	O
Cirsium arvense	Creeping Thistle	O
Anthyllis vulneraria	Kidney Vetch	O
Centaurea nigra	Common Knapweed	O

Species	Common Name	Abundance (DAFOR scale)
Cerastium arvense	Field Mouse-ear	O
Centranthus ruber	Red Valerian	O
Cirsium vulgare	Spear Thistle	O
Senecio viscosus	Sticky Groundsel	O
Medicago lupulina	Black Medick	R
Picris echioides	Bristly Oxtongue	R
Taraxacum agg.	Dandelions	R
Geranium molle	Dove's-foot Crane's-bill	R
Sedum anglicum	English Stonecrop	R
Myosotis ramosissima	Early Forget-me-not	R
Glaucium flavum	Yellow Horned-poppy	R
Anagallis arvensis	Scarlet Pimpernel	R
Juncus bufonius	Toad Rush	R
Echium vulgare	Viper's-bugloss	R
Holcus lanatus	Yorkshire-fog	R
Total number of species		**27**

3.7 Cuckmere Haven east, flat area behind ridge TV 5188 9773

Date of visit: 22 July 2003.

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 2.59ha, 15% bare shingle. A large site at the base of the shingle slope, adjacent and parallel to site 3.6 on the east of the Cuckmere river. An influx of grassland species indicating the influence of the nearby grazing pasture.

Management history: Cuckmere Haven has been extensively managed since medieval times. Shingle extraction from the beach occurred until around the 1950s and the area was used as a decoy using World War II. The mouth of the river has been fixed in place since the early 1900s. No coastal defence management is currently carried out on the east side of the river and the beach has a relatively natural profile. The site lies within the Seaford to Beachy Head SSSI, designated in 1953, and the Seven Sisters Country Park. It is managed as a recreational and educational resource.

Damage/disturbance: Pedestrian traffic is significantly higher on the east side than the west and there is evidence of significant rabbit grazing.

Habitat description: A diverse area with a high diversity of species (60 recorded) including coastal species, and areas of scrub and grassland.

Notable species: *E. atherica*, *B. vulgaris* ssp. *maritima*, *G. flavum*, *A. portulacoides*, *S. marina*, *L. binervosum* agg., *G. maritima.*

Shingle habitat score: 0.8

Community type:

a) Shingle community: No fit to a shingle community.
b) Broad shingle community: Poor Group 2.
c) NVC: Grassland community.
d) Habitats Directive Annex I: No fit.

Table 18. Vascular plant list and abundance for survey site 3.7.

Species	Common Name	Abundance (DAFOR scale)
Rumex crispus	Curled Dock	A
Anthyllis vulneraria	Kidney Vetch	A
Tripleurospermum maritimum	Sea Mayweed	A
Elytrigia atherica	Sea Couch	A
Beta vulgaris ssp.*maritima*	Sea Beet	F
Daucus carota	Wild Carrot	F
Arrhenatherum elatius	False Oat-grass	F
Lotus pedunculatus	Greater Bird's-foot-trefoil	F
Leontodon saxatilis	Lesser Hawkbit	F
Anagallis arvensis	Scarlet Pimpernel	F
Sonchus asper	Prickly Sowthistle	F
Cirsium vulgare	Spear Thistle	F
Dipsacus fullonum	Wild Teasel	F

Species	Common Name	Abundance (DAFOR scale)
Agrimonia eupatoria	Agrimony	O
Solanum dulcamara	Bittersweet	O
Rubus fruticosus agg.	Brambles	O
Dactylis glomerata	Cock's-foot	O
Pulicaria dysenterica	Common Fleabane	O
Urtica dioica	Common Nettle	O
Senecio jacobaea	Common Ragwort	O
Potentilla reptans	Creeping Cinquefoil	O
Sedum anglicum	English Stonecrop	O
Hordeum sp.	Barley sp.	O
Glaucium flavum	Yellow Horned-poppy	O
Galium verum	Lady's Bedstraw	O
Plantago lanceolata	Ribwort Plantain	O
Ligustrum sp.	Privet sp.	O
Ononis repens	Common Restharrow	O
Crambe maritima	Sea Kale	O
Atriplex portulacoides	Sea Purslane	O
Potentilla anserine	Silverweed	O
Echium vulgare	Viper's-bugloss	O
Convolvulus arvensis	Field Bindweed	R
Medicago lupulina	Black Medick	R
Prunus spinosa	Blackthorn	R
Plantago coronopus	Buck's-horn Plantain	R
Centaurium erythraea	Common Centaury	R
Galium aparine	Cleavers	R
Trifolium repens	White Clover	R
Ranunculus repens	Creeping Buttercup	R
Cirsium arvense	Creeping Thistle	R
Geranium dissectum	Cut-leaved Crane's-bill	R
Geranium molle	Dove's-foot Crane's-bill	R
Sambucus nigra	Elder	R
Senecio erucifolius	Hoary Ragwort	R
Heracleum sphondylium	Hogweed	R
Cynoglossum officinale	Hound's-tounge	R
Centaurea nigra	Common Knapweed	R
Arctium minus	Lesser Burdock	R

Species	Common Name	Abundance (DAFOR scale)
Spergularia marina	Lesser Sea-spurrey	R
Lathyrus pratensis	Meadow Vetchling	R
Cerastium arvense	Field Mouse-ear	R
Atriplex prostrate	Spear-leaved Orache	R
Odontites vernus	Red Bartsia	R
Trifolium pratense	Red Clover	R
Limonium binervosum agg.	Rock Sea-lavender	R
Glaux maritima	Sea-milkwort	R
Sonchus sp.	Sowthistle sp.	R
Juncus bufonius	Toad Rush	R
Torilis japonica	Upright Hedge-parsley	R
Bryonia dioica	White Bryony	R
Achillea millefolium	Yarrow	R
Holcus lanatus	Yorkshire-fog	R
Total number of species		**60**

Fig 6. Aerial Photograph of Cuckmere Haven survey sites, 3.1 to 3.7. Scale 1:3500.

4.1 Holywell, treatment works to access path TV 6020 9699

Date of visit: 29 July 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.57ha, 95% bare shingle. A small site at the base of low chalk cliffs with a narrow beach and easy pedestrian access.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. A 75 m rock revetment was constructed at the base of the cliffs in 2001 to protect the water source. The site lies within the Seaford to Beachy Head SSSI and is adjacent to the Cliffs below the Helen Garden SNCI.

Damage/disturbance: Although there is some pedestrian traffic due to the proximity to an easy access point, this is relatively low given the frequency of cliff falls. Cliff falls have enriched the shingle and proximity to cliff top properties means that several cultivated species are present, e.g. *B. davidii*. Coastal defence works have significantly impacted upon the habitat.

Habitat description: Not a recognised shingle community but an enriched shingle habitat with abundant *D. glomerata* and *O. repens* and occasional maritime species and garden escapes.

Notable species: *B. vulgaris* ssp. *maritima*, *C. maritima*, *C. maritimum*, *M. sinuata*, *R. raphanistrum* ssp. *maritimus*, *L. arborea*, *G. flavum*, *L. binervosum* agg. Also *L. vulgare* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001).

Shingle habitat score: -0.8

Community type:

a) Shingle community: No fit to a shingle community.
b) Broad shingle community: No fit.
c) NVC: Possible grassland community.
d) Habitats Directive Annex I: No fit.

Table 19. Vascular plant list and abundance for survey site 4.1.

Species	Common Name	Abundance (DAFOR scale)
Dactylis glomerata	Cock's-foot	A
Ononis repens	Common Restharrow	A
Arrhenatherum elatius	False Oat-grass	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Brachypodium sylvaticum	False Brome	O
Cirsium vulgare	Spear Thistle	O
Crambe maritima	Sea Kale	O
Crithmum maritimum	Rock Samphire	O
Daucus carota	Wild Carrot	O
Diplotaxis muralis	Annual Wall-rocket	O
Erysimum sp.	Wallflower	O

Species	Common Name	Abundance (DAFOR scale)
Leontodon saxatilis	Lesser Hawkbit	O
Matthiola sinuate	Sea Stock	O
Picris echioides	Bristly Oxtongue	O
Plantago lanceolata	Ribwort Plantain	O
Raphanus raphanistrum ssp. *maritimus*	Sea Radish	O
Senecio cineraria	Silver Ragwort	O
Smyrnium olusatrum	Alexanders	O
Sonchus asper	Prickly Sowthistle	O
Sonchus oleraceus	Smooth Sowthistle	O
Achillea millefolium	Yarrow	R
Anthyllis vulneraria	Kidney Vetch	R
Artemisia vulgaris	Mugwort	R
Ballota nigra	Black Horehound	R
Blackstonia perfoliata	Yellow-wort	R
Buddleja davidii	Butterfly-bush	R
Centranthus ruber	Red Valerian	R
Clematis vitalba	Traveller's-joy	R
Convolvulus arvensis	Field Bindweed	R
Dipsacus fullonum	Wild Teasel	R
Echium vulgare	Viper's-bugloss	R
Eupatorium cannabinum	Hemp Agrimony	R
Festuca rubra	Red Fescue	R
Galium mollugo	Hedge Bedstraw	R
Glaucium flavum	Yellow Horned-poppy	R
Hedera helix	Ivy	R
Inula conyzae	Ploughman's-spikenard	R
Lavatera arborea	Tree-mallow	R
Ligustrum sp.	Privet sp.	R
Limonium binervosum agg.	Rock Sea-lavender	R
Linaria vulgaris	Common Toadflax	R
Malva sylvestris	Common Mallow	R
Papaver rhoeas	Common Poppy	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Poa annua	Annual Meadow-grass	R
Prunus domestica	Wild Plum	R
Ranunculus repens	Creeping Buttercup	R

Species	Common Name	Abundance (DAFOR scale)
Reseda luteola	Weld	R
Rubus fruticosus agg.	Brambles	R
Rumex acetosa	Common Sorrel	R
Senecio jacobaea	Common Ragwort	R
Senecio vulgaris	Groundsel	R
Tussilago farfara	Colt's-foot	R
Urtica dioica	Common Nettle	R
Total number of species		**57**

4.2 Holywell, access path to café TV 60349722

Date of visit: 29 July 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.15ha, 99% bare shingle. A long linear site following the promenade. There is a footpath running along the beach and regular access points from the promenade to the beach.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. The site lies within the Seaford to Beachy Head SSSI and adjacent to the Holywell and Crows Nest Steps SNCI.

Damage/disturbance: Heavy pedestrian traffic and significant enrichment, particularly around access points, from litter and waste water from local cafés. Coastal defence and promenade works have significantly impacted upon the habitat. Plants are restricted to growing in small clumps against the seawall. The beach is relatively narrow and thus the sea sometimes washes right up to the wall.

Habitat description: Very damaged shingle site.

Notable species: *B. vulgaris* ssp. *maritima*.

Shingle habitat score: 0.7

Community type:

a) Shingle community: A poor SH24 *Rumex crispus – Tripleurospermum maritimum – Glaucium flavum* pioneer community (not a close match, probably reflecting the high level of disturbance on this site).
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 20. Vascular plant list and abundance for survey site 4.2.

Species	Common Name	Abundance (DAFOR scale)
Anagallis arvensis	Scarlet Pimpernel	O
Arenaria serpyllifolia	Thyme-leaved Sandwort	O
Glaucium flavum	Yellow Horned-poppy	O
Tripleurospermum maritimum	Sea Mayweed	O
Beta vulgaris ssp.*maritima*	Sea Beet	R
Cerastium fontanum	Common Mouse-ear	R
Hieracium sp.	Hawkweed sp.	R
Plantago coronopus	Buck's-horn Plantain	R
Total number of species		**8**

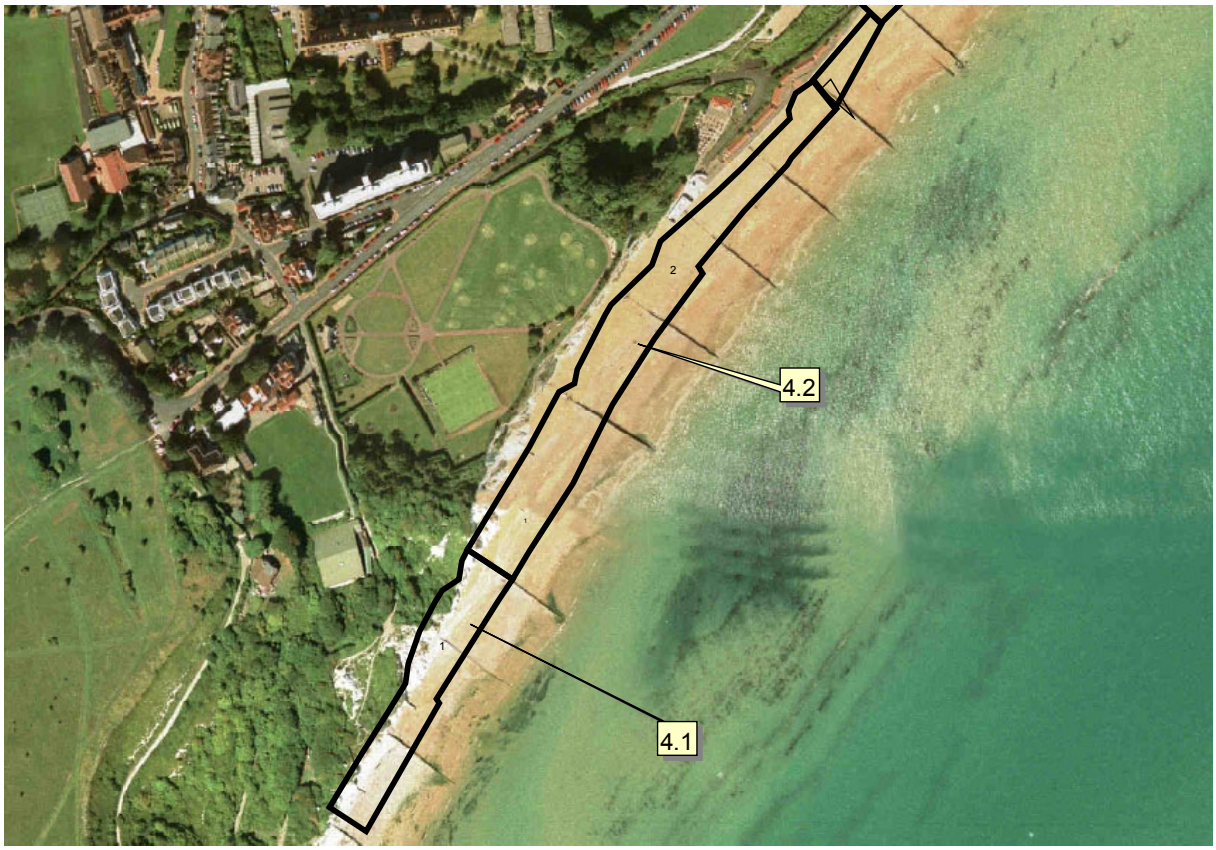

Fig. 7. Aerial Photograph of Holywell survey sites, 4.1 to 4.2. Scale 1:3500.

5.1 Eastbourne seafront, café to outfall TV 6048 9739

Date of visit: 27 May 2004.

Surveyors: TY.

Site Description: Area 0.10ha, 94% bare shingle. A small site adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. The beach protects a dense urban area. The site lies within the Seaford to Beachy Head SSSI and adjacent to the Holywell and Crows Nest Steps SNCI. Managed as a bathing beach.

Damage/disturbance: Heavy pedestrian traffic and significant enrichment, particularly around access points, from litter and waste water from local cafés. Coastal defence and promenade works have significantly impacted upon the habitat. Plants are restricted to growing in small clumps against the seawall. The beach is relatively narrow and thus the sea sometimes washes right up to the wall.

Habitat description: Pioneer community with abundant *C. ruber* and frequent *C. maritima*. The relatively high number of species recorded (41) indicates enrichment, whilst the high percentage of bare shingle within the polygon demonstrates the concentration of species along the seawall.

Notable species: *C. maritima*, *B. vulgaris* ssp. *maritima*, *E. atherica*. Also *L. vulgaris* and *L. purpurea* as they are known larval food plants of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001).

Shingle habitat score: -1.4

Community type:

a) Shingle community: Something like SH8 *Senecio viscosus – Glaucium flavum – Rumex crispus* pioneer community, although not a close match.
b) Broad shingle community: No fit.
c) NVC: Poor SD1 *Rumex crispus – Glaucium flavum* shingle community.
d) Habitats Directive Annex I: Poor 1220 Perennial vegetation of stony banks.

Table 21. Vascular plant list and abundance for survey site 5.1.

Species Name	Common Name	Abundance (DAFOR scale)
Centranthus ruber	Red Valerian	A
Bromopsis ramose	Hairy-brome	F
Senecio vulgaris	Groundsel	F
Poa annua	Annual Meadow-grass	F
Picris echioides	Bristly Oxtongue	F
Crambe maritima	Sea Kale	F
Hordeum murinum	Wall Barley	F
Bromus hordeaceus	Soft-brome	O
Valeriana officinalis	Common Valerian	O
Dactylis glomerata	Cock's-foot	O
Rumex obtusifolius	Broad-leafed Dock	O

Species Name	Common Name	Abundance (DAFOR scale)
Rumex crispus	Curled Dock	O
Brachypodium sylvaticum	False Brome	O
Foeniculum vulgare	Fennel	O
Medicago lupulina	Black Medick	O
Arrhenatherum elatius	False Oat-grass	O
Plantago media	Hoary Plantain	O
Senecio jacobaea	Common Ragwort	O
Raphanus raphanistrum	Wild Radish	O
Senecio cineraria	Silver Ragwort	O
Plantago lanceolata	Ribwort Plantain	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Sonchus oleraceus	Smooth Sowthistle	O
Cerastium tomentosum	Snow-in-summer	O
Sonchus arvensis	Perennial Sowthistle	O
Cirsium vulgare	Spear Thistle	O
Linaria vulgaris	Common Toadflax	O
Arctium minus	Lesser Burdock	R
Galium aparine	Cleavers	R
Clematis sp.	Clematis sp.	R
Cerastium arvense	Field Mouse-ear	R
Papaver rhoeas	Common Poppy	R
Trifolium pratense	Red Clover	R
Elytrigia atherica	Sea Couch	R
Raphanus sp.	Radish sp.	R
Sonchus asper	Prickly Sowthistle	R
Dipsacus fullonum	Wild Teasel	R
Linaria purpurea	Purple Toadflax	R
Clematis vitalba	Traveller's-joy	R
Daucus carota	Wild Carrot	R
Total number of species		**41**

5.2 Eastbourne seafront, outfall to Silverdale Road TV 6082 9773

Date of visit: 27 May 2004.

Surveyors: TY

Site Description: Area 1.56ha, 95% bare shingle. A long linear site close to Eastbourne town centre adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. The beach protects a dense urban area. The majority of the site lies adjacent to the Seaford to Beachy Head SSSI. Managed as a bathing beach.

Damage/disturbance: Heavy pedestrian traffic and significant enrichment, particularly around access points, from litter and waste water from local cafés. Coastal defence and promenade works have significantly impacted upon the habitat. Plants are restricted to growing in small clumps against the seawall. The beach is relatively narrow in places and thus the sea sometimes washes right up to the wall.

Habitat description: A heavily managed and heavily used fringing beach with a pioneer community.

Notable species: *C. maritimum*, *B. vulgaris* ssp. *maritima*, *S. uniflora*, *C. maritima*, *E. atherica*, *G. flavum*.

Shingle habitat score: 0.2

Community type:

a) Shingle community: Something like SH6a *Silene maritima* dominated pioneer community, *Glaucium flavum* sub-community.
b) Broad shingle community: Group 4.
c) NVC: Poor SD1 *Rumex crispus – Glaucium flavum* shingle community.
d) Habitats Directive Annex I: Poor 1220 Perennial vegetation of stony banks.

Table 22. Vascular plant list and abundance for survey site 5.2.

Species	Common Name	Abundance (DAFOR scale)
Rumex crispus	Curled Dock	F
Picris echioides	Bristly Oxtongue	F
Bromus hordeaceus	Soft-brome	O
Bromopsis ramose	Hairy-brome	O
Valeriana officinalis	Common Valerian	O
Dactylis glomerata	Cock's-foot	O
Senecio vulgaris	Groundsel	O
Poa annua	Annual Meadow-grass	O
Plantago lanceolata	Ribwort Plantain	O
Raphanus raphanistrum	Wild Radish	O
Centranthus ruber	Red Valerian	O
Crithmum maritimum	Rock Samphire	O

Arenaria serpyllifolia	Thyme-leaved Sandwort	O
Anagallis arvensis	Scarlet pimpernel	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Silene uniflora	Sea Campion	O
Crambe maritima	Sea Kale	O
Cirsium vulgare	Spear Thistle	O
Agrostis capillaris	Common Bent	R
Galium aparine	Cleavers	R
Atriplex prostrata	Spear-leaved Orache	R
Plantago coronopus	Buck's-horn Plantain	R
Elytrigia atherica	Sea Couch	R
Veronica chamaedrys	Germander Speedwell	R
Glaucium flavum	Yellow Horned-poppy	R
Total number of species		**25**

5.3 Eastbourne seafront, Silverdale Road to Wish Tower TV 6125 9808

Date of visit: 27 May 2004.

Surveyors: TY.

Site Description: Area 0.36ha, 98% bare shingle. A linear site close to Eastbourne town centre adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. The beach protects a dense urban area. Managed as a bathing beach.

Damage/disturbance: Heavy pedestrian traffic and significant enrichment, particularly around access points, from litter and waste water from local cafés. Coastal defence and promenade works have significantly impacted upon the habitat. Plants are restricted to growing in small clumps against the seawall. The beach is relatively narrow in places and thus the sea sometimes washes right up to the wall.

Habitat description: A heavily managed and heavily used fringing beach with a pioneer community.

Notable species: *C. marinum*, *C. maritimum*, *B. vulgaris* ssp. *maritima*, *S. uniflora*, *C. maritima*.

Shingle habitat score: -0.7

Community type:

a) Shingle community: Something like SH6a *Silene maritima* dominated pioneer community, *Glaucium flavum* sub-community or SH20 *Lolium perenne – Stellaria media – Sedum acre* – open community.
b) Broad shingle community: Group 4.
c) NVC: Poor SD1 *Rumex crispus – Glaucium flavum* shingle community. No close NVC match to SH20 although it is similar to MC7 *Stellaria media – Rumex acetosa* sea-bird cliff colony (Sneddon & Randall, 1993).
d) Habitats Directive Annex I: Poor 1220 Perennial vegetation of stony banks.

Table 23. Vascular plant list and abundance for survey site 5.3.

Species	Common Name	Abundance (DAFOR scale)
Bromopsis ramose	Hairy-brome	O
Tussilago farfara	Colt's-foot	O
Taraxacum agg.	Dandelions	O
Crepis vesicaria	Beaked Hawk's-beard	O
Poa annua	Annual Meadow-grass	O
Medicago lupulina	Black Medick	O
Picris echioides	Bristly Oxtongue	O
Raphanus raphanistrum	Wild Radish	O
Centranthus ruber	Red Valerian	O
Lolium perenne	Perennial Rye-grass	O
Catapodium marinum	Sea Fern-grass	O
Capsella bursa-pastoris	Shepherd's-purse	O

Species	Common Name	Abundance (DAFOR scale)
Euphorbia sp.	Spurge sp.	O
Senecio viscosus	Sticky Groundsel	O
Hordeum murinum	Wall Barley	O
Salvia verbenaca	Wild Clary	O
Solanum dulcamara	Bittersweet	R
Stellaria media	Common Chickweed	R
Galium aparine	Cleavers	R
Trifolium repens	White Clover	R
Leucanthemum vulgare	Oxeye Daisy	R
Cymbalaria muralis	Ivy-leaved Toadflax	R
Asplenium trichomanes	Maidenhair Spleenwort	R
Plantago lanceolata	Ribwort Plantain	R
Papaver rhoeas	Common Poppy	R
Senecio jacobaea	Common Ragwort	R
Crithmum maritimum	Rock Samphire	R
Beta vulgaris ssp. *maritima*	Sea Beet	R
Silene uniflora	Sea Campion	R
Crambe maritima	Sea Kale	R
Sonchus oleraceus	Smooth Sowthistle	R
Cerastium tomentosum	Snow-in-summer	R
Cirsium vulgare	Spear Thistle	R
Sedum acre	Biting Stonecrop	R
Lobularia maritima	Sweet Alison	R
Achillea millefolium	Yarrow	R
Total number of species		**37**

5.4 Eastbourne seafront, Wish Tower to Pier TV 6158 9863

Date of visit: 27 May 2004.

Surveyors: TY.

Site Description: Area 0.74ha, 98% bare shingle. A long, narrow linear site close to Eastbourne town centre, adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. The beach protects a dense urban area. Managed as a bathing beach.

Damage/disturbance: Heavy pedestrian traffic and significant enrichment, particularly around access points, from litter and waste water from local cafés. Coastal defence and promenade works have significantly impacted upon the habitat. Plants are restricted to growing in small clumps against the seawall. The beach is relatively narrow in places and thus the sea sometimes washes right up to the wall.

Habitat description: A heavily managed and heavily used fringing beach with a pioneer community.

Notable species: *C. maritimum*, *C. maritima*, *G. flavum*.

Shingle habitat score: 0.6

Community type:

a) Shingle community: Something like SH9 *Crambe maritima – Solanum dulcamara* pioneer community or SH8 *Senecio viscosus – Glaucium flavum – Rumex crispus* pioneer community, although not a close match.
b) Broad shingle community: No fit.
c) NVC: Poor SD1 *Rumex crispus – Glaucium flavum* shingle community.
d) Habitats Directive Annex I: Poor 1220 Perennial vegetation of stony banks.

Table 24. Vascular plant list and abundance for survey site 5.4.

Species	Common Name	Abundance (DAFOR scale)
Solanum dulcamara	Bittersweet	O
Tussilago farfara	Colt's-foot	O
Senecio vulgaris	Groundsel	O
Leontodon saxatilis	Lesser Hawkbit	O
Poa annua	Annual Meadow-grass	O
Cerastium arvense	Field Mouse-ear	O
Picris echioides	Bristly Oxtongue	O
Plantago coronopus	Buck's-horn Plantain	O
Plantago media	Hoary Plantain	O
Chamerion angustifolium	Rosebay Willowherb	O
Crithmum maritimum	Rock Samphire	O
Crambe maritima	Sea Kale	O
Sonchus oleraceus	Smooth Sowthistle	O
Hordeum murinum	Wall Barley	O

Species	Common Name	Abundance (DAFOR scale)
Achillea millefolium	Yarrow	O
Fraxinus excelsior	Ash	R
Rubus fruticosus agg.	Brambles	R
Bromus hordaceous	Soft-brome	R
Bromopsis ramosa	Hairy-brome	R
Arctium minus	Lesser Burdock	R
Dactylis glomerata	Cock's-foot	R
Foeniculum vulgare	Fennel	R
Senecio viscosus	Sticky Groundsel	R
Urtica dioica	Common Nettle	R
Raphanus raphanistrum	Wild Radish	R
Senecio cineraria	Silver Ragwort	R
Lolium perenne	Perennial Rye-grass	R
Lobularia maritima	Sweet Alison	R
Cirsium vulgare	Spear Thistle	R
Glaucium flavum	Yellow Horned-poppy	R
Total number of species		**30**

5.5 Eastbourne seafront, Pier to the Redoubt TV 6204 9935

Date of visit: 27 May 2004.

Surveyors: TY.

Site Description: Area 1.26ha, 98% bare shingle. A long, narrow linear site close to Eastbourne town centre, adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 these groynes were replaced with new groynes and the beach was recharged using dredged shingle. The beach protects a dense urban area. Managed as a bathing beach. A concrete wall was built to protect the Redoubt in c. 1970.

Damage/disturbance: Heavy pedestrian traffic and significant enrichment, particularly around access points, from litter and waste water from local cafés. Coastal defence and promenade works have significantly impacted upon the habitat. Plants are restricted to growing in small clumps against the seawall. The beach is relatively narrow in places and thus the sea sometimes washes right up to the wall.

Habitat description: A heavily managed and heavily used fringing beach with a pioneer community.

Notable species: None.

Shingle habitat score: -1.0

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 25. Vascular plant list and abundance for survey site 5.5.

Species	Common Name	Abundance (DAFOR scale)
Dactylis glomerata	Cock's-foot	F
Geranium molle	Dove's-foot Crane's-bill	F
Rumex crispus	Curled Dock	F
Leontodon saxatilis	Lesser Hawkbit	F
Crepis vesicaria	Beaked Hawk's-beard	F
Hordeum murinum	Wall Barley	F
Agrostis capillaris	Common Bent	O
Taraxacum agg.	Dandelions	O
Medicago lupulina	Black Medick	O
Plantago media	Hoary Plantain	O
Senecio jacobaea	Common Ragwort	O
Raphanus raphanistrum	Wild Radish	O
Centranthus ruber	Red Valerian	O
Cirsium vulgare	Spear Thistle	O

Species	Common Name	Abundance (DAFOR scale)
Calystegia sepium	Hedge Bindweed	R
Foeniculum vulgare	Fennel	R
Sisymbrium officinale	Hedge Mustard	R
Papaver rhoeas	Common Poppy	R
Sonchus arvensis	Perennial Sowthistle	R
Daucus carota	Wild Carrot	R
Total number of species		**20**

Fig. 8a. Aerial Photograph of Eastbourne seafront survey sites, 5.1 to 5.4 (part). Scale 1:6000.

Fig. 8b. Aerial Photograph of Eastbourne seafront survey sites, 5.4 to 5.5 (part). Scale 1:6000.

Fig. 8c. Aerial Photograph of Eastbourne seafront survey sites, 5.5. Scale 1:6000.

6.1 Eastbourne sailing club, Redoubt to Channel View Road TQ 6257 9995

Date of visit: 29 July 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 2.62ha, 85% bare shingle. A relatively large site close to Eastbourne town centre, adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. A concrete wall was built to protect the Redoubt in c. 1970. The beach protects a dense urban area.

Damage/disturbance: Pedestrian traffic and enrichment is lighter than on the seafront to the west. Coastal defence works have significantly impacted upon the habitat. Boats are stored on the beach and there are a few beach huts. Plants are restricted to growing in small clumps against the seawall and between boats.

Habitat description: A heavily managed and heavily used fringing beach with a pioneer community.

Notable species: *B. vulgaris* ssp. *maritima*, *G. flavum*, *E. atherica.*

Shingle habitat score: 0.5

Community type:

a) Shingle community: Something like SH15 *Beta vulgaris maritima – Rumex crispus* pioneer community, or possible SH22 *Glaucium flavum* dominated pioneer community. In both cases, not a close match due to the high occurrence of species indicative of disturbance and/or enrichment e.g. *P. rhoeas*, *C. vulgare* and *S. nigra*.
b) Broad shingle community: No fit.
c) NVC: Poor SD1 *Rumex crispus – Glaucium flavum* shingle community.
d) Habitats Directive Annex I: Poor 1220 Perennial vegetation of stony banks.

Table 26. Vascular plant list and abundance for survey site 6.1.

Species	Common Name	Abundance (DAFOR scale)
Papaver rhoeas	Common Poppy	A
Beta vulgaris ssp.*maritima*	Sea Beet	F
Cirsium vulgare	Spear Thistle	F
Glaucium flavum	Yellow Horned-poppy	F
Lotus corniculatus	Common Bird's-foot-trefoil	F
Picris echioides	Bristly Oxtongue	F
Sambucus nigra	Elder	F
Solanum dulcamara	Bittersweet	F
Achillea millefolium	Yarrow	O
Elytrigia atherica	Sea Couch	O
Anagallis arvensis	Scarlet Pimpernel	O
Bellis perennis	Common Daisy	O

Species	Common Name	Abundance (DAFOR scale)
Carduus tenuiflorus	Slender Thistle	O
Centranthus ruber	Red Valerian	O
Cerastium arvense	Field Mouse-ear	O
Cirsium arvense	Creeping Thistle	O
Echium vulgare	Viper's-bugloss	O
Hypericum perforatum	Perforate St John's-wort	O
Malva sylvestris	Common Mallow	O
Plantago coronopus	Buck's-horn Plantain	O
Rubus fruticosus agg.	Brambles	O
Rumex crispus	Curled Dock	O
Senecio jacobaea	Common Ragwort	O
Stellaria media	Common Chickweed	O
Agrostis capillaris	Common Bent	R
Arctium minus	Lesser Burdock	R
Arenaria serpyllifolia	Thyme-leaved Sandwort	R
Calystegia sepium	Hedge Bindweed	R
Daucus carota	Wild Carrot	R
Dipsacus fullonum	Wild Teasel	R
Plantago lanceolata	Ribwort Plantain	R
Total number of species		**33**

6.2 Eastbourne sailing club, Channel View Road to Sovereign Park TQ 6313 0040

Date of visit: 29 July 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.95ha, 99% bare shingle. A relatively large site close to Eastbourne town centre, adjacent to the sea wall.

Management history: Sea walls and timber groynes were constructed along the whole of the Eastbourne frontage from Holywell eastwards circa 1900/1930. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. The beach protects a dense urban area. Part of the site lies within the Prince William Parade SNCI.

Damage/disturbance: Pedestrian traffic and enrichment is lighter than on the seafront to the west. Coastal defence works have significantly impacted upon the habitat. Boats are stored on the beach and there are a few beach huts. A wide footpath has recently been constructed. Plants are restricted to growing in small clumps against the seawall and between boats.

Habitat description: A heavily managed and heavily used fringing beach with a herb dominated pioneer community.

Notable species: *E. atherica*.

Shingle habitat score: -0.4

Community type:

a) Shingle community: No close match.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 27. Vascular plant list and abundance for survey site 6.2.

Species	Common Name	Abundance (DAFOR scale)
Elytrigia atherica	Sea Couch	F
Arrhenatherum elatius	False Oat-grass	F
Lotus corniculatus	Common Bird's-foot-trefoil	F
Agrostis capillaris	Common Bent	O
Anagallis arvensis	Scarlet Pimpernel	O
Buddleja davidii	Butterfly-bush	O
Dactylis glomerata	Cock's-foot	O
Papaver rhoeas	Common Poppy	O
Sambucus nigra	Elder	O
Solanum dulcamara	Bittersweet	O
Arctium minus	Lesser Burdock	R
Arenaria serpyllifolia	Thyme-leaved Sandwort	R
Brachypodium sylvaticum	False Brome	R
Centranthus ruber	Red Valerian	R

Species	Common Name	Abundance (DAFOR scale)
Dipsacus fullonum	Wild Teasel	R
Senecio jacobaea	Common Ragwort	R
Total number of species		**16**

Fig. 9. Aerial Photograph of Eastbourne sailing club survey sites, 6.1 and 6.2. Scale 1:6500.

7.1 Pevensey, Bay View caravan park access track TQ 6491 0262

Date of visit: 23 June 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.35ha, 5% bare shingle. The site comprised a private road between the Bay View caravan park and a row of houses built on the beach.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. Since 2003 the beach has been regularly recharged using dredged shingle and reprofiled under a PFI contract. The beach protects a dense urban area.

Damage/disturbance: Heavy pedestrian and vehicular traffic causing compaction and enrichment, and there is a high proportion of sand in the beach. Coastal defence works and development of Sovereign Harbour and the Crumbles Village have significantly impacted upon the habitat. Top soil has been introduced to encourage the growth of turf and this and the proximity to houses has encouraged the spread of garden species.

Habitat description: A compacted and enriched shingle site.

Notable species: None.

Shingle habitat score: -0.8

Community type:

a) Shingle community: No close match.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 28. Vascular plant list and abundance for survey site 7.1.

Species	Common Name	Abundance (DAFOR scale)
Lepidium draba	Hoary Cress	D
Rubus fruticosus agg.	Brambles	A
Viola odorata	Sweet Violet	A
Galium aparine	Cleavers	F
Ranunculus ficaria	Lesser Celandine	F
Rumex crispus	Curled Dock	F
Sinapsis arvensis	Charlock	F
Urtica dioica	Common Nettle	F
Veronica hederifolia	Ivy-leaved Speedwell	F
Achillea millefolium	Yarrow	O
Artemisia vulgaris	Mugwort	O
Cardamine hirsuta	Hairy Bitter-cress	O

Species	Common Name	Abundance (DAFOR scale)
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Dipsacus fullonum	Wild Teasel	O
Echium vulgare	Viper's-bugloss	O
Euphorbia lathyris	Caper Spurge	O
Galium mollugo	Hedge Bedstraw	O
Glechoma hederacea	Ground Ivy	O
Picris echioides	Bristly Oxtongue	O
Plantago lanceolata	Ribwort Plantain	O
Sedum acre	Biting Stonecrop	O
Stachys sylvatica	Hedge Woundwort	O
Tussilago farfara	Colt's-foot	O
Veronica filiformis	Slender Speedwell	O
Bellis perennis	Daisy	R
Clematis vitalba	Traveller's-joy	R
Daucus carota	Wild Carrot	R
Erophila verna	Common Whitlowgrass	R
Foeniculum vulgare	Fennel	R
Galanthus nivalis	Snowdrop	R
Geranium dissectum	Cut-leaved Crane's-bill	R
Lamium purpureum	Red Dead-nettle	R
Malva sylvestris	Common Mallow	R
Melissa officinalis	Balm	R
Mentha spicata	Spear Mint	R
Potentilla reptans	Creeping Cinquefoil	R
Primula vulgaris	Primrose	R
Prunus spinosa	Blackthorn	R
Sambucus nigra	Elder	R
*Scilla verna**	Spring Squill	R
Ulex europaeus	Common Gorse	R
Vinca major	Greater Periwinkle	R
Total number of species		**43**

***** record awaiting confirmation.

7.2 Pevensey, Bay View caravan park, seaward of houses TQ 6496 0262

Date of visit: 23 June 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.23ha, 96% bare shingle. A linear site running along the front of a row of houses built on the beach.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. Since 2003 the beach has been regularly recharged using dredged shingle and reprofiled under a PFI contract. The beach protects a dense urban area.

Damage/disturbance: Heavy pedestrian and vehicular traffic causing compaction and enrichment, and there is a high proportion of sand in the beach. Coastal defence works and development of Sovereign Harbour and the Crumbles Village have significantly impacted upon the habitat. The proximity to houses has encouraged the spread of garden species.

Habitat description: A compacted and enriched shingle site.

Notable species: *T. scorodonia* - the presence of this species is an indicator of the historical interest of the site prior to development. The species is recognised as an indicator of ancient shingle ridges, e.g. at Dungeness (Ferry *et al*, 1990). Also *G. flavum*, *B. vulgaris* ssp. *maritima*, *C. maritima*.

Shingle habitat score: 0.7

Community type:

a) Shingle community: No close match.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 29. Vascular plant list and abundance for survey site 7.2.

Species	Common Name	Abundance (DAFOR scale)
Clematis vitalba	Traveller's-joy	O
Erophila verna	Common Whitlowgrass	O
Galium mollugo	Hedge Bedstraw	O
Glaucium flavum	Yellow Horned-poppy	O
Picris echioides	Bristly Oxtongue	O
Sedum acre	Biting Stonecrop	O
Anagallis arvensis	Scarlet Pimpernel	R
Beta vulgaris ssp. *maritima*	Sea Beet	R
Carlina vulgaris	Carline Thistle	R
Centranthus ruber	Red Valerian	R
Cerastium fontanum	Common Mouse-ear	R
Cirsium vulgare	Spear Thistle	R

Species	Common Name	Abundance (DAFOR scale)
Cochlearia danica	Danish Scurvygrass	R
Crambe maritima	Sea Kale	R
Cymbalaria muralis	Ivy-leaved Toadflax	R
Echium vulgare	Viper's-bugloss	R
Senecio jacobaea	Common Ragwort	R
Silene latifolia	White Campion	R
Taraxacum agg.	Dandelions	R
Teucrium scorodonia	Wood Sage	R
Total number of species		**20**

7.3 Pevensey, Martello Tower to Bay View caravan park TQ 6477 0236

Date of visit: 23 June 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.38ha, 80% bare shingle. A linear site seaward of the Crumbles Village development.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. Since 2003 the beach has been regularly recharged using dredged shingle and reprofiled under a PFI contract. The beach protects a dense urban area.

Damage/disturbance: Heavy pedestrian and vehicular traffic causing compaction and enrichment, and there is a high proportion of sand in the beach. Coastal defence works and development of Sovereign Harbour and the Crumbles Village have significantly impacted upon the habitat. The proximity to houses has encouraged the spread of garden species.

Habitat description: A compacted and enriched shingle site.

Notable species: *B. vulgaris* ssp. *maritima*. Also, *L. vulgaris* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001).

Shingle habitat score: 0.2

Community type:

a) Shingle community: No close match.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 30. Vascular plant list and abundance for survey site 7.3.

Species	Common Name	Abundance (DAFOR scale)
Echium vulgare	Viper's-bugloss	O
Achillea millefolium	Yarrow	R
Arrhenatherum elatius	False Oat-grass	R
Beta vulgaris ssp. *maritima*	Sea Beet	R
Hypochoeris radicata	Common Cat's-ear	R
Lathyrus pratensis	Meadow Vetchling	R
Lepidium draba	Hoary Cress	R
Leucanthemum vulgare	Oxeye Daisy	R
Linaria vulgaris	Common Toadflax	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Salix caprea	Goat Willow	R
Cytisus scoparius	Broom	R
Sisymbrium officinale	Hedge Mustard	R

Species	Common Name	Abundance (DAFOR scale)
Taraxacum agg.	Dandelions	R
Total number of species		**14**

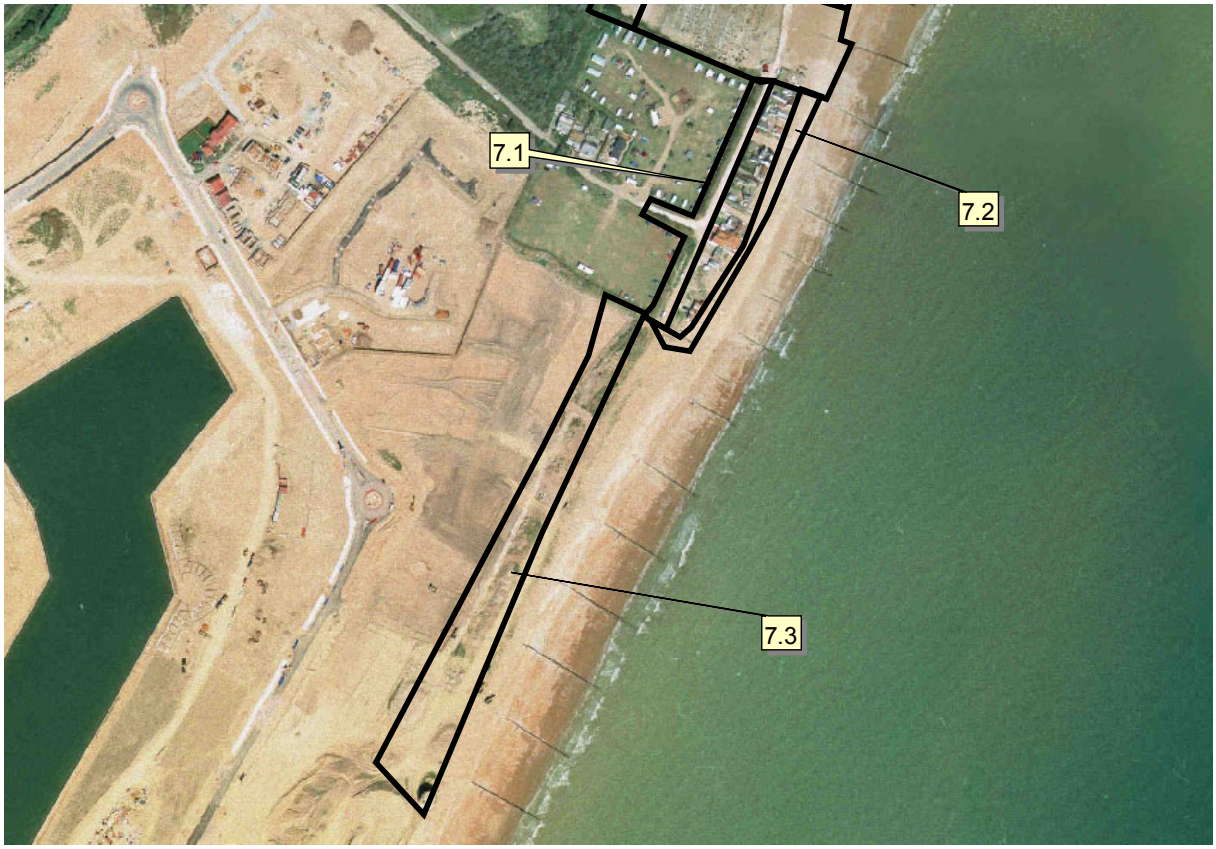

Fig. 10. Aerial Photograph of Pevensey survey sites, 7.1 to 7.3. Scale 1:4000.

8.1 Pevensey sailing club west TQ 6495 0278

Date of visit: 04 August 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.23ha, 64% bare shingle. This site lies to the west of the Pevensey sailing club, adjacent to Bay View caravan park, and represents one of the last undeveloped remnants of the Crumbles shingle foreland. Some small ridges are visible in the shingle although their history is uncertain.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Development of the harbour was part of a larger development of the majority of the shingle foreland, destroying much of the environmental interest that was there and increasing the demand for protection. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. Since 2003 the beach has been regularly recharged using dredged shingle and reprofiled under a PFI contract.

Damage/disturbance: Although the site is adjacent to a caravan park, there is no direct access, and the site therefore remains relatively undisturbed. There is an access track to the sailing club, along which grow more ruderal species. There are also occasional bonfires but these are restricted to a small area and do not affect the majority of the site.

Habitat description: Dry heath community but unlike anything defined by Senddon & Randall (1993). However, the site shows some similarities to a Dungeness A2 calcifuge grassland community (Ferry *et al*, 1990).

Notable species: *T. scorodonia*. The presence of this species is an indicator of the historical interest of the site prior to development. The species is recognised as an indicator of ancient shingle ridges, e.g. at Dungeness (Ferry *et al*, 1990). Also, *S. uniflora*, *G. flavum*, *A. littoralis*, *B. vulgaris* ssp. *maritima*, *C. maritima* and *L. purpurea* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001).The site was lichen rich.

Shingle habitat score: -0.1

Community type:

a) Shingle community: No close match.
b) Broad shingle community: Something like Group 4 although *E. vulgare* present, and *S. dulcamara*, *S. arvensis* and *T. scabrum* absent.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 31. Vascular plant list and abundance for survey site 8.1.

Species	Common Name	Abundance (DAFOR scale)
Teucrium scorodonia	Wood Sage	D
Silene uniflora	Sea Campion	A
Cirsium arvense	Creeping Thistle	F
Leontodon saxatilis	Lesser Hawkbit	F

Species	Common Name	Abundance (DAFOR scale)
Sedum anglicum	English Stonecrop	F
Atriplex prostrata	Spear-leaved Orache	O
Glaucium flavum	Yellow Horned-poppy	O
Lotus corniculatus	Common Bird's-foot-trefoil	O
Pilosella officinarum	Mouse-ear-hawkweed	O
Rubus fruticosus agg.	Brambles	O
Anagallis arvensis	Scarlet Pimpernel	R
Cerastium sp.	Mouse-ear sp.	R
Atriplex littoralis	Grass-leaved Orache	R
Bellis perennis	Daisy	R
Beta vulgaris ssp. *maritima*	Sea Beet	R
Brachypodium sylvaticum	False Brome	R
Carduus crispus	Welted Thistle	R
Carex pendula	Pendulous Sedge	R
Centranthus ruber	Red Valerian	R
Cerastium tomentosum	Snow-in-summer	R
Clematis vitalba	Traveller's-joy	R
Crambe maritima	Sea Kale	R
Echium vulgare	Viper's-bugloss	R
Euphorbia peplus	Petty Spurge	R
Foeniculum vulgare	Fennel	R
Geranium molle	Dove's-foot Crane's-bill	R
Hedera helix	Ivy	R
Holcus lanatus	Yorkshire-fog	R
Iris sp.	Iris sp. (garden escape)	R
Lathyrus pratensis	Meadow Vetchling	R
Linaria purpurea	Purple Toadflax	R
Myosotis arvensis	Field Forget-me-not	R
Pulicaria dysenterica	Common Fleabane	R
Ranunculus repens	Creeping Buttercup	R
Rumex acetosella	Sheep's Sorrel	R
Rumex crispus	Curled Dock	R
Sedum album	White Stonecrop	R
Senecio erucifolius	Hoary Ragwort	R
Senecio viscosus	Sticky Groundsel	R
Silene dioica	Red Campion	R

Species	Common Name	Abundance (DAFOR scale)
Trifolium campestre	Hop Trefoil	R
Veronica agrestis	Green Field-speedwell	R
Veronica hederifolia	Ivy-leaved Speedwell	R
Vinca minor	Lesser Periwinkle	R
Total number of species		**43**

8.2 Pevensey sailing club north TQ 6491 0290

Date of visit: 04 August 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.19ha, 80% bare shingle. This site lies to the north of the Pevensey sailing club, adjacent to an area of grassland and scrub, and represents one of the last undeveloped remnants of the Crumbles shingle foreland. Some small ridges are visible in the shingle although their history is uncertain. A footpath runs along the northern boundary where some small trees have been planted.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Development of the harbour was part of a larger development of the majority of the shingle foreland, destroying much of the environmental interest that was there and increasing the demand for protection. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. Since 2003 the beach has been regularly recharged using dredged shingle and reprofiled under a PFI contract.

Damage/disturbance: Although the site is adjacent to a caravan park, there is no direct access, and the site therefore remains relatively undisturbed. There is an access track to the sailing club, along which grow more ruderal species. There are also occasional bonfires but these are restricted to a small area and do not affect the majority of the site.

Habitat description: Dry heath community but unlike anything defined by Senddon & Randall (1993). However, the site shows some similarities to a Dungeness A2 calcifuge grassland community (Ferry *et al*, 1990).

Notable species: *T. scorodonia*. The presence of this species is an indicator of the historical interest of the site prior to development. The species is recognised as an indicator of ancient shingle ridges, e.g. at Dungeness (Ferry *et al*, 1990). Also, *S. uniflora*, *G. flavum*, *C. maritima* and *Verbascum lychnitis*. The site is lichen rich.

Shingle habitat score: 1.4

Community type:

a) Shingle community: No close match.
b) Broad shingle community: No exact fit although some similarities with Group 3.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 32. Vascular plant list and abundance for survey site 8.2.

Species	Common Name	Abundance (DAFOR scale)
Arrhenatherum elatius	False Oat-grass	D
Teucrium scorodonia	Wood Sage	D
Silene uniflora	Sea Campion	A
Echium vulgare	Viper's-bugloss	F
Leontodon saxatilis	Lesser Hawkbit	F
Picris echioides	Bristly Oxtongue	F

Species	Common Name	Abundance (DAFOR scale)
Plantago lanceolata	Ribwort Plantain	F
Sedum acre	Biting Stonecrop	F
Sisymbrium officinale	Hedge Mustard	F
Solanum dulcamara	Bittersweet	F
Sonchus asper	Prickly Sowthistle	F
Urtica dioica	Common Nettle	F
Anagallis arvensis	Scarlet Pimpernel	O
Cerastium arvense	Field Mouse-ear	O
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Dipsacus fullonum	Wild Teasel	O
Galium mollugo	Hedge Bedstraw	O
Glaucium flavum	Yellow Horned-poppy	O
Myosotis arvensis	Field Forget-me-not	O
Plantago major	Greater Plantain	O
Rubus fruticosus agg.	Brambles	O
Verbascum thapus	Great Mullein	O
Veronica agrestis	Green Field-speedwell	O
Arctium minus	Lesser Burdock	R
Arenaria serpyllifolia	Thyme-leaved Sandwort	R
Artemisia vulgaris	Mugwort	R
Bellis perennis	Daisy	R
Carduus crispus	Welted Thistle	R
Carlina vulgaris	Carline Thistle	R
Centaurium erythraea	Common Centaury	R
Crambe maritima	Sea Kale	R
Glechoma hederacea	Ground Ivy	R
Lamium album	White Dead-nettle	R
Malva sylvestris	Common Mallow	R
Mercurialis annua	Annual Mercury	R
Papaver somniferum	Opium Poppy	R
Pentaglottis sempervirens	Green Alkanet	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Populus alba	White Poplar	R
Prunella vulgaris	Selfheal	R
Reseda luteola	Weld	R

Species	Common Name	Abundance (DAFOR scale)
Rumex obtusifolius	Broad-leafed Dock	R
Salix caprea	Goat Willow	R
Sambucus nigra	Elder	R
Senecio jacobaea	Common Ragwort	R
Silene latifolia	White Campion	R
Sinapsis arvensis	Charlock	R
Verbascum lychnitis	White Mullein	R
Total number of species		**49**

8.3 Pevensey sailing club east TQ 6505 0292

Date of visit: 04 August 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.71ha, 85% bare shingle. This site lies to the west of the Pevensey sailing club, and represents one of the last undeveloped remnants of the Crumbles shingle foreland. Some small ridges are visible in the shingle although their history is uncertain. The survey area included a footpath along which were many grassland species.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Development of the harbour was part of a larger development of the majority of the shingle foreland, destroying much of the environmental interest that was there and increasing the demand for protection. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. Since 2003 the beach has been regularly recharged using dredged shingle and reprofiled under a PFI contract.

Damage/disturbance: Despite the proximity to the sailing club and some housing, the site remains relatively undisturbed. There is an access track to the sailing club, along which grow more ruderal species. There are also occasional bonfires but these are restricted to a small area and do not affect the majority of the site. Few species grow around the bonfire site.

Habitat description: Dry heath community but unlike anything defined by Sneddon & Randall (1993). However, the site shows some similarities to a Dungeness A2 calcifuge grassland community (Ferry *et al*, 1990).

Notable species: *T. scorodonia*. The presence of this species is an indicator of the historical interest of the site prior to development. The species is recognised as an indicator of ancient shingle ridges, e.g. at Dungeness (Ferry *et al*, 1990). Also, *Cynosurus echinatus*. The site is lichen rich.

Shingle habitat score: 0.6

Community type:

a) Shingle community: No close match.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 33. Vascular plant list and abundance for survey site 8.3.

Species	Common Name	Abundance (DAFOR scale)
Centaurea nigra	Common Knapweed	O
Sedum acre	Biting Stonecrop	O
Teucrium scorodonia	Wood Sage	O
Achillea millefolium	Yarrow	R
Alopecurus pratensis	Meadow Foxtail	R
Anthoxanthum odoratum	Sweet Vernal-grass	R
Crataegus monogyna	Hawthorn	R
Cynosurus echinatus	Rough Dog's-tail	R

Species	Common Name	Abundance (DAFOR scale)
Dactylis glomerata	Cock's-foot	R
Dactylorhiza fuchsia	Common Spotted Orchid	R
Deschampsia cespitosa	Tufted Hair-grass	R
Festuca rubra	Red Fescue	R
Hypericum perforatum	Perforate St John's-wort	R
Hypochoeris radicata	Common Cat's-ear	R
Leucanthemum vulgare	Oxeye Daisy	R
Lotus corniculatus	Common Bird's-foot-trefoil	R
Pinus sylvestris	Scots Pine	R
Prunus spinosa	Blackthorn	R
Quercus ilex	Evergreen Oak	R
Ranunculus repens	Creeping Buttercup	R
Rumex crispus	Curled Dock	R
Cytisus scoparius	Broom	R
Trifolium repens	White Clover	R
Ulex europaeus	Common Gorse	R
Vicia sativa	Common Vetch	R
Total number of species		**25**

Fig. 11. Aerial Photograph of Pevensey sailing club survey sites, 8.1 to 8.3. Scale 1:2500.

9.1 Sandcastle Hotel, Pevensey, seaward of Grey Tower Bungalows TQ 6518 0308

Date of visit: 14 May 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.54ha, 78% bare shingle. This site lies to the west of the Pevensey sailing club, and seaward of the Grey Towers cravan park and bungalows.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Development of the harbour was part of a larger development of the majority of the shingle foreland, destroying much of the environmental interest that was there and increasing the demand for protection. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. The beach is regularly recharged using dredged shingle and reprofiled under a PFI contract.

Damage/disturbance: The site is very compacted and enriched. It is popular with dog walkers.

Habitat description: Secondary pioneer community, compacted and enriched but retaining some shingle species including *C. maritima* and *G. flavum*.

Notable species: *G. flavum* and *C. maritima*.

Shingle habitat score: -0.3

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 34. Vascular plant list and abundance for survey site 9.1.

Species	Common Name	Abundance (DAFOR scale)
Cardamine sp.	Bitter-cress sp.	F
Centranthus ruber	Red Valerian	F
Eriophila verna	Common Whitlow-grass	F
Glaucium flavum	Yellow Horned-poppy	F
Hyacinthoides hispanica	Spanish Bluebell	F
Plantago lanceolata	Ribwort Plantain	F
Senecio vulgaris	Groundsel	F
Solanum dulcamara	Bittersweet	F
Urtica dioica	Common Nettle	F
Bellis perennis	Daisy	O
Cirsium arvense	Creeping Thistle	O
Crambe maritima	Sea Kale	O

Species	Common Name	Abundance (DAFOR scale)
Cymbalaria muralis	Ivy-leaved Toadflax	O
Echium vulgare	Viper's-bugloss	O
Geranium molle	Dove's-foot Crane's-bill	O
Lamium purpureum	Red Dead-nettle	O
Medicago arabica	Spotted Medick	O
Poa annua	Annual Meadow-grass	O
Rubus fruticosus agg.	Brambles	O
Rumex crispus	Curled Dock	O
Sedum acre	Biting Stonecrop	O
Sonchus sp.	Sowthistle sp.	O
Taraxacum agg.	Dandelions	O
Veronica serpyllifolia	Thyme-leaved Speedwell	O
Achillea millefolium	Yarrow	R
Centaurea scabiosa	Greater Knapweed	R
Cerastium semidecandrum	Little Mouse-ear	R
Cirsium vulgare	Spear Thistle	R
Convolvulus arvensis	Field Bindweed	R
Galium mollugo	Hedge Bedstraw	R
Potentilla reptans	Creeping Cinquefoil	R
Rumex acetosa	Common Sorrel	R
Sambucus nigra	Elder	R
Veronica agrestis	Green Field-speedwell	R
Vinca major	Greater Periwinkle	R
Total number of species		**35**

9.2 Sandcastle Hotel, Pevensey, caravan park to Courtlands Lodge TQ 6532 0336

Date of visit: 14 May 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 2.8ha, 84% bare shingle. A relatively large site seaward of a static caravan park and a housing development. The site includes a well trodden access path from the Martello Tower and surrounding flats to the beach.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Development of the harbour was part of a larger development of the majority of the shingle foreland, destroying much of the environmental interest that was there and increasing the demand for protection. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. The beach is regularly recharged using dredged shingle and reprofiled under a PFI contract.

Damage/disturbance: The site is very compacted and enriched and is popular with dog walkers. Proximity to housing has resulted in the spread of garden species onto the beach.

Habitat description: Secondary pioneer community, compacted and enriched but retaining some shingle species including *S. uniflora* and *G. flavum*.

Notable species: *S. uniflora*, *G. flavum*, *C. maritima* and *G. robertianum*.

Shingle habitat score: 0.2

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 35. Vascular plant list and abundance for survey site 9.2.

Species	Common Name	Abundance (DAFOR scale)
Centranthus ruber	Red Valerian	D
Daucus carota	Wild Carrot	F
Eriophila verna	Common Whitlow-grass	F
Pilosella officinarum	Mouse-ear-hawkweed	F
Myosotis ramosissima	Early Forget-me-not	F
Silene uniflora	Sea Campion	F
Veronica serpyllifolia	Thyme-leaved Speedwell	F
Alliaria petiolata	Garlic Mustard	O
Cirsium arvense	Creeping Thistle	O
Echium vulgare	Viper's-bugloss	O
Galium aparine	Cleavers	O

Glaucium flavum	Yellow Horned-poppy	O
Medicago arabica	Spotted Medick	O
Plantago lanceolata	Ribwort Plantain	O
Rumex crispus	Curled Dock	O
Senecio vulgaris	Groundsel	O
Solanum dulcamara	Bittersweet	O
Taraxacum agg.	Dandelions	O
Urtica dioica	Common Nettle	O
Arctium minus	Lesser Burdock	R
Centaurea nigra	Common Knapweed	R
Cerastium semidecandrum	Little Mouse-ear	R
Cirsium vulgare	Spear Thistle	R
Convolvulus arvensis	Field Bindweed	R
Crambe maritima	Sea Kale	R
Epilobium sp.	Willowherb sp.	R
Fuschia sp.	Fuschia sp.	R
Geranium robertianum	Herb-Robert	R
Iris sp.	Iris sp. (garden escape)	R
Lonicera xylosteum	Fly Honeysuckle	R
Malva sylvestris	Common Mallow	R
Picris echioides	Bristly Oxtongue	R
Rosa canina	Dog Rose	R
Senecio jacobaea	Common Ragwort	R
Silene latifolia	White Campion	R
Vicia sativa	Common Vetch	R
Total number of species		**36**

9.3 Sandcastle Hotel, Pevensey, access path TQ 6528 0360

Date of visit: 14 May 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.29ha, 65% bare shingle. A small linear site comprising the access track to the beach between Grenville Road and Innings Drive.

Management history: Timber groynes were constructed to retain the beach circa 1900/1930 and in 1992 the Sovereign Harbour breakwater arm was constructed. In 1993, the concrete wall near the breakwater arm was extended and work began on the northern rock breakwaters. Development of the harbour was part of a larger development of the majority of the shingle foreland, destroying much of the environmental interest that was there and increasing the demand for protection. Between 1995 and 1999 existing groynes between the Redoubt and Langley Point were replaced. In 2001 a 440m rock revetment was constructed east of Sovereign Harbour to rear of beach and groynes in the area were partially removed. The beach is regularly recharged using dredged shingle and reprofiled under a PFI contract.

Damage/disturbance: The site is very compacted and enriched and is popular with dog walkers. Proximity to housing has resulted in the spread of garden species.

Habitat description: Secondary pioneer community, compacted and enriched but retaining some shingle species including *S. uniflora* and *G. flavum*.

Notable species: *C. maritima* and *L. vulgaris* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001).

Shingle habitat score: -0.3

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 36. Vascular plant list and abundance for survey site 9.3.

Species	Common Name	Abundance (DAFOR scale)
Centranthus ruber	Red Valerian	D
Arctium minus	Lesser Burdock	O
Buddleja davidii	Butterfly-bush	O
Centaurea nigra	Common Knapweed	O
Crambe maritima	Sea Kale	O
Daucus carota	Wild Carrot	O
Eriophila verna	Common Whitlow-grass	O
Ilex aquifolium	Holly	O
Linaria vulgaris	Common Toadflax	O
Malva sylvestris	Common Mallow	O
Forsythia x. intermedia	Forsythia	O
Symphoricarpus albus	Snowberry	O

Taraxacum agg.	Dandelions	O
Achillea millefolium	Yarrow	R
Alliaria petiolata	Garlic Mustard	R
Cerastium semidecandrum	Little Mouse-ear	R
Cirsium arvense	Creeping Thistle	R
Convolvulus arvensis	Field Bindweed	R
Echium vulgare	Viper's-bugloss	R
Erysimum sp.	Wallflower sp.	R
Fuschia sp.	Fuschia sp.	R
Hedera helix	Ivy	R
Tulipa sp.	Tulip sp.	R
Total number of species		**24**

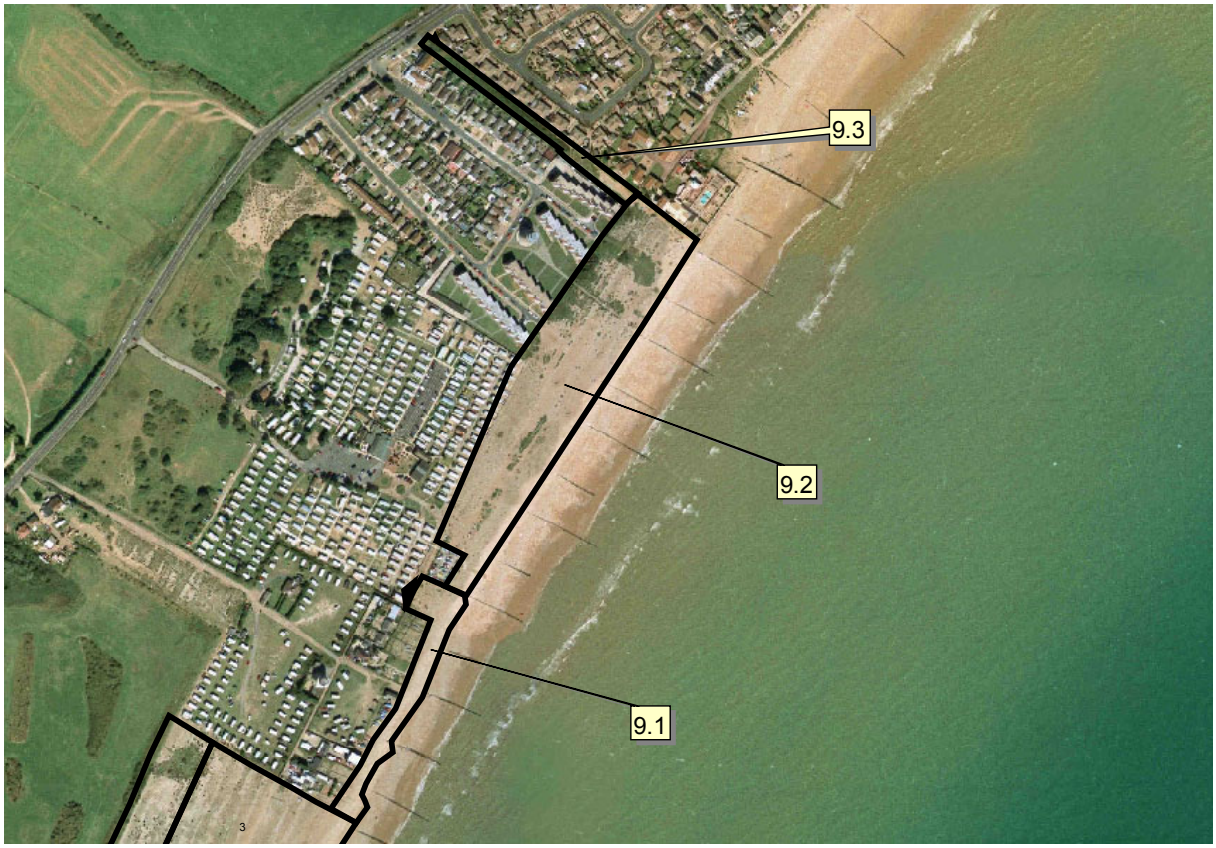

Fig. 12. Aerial Photograph of Sandcastle Hotel survey sites, 9.1 to 9.3. Scale 1:5000.

10.1 Coast Road, Normans' Bay, seaward of caravan park TQ 6778 0518

Date of visit: 02 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 3.51ha, 78% bare shingle. A relatively large site backed by a seawall with houses either side.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The primary reason for maintaining the beach is to protect the internationally important freshwater site behind. The survey area lies within a SNCI designated for its shingle flora (CR14: Shingle Beach at Normans' Bay SNCI).

Damage/disturbance: Despite the proximity to housing, the encroachment of garden species appeared relatively minor. However, there are some signs of compaction and enrichment and the site is popular with dog walkers.

Habitat description: Herb dominated pioneer community, species rich (82 species recorded) including a mixture of shingle, grassland and meadow species.

Notable species: *B. vulgaris* ssp. *maritima*, *G. angusitfolia* (UK BAP species), *C. maritima* and *G. flavum*. Also, *L. vulgaris* and *L. pupurea* are of note as they are known larval food plants of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy 2001).

Shingle habitat score: 0.5

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 37. Vascular plant list and abundance for survey site 10.1.

Species	Common Name	Abundance (DAFOR scale)
Equisetum arvense	Field Horsetail	A
Heracleum sphondylium	Hogweed	A
Lepidium draba	Hoary Cress	A
Picris echioides	Bristly Oxtongue	A
Plantago lanceolata	Ribwort Plantain	A
Rumex obtusifolius	Broad-leafed Dock	A
Senecio erucifolius	Hoary Ragwort	A
Beta vulgaris ssp.*maritima*	Sea Beet	F
Centaurea nigra	Common Knapweed	F
Cirsium arvense	Creeping Thistle	F
Dactylis glomerata	Cock's-foot	F
Galeopsis angustifolia	Red Hemp-nettle	F
Poa annua	Annual Meadow-grass	F
Ranunculus sardous	Hairy Buttercup	F

Species	Common Name	Abundance (DAFOR scale)
Rubus caesius	Dewberry	F
Senecio jacobaea	Common Ragwort	F
Tussilago farfara	Colt's-foot	F
Urtica dioica	Common Nettle	F
Achillea millefolium	Yarrow	O
Artemisia vulgaris	Mugwort	O
Anisantha sterilis	Barren Brome	O
Calystegia sepium	Hedge Bindweed	O
Dipsacus fullonum	Wild Teasel	O
Galium aparine	Cleavers	O
Galium mollugo	Hedge Bedstraw	O
Geranium dissectum	Cut-leaved Crane's-bill	O
Holcus lanatus	Yorkshire-fog	O
Leucanthemum vulgare	Oxeye Daisy	O
Lotus corniculatus	Common Bird's-foot-trefoil	O
Malva sylvestris	Common Mallow	O
Medicago lupulina	Black Medick	O
Myosotis arvensis	Field Forget-me-not	O
Plantago coronopus	Buck's-horn Plantain	O
Potentilla reptans	Creeping Cinquefoil	O
Pulicaria dysenterica	Common Fleabane	O
Ranunculus repens	Creeping Buttercup	O
Rumex crispus	Curled Dock	O
Sinapsis arvensis	Charlock	O
Taraxacum agg.	Dandelions	O
Trifolium campestre	Hop Trefoil	O
Trifolium repens	White Clover	O
Vicia hirsuta	Hairy Tare	O
Aegopodium podagraria	Ground-elder	R
Anacamptis pyramidalis	Pyramidal Orchid	R
Anagallis arvensis	Scarlet Pimpernel	R
Bellis perennis	Daisy	R
Centaurea scabiosa	Greater Knapweed	R
Cerastium arvense	Field Mouse-ear	R
Clematis vitalba	Traveller's-joy	R

Species	Common Name	Abundance (DAFOR scale)
Cochlearia danica	Danish Scurvygrass	R
Conium maculatum	Hemlock	R
Coronopus didymus	Lesser Swine-cress	R
Crambe maritima	Sea Kale	R
Crepis capillaris	Smooth Hawk's-beard	R
Daucus carota	Wild Carrot	R
Echium vulgare	Viper's-bugloss	R
Epilobium hirsutum	Great Willowherb	R
Eupatorium cannabinum	Hemp Agrimony	R
Fumaria officinalis	Common Fumitory	R
Glaucium flavum	Yellow Horned-poppy	R
Iris sp.	Iris sp. (garden escape)	R
Juncus influexus	Hard Rush	R
Leontodon saxatilis	Lesser Hawkbit	R
Linaria purpurea	Purple Toadflax	R
Linaria vulgaris	Common Toadflax	R
Malva moschata	Musk Mallow	R
Matricaria recutita	Scented Mayweed	R
Menta spicata	Spear Mint	R
Oxalis articulata	Pink Sorrel	R
Papaver rhoeas	Common Poppy	R
Pastinaca sativa	Wild Parsnip	R
Persicaria maculosa	Redshank	R
Prunella vulgaris	Selfheal	R
Rhinanthus minor	Yellow Rattle	R
Rubus fruticosus agg.	Brambles	R
Rubus laciniatus	Cut-leaved Blackberry	R
Senecio viscosus	Sticky Groundsel	R
Silene latifolia	White Campion	R
Silene dioica	Red Campion	R
Tripleurospermum maritimum	Sea Mayweed	R
Ulex europaeus	Common Gorse	R
Veronica chamaedrys	Germander Speedwell	R
Veronica hederifolia	Ivy-leaved Speedwell	R
Veronica serpyllifolia	Thyme-leaved Speedwell	R
Vicia sativa	Common Vetch	R

Species	Common Name	Abundance (DAFOR scale)
Total number of species		**84**

10.2 Coast Road, Normans' Bay, Aquarius to Driftwood TQ 6840 0546

Date of visit: 02 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 2.10ha, 80% bare shingle. A relatively large site backed by a seawall with houses either side.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The primary reason for maintaining the beach is to protect the internationally important freshwater site behind. Part of the survey area lies within a SNCI designated for its shingle flora (CR14: Shingle Beach at Normans' Bay SNCI).

Damage/disturbance: Despite the proximity to housing, the encroachment of garden species appeared relatively minor. However, there are some signs of compaction and enrichment and the site is popular with dog walkers.

Habitat description: Recharged and compacted herb dominated pioneer community with 62 species recorded, including a mixture of shingle, grassland and meadow species.

Notable species: *B.vulgaris* ssp. *maritima*, *C. maritima*, *S. uniflora* and *G. flavum*.

Shingle habitat score: -0.6

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 38. Vascular plant list and abundance for survey site 10.2.

Species	Common Name	Abundance (DAFOR scale)
Lepidium draba	Hoary Cress	A
Plantago lanceolata	Ribwort Plantain	A
Rumex obtusifolius	Broad-leafed Dock	A
Beta vulgaris ssp.*maritima*	Sea Beet	F
Cirsium arvense	Creeping Thistle	F
Crambe maritima	Sea Kale	F
Dactylis glomerata	Cock's-foot	F
Lotus corniculatus	Common Bird's-foot-trefoil	F
Poa annua	Annual Meadow-grass	F
Rubus caesius	Dewberry	F
Senecio jacobaea	Common Ragwort	F
Silene uniflora	Sea Campion	F
Tussilago farfara	Colt's-foot	F
Urtica dioica	Common Nettle	F

Species	Common Name	Abundance (DAFOR scale)
Achillea millefolium	Yarrow	O
Anisantha sterilis	Barren Brome	O
Calystegia silvatica	Large Bindweed	O
Dipsacus fullonum	Wild Teasel	O
Galium aparine	Cleavers	O
Galium mollugo	Hedge Bedstraw	O
Geranium dissectum	Cut-leaved Crane's-bill	O
Holcus lanatus	Yorkshire-fog	O
Malva sylvestris	Common Mallow	O
Medicago lupulina	Black Medick	O
Plantago coronopus	Buck's-horn Plantain	O
Pulicaria dysenterica	Common Fleabane	O
Rumex crispus	Curled Dock	O
Sinapsis arvensis	Charlock	O
Taraxacum agg.	Dandelions	O
Trifolium campestre	Hop Trefoil	O
Anagallis arvensis	Scarlet Pimpernel	R
Arctium minus	Lesser Burdock	R
Bellis perennis	Daisy	R
Blackstonia perfoliata	Yellow-wort	R
Centaurea scabiosa	Greater Knapweed	R
Centaurium erythraea	Common Centaury	R
Cochlearia danica	Danish Scurvygrass	R
Conium maculatum	Hemlock	R
Crepis capillaris	Smooth Hawk's-beard	R
Daucus carota	Wild Carrot	R
Echium vulgare	Viper's-bugloss	R
Eupatorium cannabinum	Hemp Agrimony	R
Fumaria officinalis	Common Fumitory	R
Glaucium flavum	Yellow Horned-poppy	R
Juncus influexus	Hard Rush	R
Leontodon saxatilis	Lesser Hawkbit	R
Linum catharticum	Fairy Flax	R
Matricaria recutita	Scented Mayweed	R
Medicago arabica	Spotted Medick	R
Myosotis arvensis	Field Forget-me-not	R

Species	Common Name	Abundance (DAFOR scale)
Papaver rhoeas	Common Poppy	R
Pastinaca sativa	Wild Parsnip	R
Picris echioides	Bristly Oxtongue	R
Prunella vulgaris	Selfheal	R
Ranunculus repens	Creeping Buttercup	R
Rhinanthus minor	Yellow Rattle	R
Rumex acetosa	Common Sorrel	R
Senecio viscosus	Sticky Groundsel	R
Silene latifolia	White Campion	R
Sonchus asper	Prickly Sowthistle	R
Trifolium repens	White Clover	R
Tripleurospermum maritimum	Sea Mayweed	R
Veronica hederifolia	Ivy-leaved Speedwell	R
Vicia sativa	Common Vetch	R
Total number of species		**64**

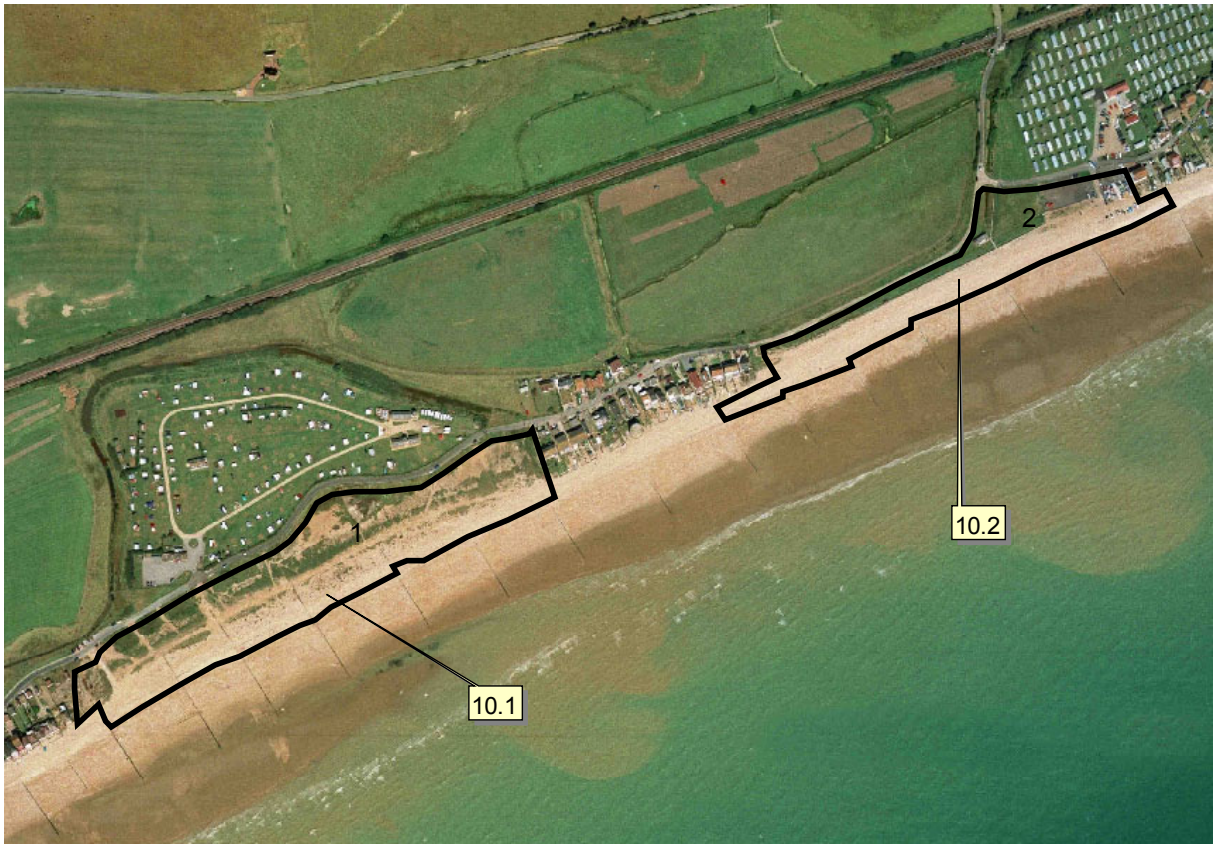

Fig. 13. Aerial Photograph of Normans' Bay survey sites, 10.1 and 10.2. Scale 1:5000.

11.1 Pevensey Bay, EA Depot, Herbrand Walk TQ 6950 0602

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 0.46ha, 75% bare shingle. A small site comprising a storage area used by the Environment Agency. Adjacent to the road and railway line, the depot is protected by a shingle ridge to the south, a chalk bank to the west and chalk/clay banks to the north and east.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. The survey area is surrounded by the Pevensey Levels SSSI.

Damage/disturbance: The site has been highly compacted by heavy machinery with a high sand content.

Habitat description: Compacted and enriched site with *Sonchus* sp. dominant and abundant *H. lanatus*. Some shingle species persist including *B. vulgaris* ssp. *maritima* and *C. maritima*. The site is also a stronghold for *Anacamptis pyramidalis* Pyramidal Orchid and *Rhinanthus minor* Yellow Rattle.

Notable species: *Chenpodium vulvaria* (Stinking Goosefoot). Between 1987 and 1999, this species was only recorded in 16 10km^2 throughout the UK and has not been recorded at Pevensey since before 1970 (Preston *et al*, 2002). Also, *B. vulgaris* ssp. *maritima*, *C. maritima*, *G. flavum* and *L. vulgaris* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001). Although not recorded in this survey, the site is known to support a population of the increasingly scarce invertebrate *Lampyris noctiluca* glow-worm (Ryland, 1999, 2000 & 2001).

Shingle habitat score: 0.6

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 39. Vascular plant list and abundance for survey site 11.1.

Species	Common Name	Abundance (DAFOR scale)
Sonchus sp.	Sowthistle sp.	D
Holcus lanatus	Yorkshire-fog	A
Hypericum perforatum	Perforate St John's-wort	F
Plantago lanceolata	Ribwort Plantain	F
Rhinanthus minor	Yellow Rattle	F
Anacamptis pyramidalis	Pyramidal Orchid	O
Anagallis arvensis	Scarlet Pimpernel	O
Beta vulgaris ssp.*maritima*	Sea Beet	O

Species	Common Name	Abundance (DAFOR scale)
Centaurea nigra	Common Knapweed	O
Cirsium vulgare	Spear Thistle	O
Dactylis glomerata	Cock's-foot	O
Dipsacus fullonum	Wild Teasel	O
Euphrasia nemorosa	Common Eyebright	O
Geranium dissectum	Cut-leaved Crane's-bill	O
Galium saxatile	Heath Bedstraw	O
Glechoma hederacea	Ground Ivy	O
Hypericum pulchrum	Slender St John's-wort	O
Lepidium draba	Hoary Cress	O
Lotus corniculatus	Common Bird's-foot-trefoil	O
Potentilla reptans	Creeping Cinquefoil	O
Rumex acetosa	Common Sorrel	O
Sonchus asper	Prickly Sowthistle	O
Urtica dioica	Common Nettle	O
Artemisia vulgaris	Mugwort	R
Bellis perennis	Daisy	R
Blackstonia perfoliata	Yellow-wort	R
Carex obtrubae	False Fox-sedge	R
Chenpodium vulvaria	Stinking Goosefoot	R
Cirsium arvense	Creeping Thistle	R
Crambe maritima	Sea Kale	R
Crataegus monogyna	Hawthorn	R
Fumaria officinalis	Common Fumitory	R
Glaucium flavum	Yellow Horned-poppy	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Leontodon saxatilis	Lesser Hawkbit	R
Leucanthemum vulgare	Oxeye Daisy	R
Linaria vulgaris	Common Toadflax	R
Malus sp.	Apple sp.	R
Myosotis arvensis	Field Forget-me-not	R
Oenanthe crocata	Hemlock Water-dropwort	R
Oxalis articulata	Pink-sorrel	R
Papaver somniferum	Opium Poppy	R
Plantago coronopus	Buck's-horn Plantain	R
Ranunculus sardous	Hairy Buttercup	R

Species	Common Name	Abundance (DAFOR scale)
Rumex crispus	Curled Dock	R
Sambucus nigra	Elder	R
Scrophularia nodosa	Common Figwort	R
Sinapsis arvensis	Charlock	R
Solanum dulcamara	Bittersweet	R
Trifolium campestre	Hop Trefoil	R
Valerianella sp.	Cornsalad sp.	R
Veronica chamaedrys	Germander Speedwell	R
*Veronica verna**	Spring Speedwell	R
Total number of species		**53**

* record awaiting confirmation.

11.2 Pevensey Bay, Herbrand Walk TQ 6987 0612

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM, DV.

Site Description: Area 3.32ha, 80% bare shingle. A relatively large site adjacent to herbrand Walk. The survey area includes the north facing slope protecting the EA depot (survey site 11.1) and the shingle ridge to the mean high water mark. Towards the eastern end of the site, beach huts have been built on the beach.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. Part of the survey area lies within the Pevensey Levels SSSI. A new sea wall was built in 2003 to protect the road, and the crest of the ridge was broadened. Prior to this work, seeds were collected from the area and then re-scattered once the works were complete.

Damage/disturbance: Some compaction and disturbance from recent defence works. An access track runs from the top of the ridge, down the bank to the EA depot. This area is particularly disturbed. However, timber groynes have been places around the most densely vegetated areas to protect them from shingle lorries.

Habitat description: Disturbed site with abundant *R. crispus*, *L. cornciulatus* and *T. repens. C. maritima* is frequent. Herb dominated pioneer community.

Notable species: *C. maritima*, *B. vulgaris* ssp. *maritima*, *G. flavum*, *A. tripolium* and *S. uniflora*. It should also be noted that the BAP species *G. angustifolia* was recorded at this site in 2004 indicating that the area is recovering well after the recent works.

Shingle habitat score: 1.8

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 40. Vascular plant list and abundance for survey site 11.2.

Species	Common Name	Abundance (DAFOR scale)
Lotus corniculatus	Common Bird's-foot-trefoil	A
Rumex crispus	Curled Dock	A
Trifolium repens	White Clover	A
Vicia hirsuta	Hairy Tare	A
Crambe maritima	Sea Kale	F
Dactylis glomerata	Cock's-foot	F
Euphrasia nemorosa	Common Eyebright	F
Holcus lanatus	Yorkshire-fog	F
Poa annua	Annual Meadow-grass	F

Species	Common Name	Abundance (DAFOR scale)
Beta vulgaris ssp. *maritima*	Sea Beet	O
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Glaucium flavum	Yellow Horned-poppy	O
Potentilla reptans	Creeping Cinquefoil	O
Rubus fruticosus agg.	Brambles	O
Rumex acetosa	Common Sorrel	O
Sedum acre	Biting Stonecrop	O
Senecio erucifolius	Hoary Ragwort	O
Solanum dulcamara	Bittersweet	O
Sonchus sp.	Sowthistle sp.	O
Agrimonia eupatoria	Agrimony	R
Anagallis arvensis	Scarlet Pimpernel	R
Anthriscus sylvestris	Cow Parsley	R
Arrhenatherum elatius	False Oat-grass	R
Aster sp.	Michaelmas-daisy sp.	R
Aster tripolium	Sea Aster	R
Dipsacus fullonum	Wild Teasel	R
Echium vulgare	Viper's-bugloss	R
Lathyrus pratensis	Meadow Vetchling	R
Leucanthemum vulgare	Oxeye Daisy	R
Lonicera periclymenum	Honeysuckle	R
Lysimachia punctata	Dotted Loosestrife	R
Pastinaca sativa	Wild Parsnip	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Plantago maritima	Sea Plantain	R
Prunella vulgaris	Selfheal	R
Pulicaria dysenterica	Common Fleabane	R
Rosa sp.	Rose sp.	R
Sambucus nigra	Elder	R
Silene uniflora	Sea Campion	R
Total number of species		**40**

11.3 Pevensey Bay, chalk bank, EA depot TQ 6944 0598

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.10ha, 5% bare shingle. This survey are comprises a small chalk bank to the west of the EA depot (site 11.1). Whilst not strictly a shingle habitat, the bank was surveyed because of its proximity to other shingle habitats.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. The survey area lies within the Pevensey Levels SSSI.

Damage/disturbance: Some compaction and disturbance.

Habitat description: Not a typical shingle community but a herb rich calcareous flora. However, some shingle species persist, including *S. uniflora* and *R. crispus* (both frequent) indicating the strong maritime influence.

Notable species: *S. uniflora*, *B. vulgaris* ssp. *maritima*, *G. flavum*, *F. laevis* and *S. maritimum*. Also, *L. vulgaris* as it is a known larval food plant of the BAP and RDB3 species *C. lunula* (UK Biodiversity Group, 1999b; Clancy, 2001). Although not recorded in this survey, the chalk bank is known to support a population of the increasingly scarce invertebrate *L. noctiluca* (Ryland, 1999, 2000 & 2001).

Shingle habitat score: 0.4

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 42. Vascular plant list and abundance for survey site 11.3.

Species	Common Name	Abundance (DAFOR scale)
Anacamptis pyramidalis	Pyramidal Orchid	F
Euphrasia nemorosa	Common Eyebright	F
Festuca rubra	Red Fescue	F
Holcus lanatus	Yorkshire-fog	F
Hypochoeris radicata	Common Cat's-ear	F
Prunus spinosa	Blackthorn	F
Rumex crispus	Curled Dock	F
Silene uniflora	Sea Campion	F
Arrhenatherum elatius	False Oat-grass	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Blackstonia perfoliata	Yellow-wort	O

Species	Common Name	Abundance (DAFOR scale)
Centaurea nigra	Common Knapweed	O
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Cynosurus cristatus	Crested Dog's-tail	O
Galium aparine	Cleavers	O
Geranium molle	Dove's-foot Crane's-bill	O
Glaucium flavum	Yellow Horned-poppy	O
Glechoma hederacea	Ground Ivy	O
Leucanthemum vulgare	Oxeye Daisy	O
Linum catharticum	Fairy Flax	O
Lotus corniculatus	Common Bird's-foot-trefoil	O
Malus sp.	Apple sp.	O
Phleum pratense	Timothy	O
Plantago lanceolata	Ribwort Plantain	O
Rhinanthus minor	Yellow Rattle	O
Rubus fruticosus agg.	Brambles	O
Senecio jacobaea	Common Ragwort	O
Achillea millefolium	Yarrow	R
Agrimonia eupatoria	Agrimony	R
Carex obtruae	False Fox-sedge	R
Cerastium arvense	Field Mouse-ear	R
Crataegus monogyna	Hawthorn	R
Dactylis glomerata	Cock's-foot	R
Epilobium hirsutum	Great Willowherb	R
Frankenia laevis	Sea Heath	R
Hypericum perforatum	Perforate St John's-wort	R
Ligustrum sp.	Privet sp.	R
Linaria vulgaris	Common Toadflax	R
Medicago lupulina	Black Medick	R
Oenanthe crocata	Hemlock Water-dropwort	R
Pastinaca sativa	Wild Parsnip	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Prunella vulgaris	Selfheal	R
Pulicaria dysenterica	Common Fleabane	R
Rosa canina	Dog Rose	R
Sambucus nigra	Elder	R

Species	Common Name	Abundance (DAFOR scale)
Sedum anglicum	English Stonecrop	R
Seriphidium maritimum	Sea Wormwood	R
Solanum dulcamara	Bittersweet	R
Taraxacum agg.	Dandelions	R
Trifolium pratense	Red Clover	R
Urtica dioica	Common Nettle	R
Valerianella sp.	Cornsalad sp.	R
Total number of species		**54**

11.4 Pevensey Bay, Herbrand Walk sluice TQ 6941 0595

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.40ha, 40% bare shingle. This survey area, adjacent to the railway line, encompasses a small area of shingle with a sluice. There is therefore quite a high silt content, and both fresh and saltwater influences.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. The survey area lies within the Pevensey Levels SSSI.

Damage/disturbance: Some compaction and disturbance.

Habitat description: Compacted site with some saltmarsh influence. *S. uniflora*, *L. corniculatus* and *H. pulchrum* frequent.

Notable species: *S. uniflora*, *F. laevis* and *Salicornia* agg.

Shingle habitat score: 0.6

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 43. Vascular plant list and abundance for survey site 11.4.

Species	Common Name	Abundance (DAFOR scale)
Hypericum pulchrum	Slender St John's-wort	F
Lotus corniculatus	Common Bird's-foot-trefoil	F
Silene uniflora	Sea Campion	F
Anthemis cotula	Stinking Chamomile	R
Arctium minus	Lesser Burdock	R
Blackstonia perfoliata	Yellow-wort	R
Centaurium erythraea	Common Centaury	R
Frankenia laevis	Sea Heath	R
Linum catharticum	Fairy Flax	R
Myosotis arvensis	Field Forget-me-not	R
Picris echioides	Bristly Oxtongue	R
Plantago lanceolata	Ribwort Plantain	R
Potentilla reptans	Creeping Cinquefoil	R
Prunella vulgaris	Selfheal	R
Ranunculus repens	Creeping Buttercup	R

Rumex acetosa	Common Sorrel	R
Salicornia agg.	Glassworts	R
Silene latifolia	White Campion	R
Sonchus asper	Prickly Sowthistle	R
Trifolium repens	White Clover	R
Total number of species		**20**

11.5 Pevensey Bay, landward of Herbrand Walk TQ 6967 0608

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.62ha, 40% bare shingle. This polygon of shingle is bordered by the railway line to the north and the road to the south.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. Part of the survey area lies within the Pevensey Levels SSSI.

Damage/disturbance: A considerable amount of material has been dumped on the site, and it is compacted and highly enriched.

Habitat description: Herb rich grassland, highly enriched and degraded as indicated by abundant *U. dioica*, grassland species and high diversity (80 species recorded). However, the maritime influence is still apparent from the record of frequent *T. maritimum*, *R. crispus* and *E. vulgare*.

Notable species: *B. vulgaris* spp. *maritima*.

Shingle habitat score: -0.8

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 44. Vascular plant list and abundance for survey site 11.5.

Species	Common Name	Abundance (DAFOR scale)
Clematis vitalba	Traveller's-joy	A
Daucus carota	Wild Carrot	A
Holcus lanatus	Yorkshire-fog	A
Poa annua	Annual Meadow-grass	A
Rhinanthus minor	Yellow Rattle	A
Tripleurospermum maritimum	Sea Mayweed	A
Urtica dioica	Common Nettle	A
Achillea millefolium	Yarrow	F
Anisantha sterilis	Barren Brome	F
Calystegia silvatica	Large Bindweed	F
Centaurea nigra	Common Knapweed	F
Dactylis glomerata	Cock's-foot	F
Dipsacus fullonum	Wild Teasel	F
Echium vulgare	Viper's-bugloss	F
Equisetum arvense	Field Horsetail	F

Species	Common Name	Abundance (DAFOR scale)
Galium aparine	Cleavers	F
Heracleum sphondylium	Hogweed	F
Leontodon saxatilis	Lesser Hawkbit	F
Lepidium draba	Hoary Cress	F
Leucanthemum vulgare	Oxeye Daisy	F
Lotus corniculatus	Common Bird's-foot-trefoil	F
Matricaria recutita	Scented Mayweed	F
Medicago arabica	Spotted Medick	F
Myosotis arvensis	Field Forget-me-not	F
Picris echioides	Bristly Oxtongue	F
Pulicaria dysenterica	Common Fleabane	F
Rumex crispus	Curled Dock	F
Silene latifolia	White Campion	F
Trifolium campestre	Hop Trefoil	F
Trifolium repens	White Clover	F
Anagallis arvensis	Scarlet Pimpernel	O
Artemisia vulgaris	Mugwort	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Centaurea scabiosa	Greater Knapweed	O
Cerastium arvense	Field Mouse-ear	O
Cirsium arvense	Creeping Thistle	O
Cochlearia danica	Danish Scurvygrass	O
Coronopus didymus	Lesser Swine-cress	O
Crepis capillaris	Smooth Hawk's-beard	O
Epilobium hirsutum	Great Willowherb	O
Eupatorium cannabinum	Hemp Agrimony	O
Fumaria officinalis	Common Fumitory	O
Galium mollugo	Hedge Bedstraw	O
Juncus influexus	Hard Rush	O
Malva moschata	Musk Mallow	O
Malva sylvestris	Common Mallow	O
Medicago lupulina	Black Medick	O
Menta spicata	Spear Mint	O
Pastinaca sativa	Wild Parsnip	O
Persicaria maculosa	Redshank	O

Species	Common Name	Abundance (DAFOR scale)
Plantago coronopus	Buck's-horn Plantain	O
Plantago lanceolata	Ribwort Plantain	O
Potentilla reptans	Creeping Cinquefoil	O
Ranunculus repens	Creeping Buttercup	O
Rumex obtusifolius	Broad-leafed Dock	O
Senecio jacobaea	Common Ragwort	O
Senecio erucifolius	Hoary Ragwort	O
Senecio viscosus	Sticky Groundsel	O
Sinapsis arvensis	Charlock	O
Tussilago farfara	Colt's-foot	O
Ulex europaeus	Common Gorse	O
Veronica hederifolia	Ivy-leaved Speedwell	O
Vicia tetrasperma	Smooth Tare	O
Aegopodium podagraria	Ground-elder	R
Anacamptis pyramidalis	Pyramidal Orchid	R
Bellis perennis	Daisy	R
Conium maculatum	Hemlock	R
Geranium dissectum	Cut-leaved Crane's-bill	R
Iris sp.	Iris sp.	R
Oxalis articulata	Pink-sorrel	R
Papaver rhoeas	Common Poppy	R
Prunella vulgaris	Selfheal	R
Ranunculus sardous	Hairy Buttercup	R
Rubus caesius	Dewberry	R
Rubus laciniatus	Cut-leaved Blackberry	R
Silene dioica	Red Campion	R
Taraxacum agg.	Dandelions	R
Veronica chamaedrys	Germander Speedwell	R
Vicia sativa	Common Vetch	R
Total number of species		**80**

11.6 Pevensey Bay, east of sluice TQ 6925 0592

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.71ha, 50% bare shingle. This survey site comprises a grassy sward at the base of the shingle slope, bordered to the north by the railiway line.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. The majority of the survey site lies within the Pevensey Levels SSSI.

Damage/disturbance: Despite some compaction and disturbance from coastal defence works and the railway line, the site is relatively undisturbed.

Habitat description: *A. elatius* grassland with *T. scorodonia* dominant. The site shows some similarities to a Dungeness A2 calcifuge grassland community (Ferry *et al*, 1990).

Notable species: *T. scorodonia*. The presence of this species is an indicator of the historical interest of the site prior to development. The species is recognised as an indicator of ancient shingle ridges, e.g. at Dungeness (Ferry *et al*, 1990). Although not recorded in this survey, the site is known to support a population of the increasingly scarce invertebrate *L. noctiluca* (Ryland, 1999, 2000 & 2001).

Shingle habitat score: 1.2

Community type:

a) Shingle community: No fit.
b) Broad shingle community: Poor Group 3.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 45. Vascular plant list and abundance for survey site 11.6.

Species	Common Name	Abundance (DAFOR scale)
Teucrium scorodonia	Wood Sage	D
Arrhenatherum elatius	False Oat-grass	A
Echium vulgare	Viper's-bugloss	F
Trifolium dubium	Lesser Trefoil	F
Anagallis arvensis	Scarlet Pimpernel	O
Cerastium arvense	Field Mouse-ear	O
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Daucus carota	Wild Carrot	O
Dipsacus fullonum	Wild Teasel	O
Petasites fragrans	Winter Heliotrope	O

Species	Common Name	Abundance (DAFOR scale)
Plantago lanceolata	Ribwort Plantain	O
Prunus spinosa	Blackthorn	O
Senecio jacobaea	Common Ragwort	O
Solanum dulcamara	Bittersweet	O
Arctium minus	Lesser Burdock	R
Arenaria serpyllifolia	Thyme-leaved Sandwort	R
Artemisia vulgaris	Mugwort	R
Bellis perennis	Daisy	R
Carduus crispus	Welted thistle	R
Carlina vulgaris	Carline thistle	R
Centaurium erythraea	Common Centaury	R
Cynosurus cristatus	Crested Dog's-tail	R
Dactylis glomerata	Cock's-foot	R
Dactylorhiza fuchsii	Common Spotted Orchid	R
Equisetum arvense	Field Horsetail	R
Festuca rubra	Red Fescue	R
Holcus lanatus	Yorkshire-fog	R
Silene dioica	Red Campion	R
Sison amomum	Stone Parsley	R
Solanum nigrum	Black Nightshade	R
Stellaria graminea	Lesser Stitchwort	R
Tragopogon pratensis	Goat's-beard	R
Trifolium pratense	Red Clover	R
Trifolium repens	White Clover	R
Ulex europaeus	Common Gorse	R
Total number of species		**36**

11.7 Pevensey Bay, shingle ridge east of EA depot TQ 6930 0588

Date of visit: 16 June 2003.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.49ha, 80% bare shingle. This survey site comprises the top of the shingle ridge and the landward slope that abuts site 11.6.

Management history: Timber groynes were constructed to retain the beach in the early 1900s and since 2001 there has been regular recharge and recycling under a PFI agreement. The depot serves as a storage area for coastal defence works machinery. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. The majority of the survey site lies within the Pevensey Levels SSSI. Old groyne timbers has been placed near the top of the ridge to prevent vehicles from damaging the vegetation.

Damage/disturbance: Some compaction and disturbance from coastal defence works.

Habitat description: Secondary pioneer community with abundant *R. crispus* and frequent *C. maritima*. However, the habitat does not fit any of the defined communities.

Notable species: *C. maritima*, *B. vulgaris* ssp. *maritima*, *G. flavum*, *A. tripolium* and *S. uniflora*.

Shingle habitat score: 1.8

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 46. Vascular plant list and abundance for survey site 11.7.

Species	Common Name	Abundance (DAFOR scale)
Lotus corniculatus	Common Bird's-foot-trefoil	A
Rumex crispus	Curled Dock	A
Trifolium repens	White Clover	A
Vicia hirsuta	Hairy Tare	A
Crambe maritima	Sea Kale	F
Dactylis glomerata	Cock's-foot	F
Euphrasia nemorosa	Common Eyebright	F
Holcus lanatus	Yorkshire-fog	F
Poa annua	Annual Meadow-grass	F
Beta vulgaris ssp. *maritima*	Sea Beet	O
Cirsium arvense	Creeping Thistle	O
Cirsium vulgare	Spear Thistle	O
Glaucium flavum	Yellow Horned-poppy	O

Species	Common Name	Abundance (DAFOR scale)
Potentilla reptans	Creeping Cinquefoil	O
Rubus fruticosus agg.	Brambles	O
Rumex acetosa	Common Sorrel	O
Sedum acre	Biting Stonecrop	O
Senecio erucifolius	Hoary Ragwort	O
Solanum dulcamara	Bittersweet	O
Sonchus sp.	Sowthistle sp.	O
Agrimonia eupatoria	Agrimony	R
Anagallis arvensis	Scarlet Pimpernel	R
Anthriscus sylvestris	Cow Parsley	R
Arrhenatherum elatius	False Oat-grass	R
Aster tripolium	Sea Aster	R
Dipsacus fullonum	Wild Teasel	R
Echium vulgare	Viper's-bugloss	R
Lathyrus pratensis	Meadow Vetchling	R
Leucanthemum vulgare	Oxeye Daisy	R
Lonicera periclymenum	Honeysuckle	R
Lysimachia punctata	Dotted Loosestrife	R
Pastinaca sativa	Wild Parsnip	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Plantago maritima	Sea Plantain	R
Prunella vulgaris	Selfheal	R
Pulicaria dysenterica	Common Fleabane	R
Rosa canina	Dog Rose	R
Sambucus nigra	Elder	R
Silene uniflora	Sea Campion	R
Total number of species		**39**

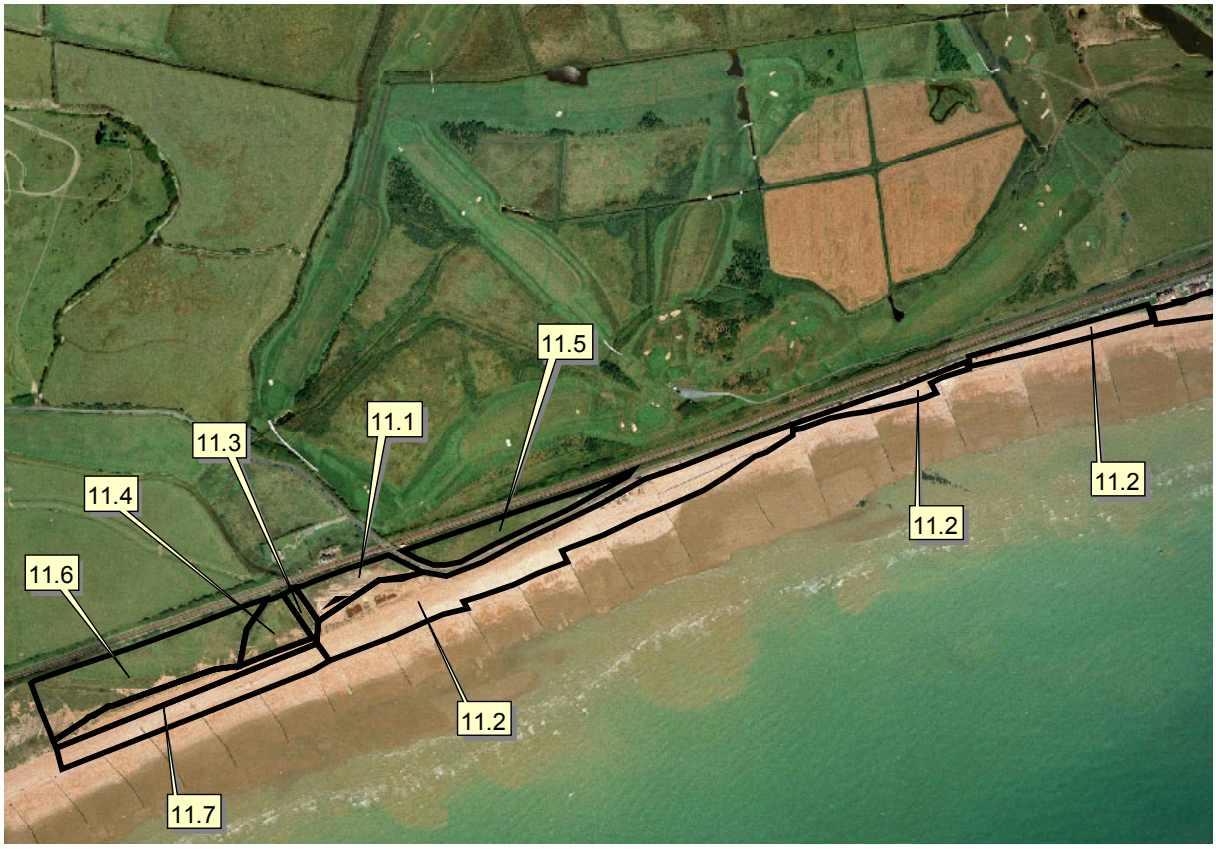

Fig. 14. Aerial Photograph of Pevensey Bay survey sites, 11.1 to 11.7. Scale 1:6500.

12.1 Cooden Beach, Herbrand Walk TQ 7080 0640

Date of visit: 18 May 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 1.55ha, 95% bare shingle. A narrow linear site running along the top of the shingle ridge to the houses behind. There is easy pedestrian access to the beach from the road.

Management history: Timber groynes were constructed to retain the beach in the early 1900s. The adjacent hinterland is designated as the Pevensey Levels Ramsar site and is of international importance for its freshwater habitats. The primary reason for maintaining the beach is to protect this freshwater site. Houses have been built on to the beach.

Damage/disturbance: There is a high degree of enrichment from the housing developments. Many residents tip garden waste directly onto the shingle and/or burn waste on the beach.

Habitat description: Remnant pioneer community with frequent *B. vulgaris* ssp. *maritima* being overtaken by human domestic activity.

Notable species: *B. vulgaris* ssp. *maritima*, *C. marinum*, *L. arborea*, *C. maritima*, *A. maritima*, *C. maritimum* and *G. flavum*.

Shingle habitat score: 0.2

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 47. Vascular plant list and abundance for survey site 12.1.

Species	**Common Name**	**Abundance (DAFOR scale)**
Lepidium draba	Hoary Cress	A
Plantago coronopus	Buck's-horn Plantain	F
Beta vulgaris ssp. *maritima*	Sea Beet	F
Sonchus sp.	Sowthistle sp.	F
Sonchus asper	Prickly Sowthistle	F
Sonchus oleraceus	Smooth Sowthistle	F
Galium aparine	Cleavers	O
Catapodium marinum	Sea Fern-grass	O
Lavatera arborea	Tree-mallow	O
Poa annua	Annual Meadow-grass	O
Medicago arabica	Spotted Medick	O
Picris echioides	Bristly Oxtongue	O
Senecio cineraria	Silver Ragwort	O
Crambe maritima	Sea Kale	O
Veronica hederifolia	Ivy-leaved Speedwell	O

Species	Common Name	Abundance (DAFOR scale)
Armeria maritima	Thrift	O
Lotus corniculatus	Common Bird's-foot-trefoil	R
Rubus fruticosus agg.	Brambles	R
Arctium minus	Lesser Burdock	R
Ranunculus bulbosus	Bulbous Buttercup	R
Hypochoeris radicata	Common Cat's-ear	R
Stellaria media	Common Chickweed	R
Potentilla reptans	Creeping Cinquefoil	R
Bellis perennis	Daisy	R
Leucanthemum vulgare	Oxeye Daisy	R
Taraxacum agg.	Dandelions	R
Rumex crispus	Curled Dock	R
Pulicaria dysenterica	Common Fleabane	R
Senecio vulgaris	Groundsel	R
Medicago lupulina	Black Medick	R
Cerastium arvense	Field Mouse-ear	R
Atropa belladonna	Deadly Nightshade	R
Plantago lanceolata	Ribwort Plantain	R
Lamium purpureum	Red Dead-nettle	R
Centranthus ruber	Red Valerian	R
Crithmum maritimum	Rock Samphire	R
Veronica arvensis	Wall Speedwell	R
Sedum acre	Biting Stonecrop	R
Cirsium arvense	Creeping Thistle	R
Salix caprea	Goat Willow	R
Glaucium flavum	Yellow Horned-poppy	R
Total number of species		**41**

12.2 Cooden Beach, Cooden Drive TQ 7110 0646

Date of visit: 18 May 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.24ha, 95% bare shingle. A small site running along the top of the shingle ridge to the houses behind. There is easy pedestrian access to the beach from the road.

Management history: Timber groynes were constructed to retain the beach in the early 1900s. Houses have been built on to the beach.

Damage/disturbance: There is a high degree of enrichment from the housing developments. Many residents tip garden waste directly onto the shingle and/or burn waste on the beach.

Habitat description: Remnant pioneer community being overtaken by human domestic activity.

Notable species: *B. vulgaris* ssp. *maritima* and *G. flavum*.

Shingle habitat score: 0.6

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 48. Vascular plant list and abundance for survey site 12.2.

Species	**Common Name**	**Abundance (DAFOR scale)**
Lepidium draba	Hoary Cress	F
Picris echioides	Bristly Oxtongue	F
Sonchus asper	Prickly Sowthistle	F
Epilobium hirsutum	Great Willowherb	F
Plantago coronopus	Buck's-horn Plantain	O
Beta vulgaris ssp. *maritima*	Sea Beet	O
Cirsium vulgare	Spear Thistle	O
Veronica polita	Grey Field-speedwell	O
Anthoxanthum odoratum	Sweet Vernal-grass	O
Cirsium arvense	Creeping Thistle	O
Glaucium flavum	Yellow Horned-poppy	O
Taraxacum agg.	Dandelions	R
Medicago arabica	Spotted Medick	R
Sedum acre	Biting Stonecrop	R
Total number of species		**14**

12.3 Cooden Beach, Beaulieu Road TQ 7155 0656

Date of visit: 18 May 2004.

Surveyors: TY, JS, WM, PD, JM.

Site Description: Area 0.41ha, 75% bare shingle. A small site comprising a narrow fringing beach below low lying chalk cliffs.

Management history: Timber groynes were constructed to retain the beach in the early 1900s. The site lies within the Cooden Cliffs SNCI.

Damage/disturbance: The site is popular with dog walkers and there is some evidence of rabbit grazing.

Habitat description: Remnant pioneer community with abundant *C. maritima* and *B. vulgaris* ssp. *maritima* frequent.

Notable species: *C. maritima*, *L. arborea* and *B. vulgaris* ssp. *maritima*.

Shingle habitat score: -0.4

Community type:

a) Shingle community: No fit.
b) Broad shingle community: No fit.
c) NVC: No fit.
d) Habitats Directive Annex I: No fit.

Table 49. Vascular plant list and abundance for survey site 12.3.

Species	Common Name	Abundance (DAFOR scale)
Lepidium draba	Hoary Cress	A
Crambe maritima	Sea Kale	A
Lavatera arborea	Tree-mallow	F
Plantago coronopus	Buck's-horn Plantain	F
Beta vulgaris ssp. *maritima*	Sea Beet	F
Sonchus asper	Prickly Sowthistle	F
Vicia sativa	Common Vetch	F
Lotus corniculatus	Common Bird's-foot-trefoil	O
Anisantha sterilis	Barren Brome	O
Galium aparine	Cleavers	O
Geranium dissectum	Cut-leaved Crane's-bill	O
Rumex crispus	Curled Dock	O
Picris echioides	Bristly Oxtongue	O
Plantago media	Hoary Plantain	O
Plantago lanceolata	Ribwort Plantain	O
Senecio jacobaea	Common Ragwort	O
Cirsium arvense	Creeping Thistle	O
Hordeum murinum	Wall Barley	O

Species	Common Name	Abundance (DAFOR scale)
Malus sp.	Apple sp.	R
Prunus spinosa	Blackthorn	R
Rubus fruticosus agg.	Brambles	R
Arctium minus	Lesser Burdock	R
Daucus carota	Wild Carrot	R
Hypochoeris radicata	Common Cat's-ear	R
Bellis perennis	Daisy	R
Taraxacum agg.	Dandelions	R
Pulicaria dysenterica	Common Fleabane	R
Crepis vesicaria	Beaked Hawk's-beard	R
Hedera helix	Ivy	R
Atriplex prostrata	Spear-leaved Orache	R
Sagina sp.	Pearlwort sp.	R
Centranthus ruber	Red Valerian	R
Sedum acre	Biting Stonecrop	R
Lobularia maritima	Sweet Alison	R
Vicia hirsuta	Hairy Tare	R
Vicia tetrasperma	Smooth Tare	R
Total number of species		**36**

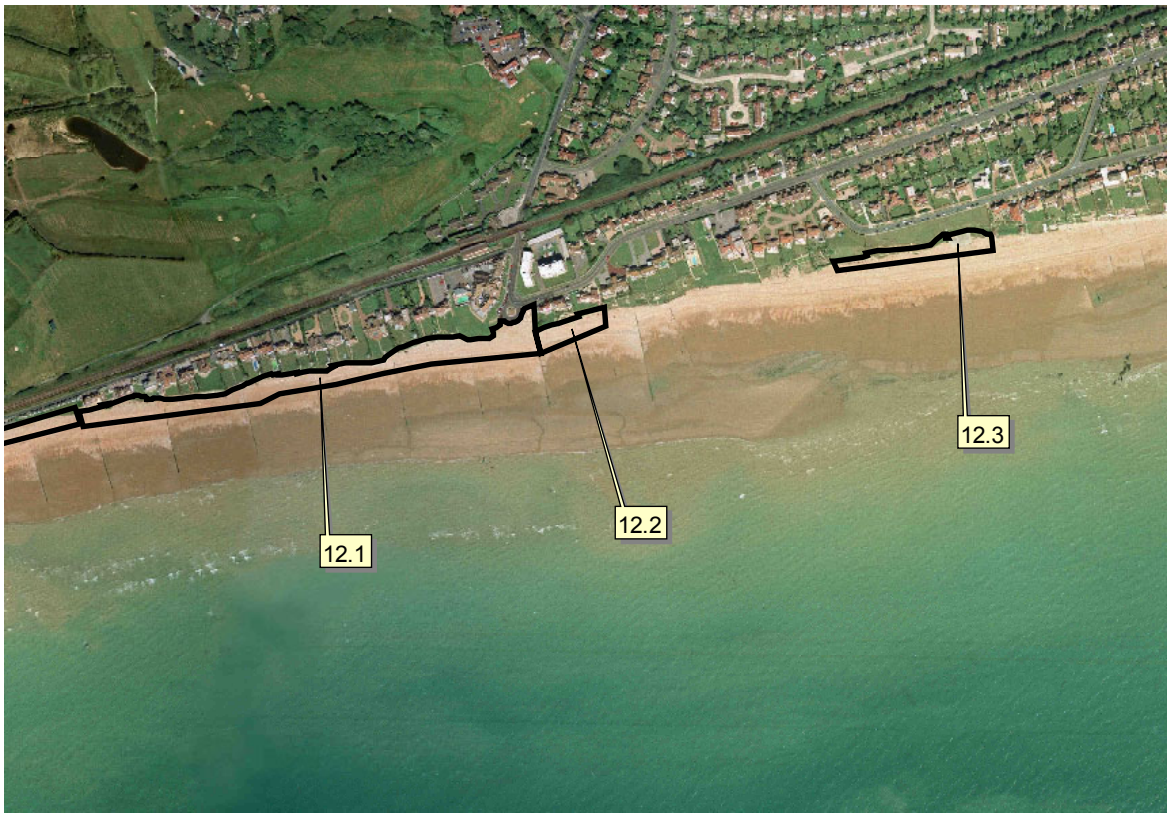

Fig. 15. Aerial Photograph of Cooden Beach survey sites, 12.1 to 12.3. Scale 1:6500.

Distribution of key species

Eleven species were chosen as being indicative of shingle sites, and their distribution within the survey area was mapped. The species were *C. maritima* (Fig. 16), *A. prostrata* (Fig. 17), *G. flavum* (Fig. 18), *G. angustifolia* (Fig. 19), *S. uniflora* (Fig. 20), *G. robertianum* (Fig. 21), *B. vulgaris* ssp. *maritima* (Fig. 22), *S. acre* (Fig. 23), *S. anglicum* (Fig. 24), *C. maritimum* (Fig. 25) and *T. scorodonia* (Fig. 26).

Relative value of sites

The species shown in Table 2 was used to calculate a score for each survey site. Individual shingle habitat scores have been included in the site summaries and are illustrated below in Fig. 27. Fig 28 shows the number of notable species recorded at each site.

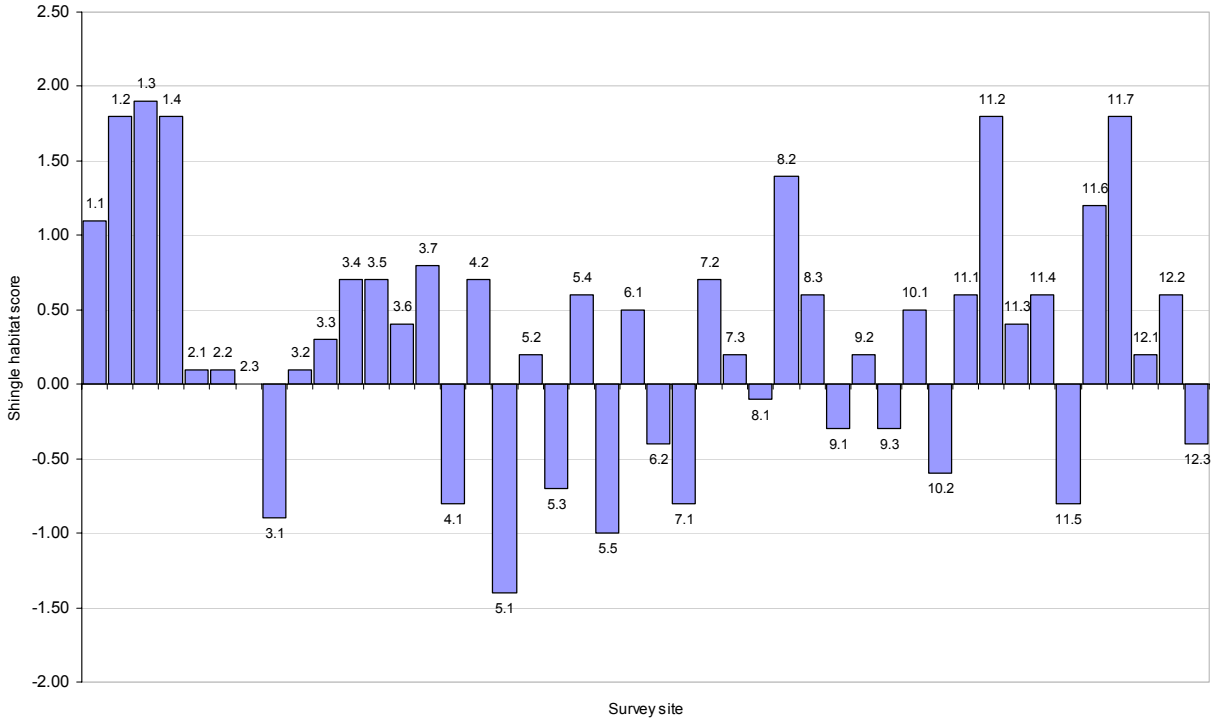

Fig. 27. Bar chart to illustrate variation in the relative shingle habitat scores.

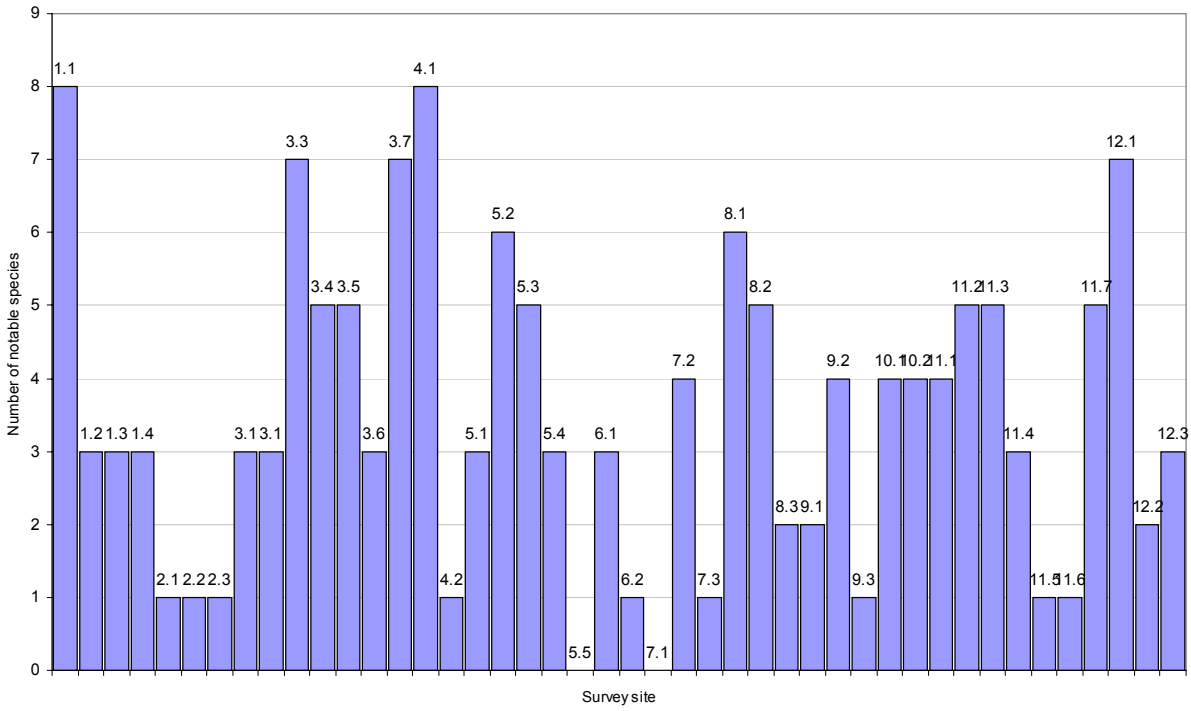

Fig. 28. Bar chart to show the number of notable species recorded at each survey site.

Discussion

One of the principle aims of the BAR Project is to ascertain those beaches at greatest risk of erosion, and the implications for nature conservation. However, in terms of biodiversity, risk cannot be ascertained until the level of interest is understood. For example, one beach may be at significant risk of erosion, but if it is a beach where there is low wildlife interest, the risk to biodiversity will be minimal. In contrast, another beach could be at a relatively lower level of risk of erosion, but if there is significant wildlife interest there, the risk to biodiversity could be higher. There is also a need to ascertain whether habitats are under any additional pressures which could compound the impacts of climate change. For example, if the beach is confined by a hard structure such as a sea wall, the risk would increase as there would be no potential for the beach, and therefore the wildlife interest, to respond to rising sea levels by migrating landwards. The subsequent loss of wildlife habitat is known as “coastal squeeze”, a phenomenon that is identified as one of the major threats to coastal habitats. Shingle features are rarely stable in the long term and ridges lying parallel to the shoreline tend to be rolled over landwards by wave action in storm events. Such movement is likely to be accelerated by rising sea levels and increased storminess (UK Biodiversity Group, 1999a). “Shingle squeeze” is a particular form of coastal squeeze affecting coastal vegetated shingle and is a combination of direct habitat loss from e.g. development or aggregate extraction combined with sea level rise (Doody, 2001 & 2003). In areas where sediment availability is reduced, such as the BAR region, the squeeze includes a steepening beach profile and a foreshortening of the seaward zones (Living with the Sea, 2003).

Baseline information of the wildlife interest of shingle accumulations is sporadic within the BAR Region and tends to be concentrated on sites that already receive some protection through designation, either statutory (SSSI, SAC or Special Protection Area (SPA)) or non-statutory (SNCI), or those that are subject to specific applications. For example, Dungeness, which is designated as a SSSI, a candidate SAC for both its annual and perennial shingle vegetation, and an SPA, was subject to a comprehensive survey of its vegetation to allow for the effective development of conservation and development policies (Ferry *et al*, 1990). Various sites within Pevensey Bay were surveyed in 1999, and then again in 2000 and 2001 as part of a biological monitoring exercise associated with a long term sea defence scheme (Ryland, 1999, 2000 & 2001). A survey of vegetated shingle in East and West Sussex (Ryland, 1993; Williams and Cooke, 1993), principally to inform the National Rivers Authority (now the Environment Agency) on areas to avoid when carrying out emergency sea defence works following winter storms, concentrated on surveying non-statutory and non-designated shingle sites. However, only those sites which showed some “significant interest”, the baseline for which was the presence of a recognisable pioneer community, were covered.

The majority of the East Sussex coastline that supports vegetated shingle is designated at either local, national or sometimes international level. However, one of the problems with limiting surveys to those areas which already receive some protection, or which contain certain pre-defined communities, is that it does not recognise the potential of other areas. The current study surveyed the majority of shingle sites in East Sussex (excluding Rye Bay which was subject to a separate survey) that supported any vegetation, and was not limited to those which contained certain species. It has therefore provided a baseline from which to monitor future change and has highlighted the areas that currently receive no formal protection but that could benefit from sympathetic management. For example, Cooden Beach (particularly site 12.1), is not designated and therefore receives no protection other than that granted through the general targets within the relevant national and local BAPs (UK Biodiversity Group, 1999a; Sussex Biodiversity Partnership, 1999), and was not covered by any of the previous surveys (Sneddon & Randall, 1993; Ryland, 1993; Williams & Cooke, 1993). However, the current survey demonstrated the presence of a remnant pioneer community with frequent *B. vulgaris* ssp. *maritima* and the presence of several other coastal

species including *C. maritima*, *A. maritima*, *R. crispus*, *C. maritimum* and *G. flavum*. The current survey also demonstrated that the community is being overtaken by human activity leading to the establishment of species adapted to rich soils indicating enrichment of the substrate (e.g. *Leucanthemum vulgare* (Oxeye Daisy)), and garden escapes (e.g. *Centranthus ruber* (Red Valerian)). Much of this sort of damage is brought about through public pressure and is largely a result of a lack of appreciation for the habitat. Such areas could potentially be restored through sympathetic management and an increased public awareness of the importance of the habitat.

One of the advantages of the current study was that it utilised volunteers. All of the volunteers involved were from the local community and many live in houses built on or close to the beach. Although they had some appreciation for their local environment, they were largely unaware of its environmental significance. Their involvement in the project provided a unique opportunity to educate them in the importance of coastal habitats generally and vegetated shingle in particular and also threats to the habitat. The regular presence of surveyors on the beach generated further interest in the project and proved to be a valuable way of raising awareness about the project.

Shingle communities

Many of the areas surveyed throught the current study did not fit any pre-defined community (Sneddon & Randall, 1993; Williams & Cooke, 1993; Rodwell, 2000; European Commission, 2003). Indeed, of the 44 sites surveyed, none could be confidently matched to any of Sneddon and Randall's shingle NVC communities, although 15 showed some similarities. Nine surveyed sites were matched to Rodwell's NVC communities (mostly SD1), with a further 11 showing some similarities to a range of NVC community types. This higher degree of confidence could be attributed to the fact that SD1 is a fairly broad community type with a relatively large number of associates as well as the constants of *R. crispus* and *G. flavum*. In contrast, only seven sites could be assigned to Williams and Cooke's community types, four of these being poor matches.

In the majority of cases, those sites that showed no match to, or only some similarities with, pre-defined communities showed signs of compaction, disturbance and or enrichment, mostly as a result of management practices. Ferry (2001) reports that in addition to the essentially natural, more-or-less undisturbed shingle communities, there is a whole spectrum of communities associated with varying degrees of disturbance, some of which are detailed in Ferry *et al* (1990), but some of which remain to be properly described. However, highly constant species of the whole range of these disturbed shingle communties are *Plantago lanceolata* (Ribwort Plantain), *Senecio jacobaea* (Ragwort), *Festuca rubra* (Red Fescue) and *Poa compressa* (Flattened Meadow-grass) (Ferry, 2001). Whilst *P. compressa* was not recorded on any site during the current study, *P. lanceolata* was recorded from 30 out of the 44 sites surveyed, *S. jacobaea* from 23 and *F. rubra* from 10. Furthermore, it has been noted that large populations of *G. flavum* and *Echium vulgare* (Viper's-bugloss) are confined to disturbed shingle at Dungeness (Doody, 2001). In the current study, these species were recorded from 25 and 20 sites respectively, indicating the high level of disturbance to shingle beaches along the East Sussex coast.

The community definitions described above were derived from surveys of the best examples of vegetated shingle around the UK. Sneddon and Randall (1993) used the presence of permanent flora above the strandline as a prerequisite for the selection of sites, and subsequently surveyed around 60 sites around the UK, derived from habitat maps, information from regional Nature Conservancy Council staff (responsible for SSSIs) and published sources (excluding Dungeness as this was subject to a separate survey (Ferry *et al*, 1990)). By definition, the survey would therefore have excluded ephemeral strandline

communities which are known to be of significant ecological interest, being listed on Annex I of the Habitats Directive (European Community, 1992) as H1210 *Annual vegetation of driftlines*. Rodwell's surveys (2000) were not confined to renowned or especially rich or diverse sites as the aim was to achieve a representative cover of sites. However, Rodwell states that "…coverage of the vegetation of shingle features around the British coast was less adequate…" than the coverage of other coastal habitats and excluded those sites covered by Sneddon and Randall (1993) and Ferry *et al* (1990), concluding that it was probable at least one further community could be added to the account from those surveys (Rodwell, 2000).

In contrast, although the current study included sites designated for their vegetated shingle (Fig. 29), it also included coverage of other areas not considered worthy of designation. Many of these sites e.g. Seaford Bay (sites 2.1, 2.2 and 2.3) have been extensively influenced by activities including development, coastal defence works and public pressure. It is therefore difficult to draw comparisons between these degraded sites and those used to define standard shingle communities.

Another problem with comparing the results collected in the current study with previously defined community types is that previous studies surveyed sites from a wide geographic area with differing conditions. For example, Rodwell (2000) states that the strandline community SD2 is most prominent along the warmer southern coasts of the UK, being replaced by SD3 in northern Britain. Sneddon and Randall (1993) also note the problems associated with the inherent variability in communities across a wide spatial area, and several of the communities defined through their study were noted as having a southern distribution, e.g. SH122 *Prunus spinosa – Eurynchium praelongum* community, SH23 *Tripleurospermum maritimum – Silene maritima – Euphorbia paralias* community, SH19 *Senecio viscosus – Rumex crispus* community, and SH6a *Silene maritima* dominated pioneer community, *Glaucium flavum* sub-community, with several communities being specific to particular sites.

Previous surveys have defined shingle communities by sampling quadrats and then using TWINSPAN analysis, a system that uses reciprocal averaging to define axes of dissimilarity within data sets (Causton, 1988), to identify typical community types (Ferry *et al*, 1990; Williams & Cooke, 1993; Sneddon & Randall, 1993; Rodwell, 2000). There are two major flaws with such an approach. The first is that it is time consuming and requires a great deal of expertise. The second is that shingle communities are not uniform and can be looked at at different scales of detail. Vegetation often occurs in patches, due to natural or manmade influences, and the process of chosing patches to survey is therefore subjective. Sneddon & Randall (1993) firstly surveyed sites by eye to identify homogenous stands of vegetation that could be used as mappable units. However, as one of the objectives of the current study was to undertake a baseline ecological survey of the main areas of vegetated shingle in East Sussex, sites were generally defined by easily recognisable landmarks rather than boundaries between community types, the only prerequisite for survey being the presence of vegetation.

Relative value of sites

Previous studies have attempted to rank sites according to quality. For example, Williams and Cooke (1993) used four criteria to assess the relative value of non-SSSI sites within their survey area. The criteria were 1) the number of species recorded, 2) the area of vegetated shingle, 3) the number of community types present, and 4) rare plant records. It was decided that such a system of evaluation was unsuitable for the current study for several reasons. Williams and Cooke (1993) allocated a higher relative score to those areas with high numbers of species recorded. However, in the majority of the sites surveyed in the current

study, a large number of species was generally a negative factor indicating enrichment (e.g. sites 4.1 and 5.1). The second criteria was also unsuitable for the current study as the areas surveyed varied considerably from 0.08 ha to 6.15 ha. This variation in size was not necessarily a reflection of the area of vegetation, but rather was a reflection of an easily definable and mappable area. Whilst it was clear that some of the sites surveyed in the current study included more than one community type, and could have been subdivided, e.g. sites 2.2 and 3.7, for the purpose of establishing a baseline of shingle vegetation and to make things as simple as possible from the purpose of explaining the process to volunteers without any expertise in recognising communities, each survey site was treated as one community. Finally, the list of rare plants used by Williams and Cooke (1993) was extremely narrow and excluded several rare species including *Chenpodium vulvaria* (Stinking Goosefoot (VU)), *Frankenia laevis* (Sea Heath (NS)) and *Galeopsis angustifolia* (Red Hemp-nettle (NS)). For the present study, three techniques were used to assess the relative value of sites; presence of notable species, shingle habitat score and distribution of key species.

Table 4 details the notable species chosen for the present study, comprising those meeting IUCN or national criteria for rarity and those being predominantly confined to coastal habitats, particularly shingle beaches. Of the 44 sites surveyed, only two had no notable species recorded (Fig. 28). The first of these sites (site 5.5, Eastbourne seafront, pier to the Redoubt) was a long, narrow, linear site, close to Eastbourne town centre, and was described as being heavily disturbed and significantly enriched, with vegetation being confined to clumps against the sea wall. Despite this, *R. crispus* was recorded as Frequent. Preston *et al* (2002) describe the species as characteristic of shingle beaches, sandy and rocky shores, banks by the sea, sand dunes and the upper parts of saltmarshes, being most frequent in strandline communities on shingle. The other site with no notable species was site 7.1, an access track between the Bay View caravan park and some beach houses in Pevensey, was also described as compacted and enriched. Again, however, *R. crispus* was recorded as Freqent, and the site included other species characteristic of shingle beaches and/or other coastal habitats, specifically *E. vulgare*, *P. lanceolata* and *Sedum acre* (Biting Stonecrop). The widespread distribution of notable species across the survey sites, including those deemed to be of no interest in previous surveys, offers an indication of the persistence of shingle species along the coast in spite of heavy disturbance and suggests the potential for habitat restoration given sympathetic management.

Many areas supported species characteristic of coastal shingle but with associates that were not found in previous surveys. For example, site 7.3 (Pevensey) supported *E. vulgare* (Viper's-bugloss), *Arrhenatherum elatius* (False Oat-grass), *B. vulgaris* ssp. *maritima* and *Pilosella officinarum* (Mouse-ear-hawkweed), all of which illustrate the shingle communities that were present on the Crumbles prior to development. However, major development landward of the site and associated coastal defence works have led to extensive damage and disturbance through removal of the surface layer of shingle (and the subsequent loss of a considerable quantity of the local seed source), addition of fine material within the shingle matrix, compaction of the shingle, and enrichment through close proximity to houses. *Cytisus scoparius* (Broom) was also recorded on this site. Although widespread, there is a subspecies *maritimum* that is native to coastal areas, particularly maritime cliffs and sometimes shingle (Stace, 1999; Preston *et al*, 2002). However, in this case, it was not clear whether this was the subspecies and it may have been planted. *C. scoparius* is seen as a major contributor to humus production and subsequently to the development of shingle heath (Ferry, 2001). In an experiment in restoration, locally sourced *C. scoparius* seeds have been sown on areas of bare shingle at Dungeness damaged during World War II, with an aim to drive further Broom colonisation, hopefully resulting in the establishment of other successional vegetation (Doody, 2003; B. Banks, pers. comm.).

The second technique used to assess relative value was to calculate a shingle habitat score for each site using the presence of a series of positive and negative indicator species (Table 2). Calculated scores ranged from a maximum of 1.9 (site 1.3, Tide Mills) to a minimum of -1.4 (site 5.1, Eastbourne seafront), as illustrated in Fig. 27, with an average score of 0.3. Site 5.1 was a very small site (0.1 ha) adjacent to the sea wall. But with a high number of species recorded indicating enrichment due to the proximity to local houses, cafés and access points. Also, as the beach was relatively narrow with the sea sometimes washing right up to the sea wall, all the vegetation was concentrated in clumps against the wall. The low shingle habitat score was due to only two positive indicator species being present (*C. maritima* and *L. vulgairs*) and two negative indicators (*C.ruber* recorded as Abundant, and *C. tomentosum*). Both these negative indicators are garden escapes, known to out-compete native shingle flora. As such, they are being actively controlled in some areas (B. Yates, pers. comm.). Site 1.3 was a much larger site (6.15 ha) receiving a level of protection through its designation as a SNCI. The site included seven positive indicator species, with *C. maritima* being Dominant.

In total, 13 of the 44 sites surveyed achieved a negative shingle habitat score (Fig. 27), one of which is discussed above. Of the remaining 12, eight were less than 1 ha in size and nine have recently been subject to major coastal defence works. With the exception of one site (site 8.1; see discussion below), all were described as being heavily compacted, trampled and/or enriched. The negative habitat score achieved by site 8.1 (Pevensey Sailing Club west) was slightly surprising given that it included five positive indicator species (*T. scorodonia* was recorded as Dominant) and it was described as being relatively undisturbed and indeed comprises one of the last undeveloped remnants of the Crumbles. However, it is noted that the survey area included an access track to the Sailing Club along which were some more ruderal species. The negative score can therefore be attributed to the presence of two negative indicator species; *C. ruber* and *C. tomentosum*.

Mapping the distribution of key species gives an indication of where the most important areas for vegetated shingle are and therefore those that would benefit from sympathetic management as they indicate that conditions are suitable for those species to survive. Shingle species demonstrate a range of adaptations to the nutrient poor environmental conditions found on coastal shingle and are quickly crowded out by non-specialists where conditions move away from this narrow range.

Williams & Cooke (1993), in their survey of vegetated shingle sites of East and West Sussex, used the presence of a recognisable pioneer community, generally characterised by *C. maritima* and *G. flavum*, as the baseline for significant interest. Results from the current study show that both species had a wide distribution along the East Sussex coast, being recorded from approximately half of the sites surveyed (Figs 16 and 18). In considering the geographic distribution, *C. maritima* was found in all areas with the exception of Seaford Bay (sites 2.1 to 2.3) and Eastbourne sailing club (sites 6.1 and 6.2). Similarly, the only geographic area from which *G. flavum* was completely absent was Seaford Bay. Seaford Bay has been extensively disrupted as a result of coastal defence activities. The beach was artificially recharged in the 1980s and is now regularly recycled and reprofiled by the Environment Agency. Such a high level of disturbance makes it difficult for any species to establish, as demonstrated by the small number of species recorded from site 2.1, the only Seaford Bay site wholly within the recharge and recycled area, and the absence of any species above 25% cover (Table 7). Indeed, two of the species recorded as Occasional, the highest level of abundance within this site, *Picris hieracioides* (Hawkweed Oxtongue) and *Tripleurospermum inodroum* (Scentless Mayweed), are described as occurring on rough and disturbed or waste places (Stace, 1999), indicating the high level of disturbance and probably also the high sand content resulting from the coastal defence works.

The Nationally Scarce UK BAP species *Galeopsis angustifolia* Red Hemp-nettle was recorded from only one site (10.1 Normans' Bay), although it was also observed by the author within site 11.2 (Pevensey Bay) in 2004. *G. angustifolia* is a species of arable land, found mostly on calcareous soils, although it also occurs on coastal sands and shingle in the southern counties of England and Wales (UK Biodiversity Group, 1998). Indeed, the most recent records from East and West Sussex are from coastal sites (Briggs, 2001). Outside the UK it is found in western, central and southern Europe, eastwards to Poland and Bulgaria, The species has been steadily declining in England and north west Europe; it was recorded from 428 10 km squares in Great Britain prior to 1970, but only in 91 between 1987 to 1999 (Preston *et al*, 2002) and is now regarded as rare in north west Europe (UK Biodiversity Group, 1998). *G. angustifolia* is a late-flowering plant, and its decline is largely attributed to a change from spring to winter sown crops having a negative impact on its arable population (Preston *et al*, 2003). Within the survey area, in addition to the record collected during this survey and the additional observation reported above, the species is known to be locally common within Rye Harbour Nature Reserve (Briggs, 2001), and locally frequent at several locations within Pevensey Bay (Ryland, 1999, 2000 & 2001). It is interesting to note that the 2004 observation was recorded from an area that was cleared for coastal defence works, and re-seeded using local seed by the author after completion of the works, indicating that the species is amenable to restoration. Given the rapid rate of decline within the plant's arable range, every care should be taken to protect the species in its coastal habitat.

One additional species that is of particular note is *Chenpodium vulvaria*, recorded as Rare from site 11.1 (Pevensey Bay). Preston *et al* (2003) describe the species as being a foetid, often prostrate annual of disturbed, nutrient rich soil on sandy shingle beaches, sand dunes and coastal cliffs, where the soil is enriched by the droppings of sea birds, and formerly a ruderal species of places enriched with animal dung. Its distribution declined dramatically before 1930, possibly as a result of a change from the use of horses to tractors in agricultural practices and a decline in the use of dung as a fertiliser. By 1930, its distribution was virtually confined to coastal habitats and even in these locations it has continued to decline for reasons which are unclear (Preston *et al*, 2003). In the period between 1987 and 1999, it was only recorded in 16 10 km squares in the UK, and it was not recorded within the UK BAR Region during this period at all. Indeed, the current record is the first since pre 1970 records. The area from which it was recorded in the present study was within an area used for storage by the Environment Agency and adjacent to a railway line. The site has therefore been severely compacted and subject to high levels of enrichment.

The above described techniques of assessing the relative value of the vegetated shingle surveyed are not definitive, but do provide a good indication of those sites of interest. From further analysis of the results and a combination of these techniques, it should be possible to rank the areas survyed in terms of biodiversity value, and therefore to ascertain those which would merit protection.

Outlook for Phase 2 of BAR

The current study demonstrated that the relatively simple method of recording vascular plants and their abundance can provide a useful tool for assessing the distribution and relative quality of vegetated shingle. It is hoped that combining survey results such as those compiled during this study with hazard maps of erosion risk derived from geomorphological studies, will provide a valuable tool in determining sustainable coastal management practices. The technique will be expanded to the remaining areas of the BAR Region to obtain a comprehensive baseline of ecological information for the vegetated shingle of the English and French eastern Channel coasts. The technique for assessing the relative value of sites will be further developed and its robustness will be tested by trialling it in England and France.

The survey has generated a great deal of interest in coastal biodiversity and in the BAR Project generally. It has also demonstrated that volunteers, whilst often amateur botanists, can provide meaningful data that will be valuable to coastal managers. It is hoped that the volunteer base will be expanded in Phase 2 of the Project, with training in basic plant identification and recording techniques being provided. Such training programmes will help to raise awareness of the habitat and further promote its protection.

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Appendix 1

Complete list of species recorded

Species	Common Name
Achillea millefolium	Yarrow
Aegopodium podagraria	Ground-elder
Agrimonia eupatoria	Agrimony
Agrostis capillaries	Common Bent
Agrostis sp.	Bent sp.
Alliaria petiolata	Garlic Mustard
Alopecurus pratensis	Meadow Foxtail
Anacamptis pyramidalis	Pyramidal Orchid
Anagallis arvensis	Scarlet Pimpernel
Anisantha sterilis	Barren Brome
Anthemis cotula	Stinking Chamomile
Anthoxanthum odoratum	Sweet Vernal-grass
Anthriscus sylvestris	Cow Parsley
Anthyllis vulneraria	Kidney Vetch
Arctium lappa	Greater Burdock
Arctium minus	Lesser Burdock
Arenaria serpyllifolia	Thyme-leaved Sandwort
Armeria maritima	Thrift
Arrhenatherum elatius	False Oat-grass
Artemisia vulgaris	Mugwort
Asplenium trichomanes	Maidenhair Spleenwort
Aster sp.	Michaelmas-daisy sp.
Aster tripolium	Sea Aster
Atriplex littoralis	Grass-leaved Orache
Atriplex portulacoides	Sea Purslane
Atriplex prostrata	Spear-leaved Orache
Atropa belladonna	Deadly Nightshade
Ballota nigra	Black Horehound
Bellis perennis	Daisy
Beta vulgaris ssp. *maritima*	Sea Beet
Blackstonia perfoliata	Yellow-wort
Brachypodium sylvaticum	False Brome
Bromopsis ramosa	Hairy-brome
Bromus hordeaceus	Soft-brome

Bryonia dioica	White Bryony
Buddleja davidii	Butterfly-bush
Cakile maritima	Sea Rocket
Calystegia sepium	Hedge Bindweed
Calystegia silvatica	Large Bindweed
Capsella bursa-pastoris	Shepherd's-purse
Cardamine hirsute	Hairy Bitter-cress
Cardamine sp.	Bitter-cress sp.
Carduus crispus	Welted Thistle
Carduus tenuiflorus	Slender Thistle
Carex obtrubae	False Fox-sedge
Carex pendula	Pendulous Sedge
Carlina vulgaris	Carline Thistle
Catapodium marinum	Sea Fern-grass
Centaurea nigra	Common Knapweed
Centaurea scabiosa	Greater Knapweed
Centaurium erythraea	Common Centaury
Centranthus ruber	Red Valerian
Cerastium arvense	Field Mouse-ear
Cerastium fontanum	Common Mouse-ear
Cerastium glomeratum	Sticky Mouse-ear
Cerastium semidecandrum	Little Mouse-ear
Cerastium sp.	Mouse-ear sp.
Cerastium tomentosum	Snow-in-summer
Chamerion angustifolium	Rosebay Willowherb
Chenpodium vulvaria	Stinking Goosefoot
Cirsium arvense	Creeping Thistle
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Clematis sp.	Clematis sp.
Clematis vitalba	Traveller's-joy
Cochlearia danica	Danish Scurvygrass
Conium maculatum	Hemlock
Convolvulus arvensis	Field Bindweed
Coronopus didymus	Lesser Swine-cress
Cotoneaster sp.	Cotoneaster sp.
Crambe maritima	Sea Kale
Crataegus monogyna	Hawthorn
Crepis capillaris	Smooth Hawk's-beard

Crepis vesicaria	Beaked Hawk's-beard
Crithmum maritimum	Rock Samphire
Cymbalaria muralis	Ivy-leaved Toadflax
Cynoglossum officinale	Hound's Tongue
Cynosurus cristatus	Crested Dog's-tail
Cynosurus echinatus	Rough Dog's-tail
Cytisus scoparius	Broom
Dactylis glomerata	Cock's-foot
Dactylorhiza fuchsii	Common Spotted Orchid
Daucus carota	Wild Carrot
Deschampsia cespitosa	Tufted Hair-grass
Diplotaxis muralis	Annual Wall-rocket
Dipsacus fullonum	Wild Teasel
Echium vulgare	Viper's-bugloss
Elytrigia atherica	Sea Couch
Epilobium hirsutum	Great Willowherb
Epilobium sp.	Willowherb sp.
Equisetum arvense	Field Horsetail
Erophila verna	Common Whitlowgrass
Erysimum sp.	Wallflower sp.
Eupatorium cannabinum	Hemp Agrimony
Euphorbia lathyris	Caper Spurge
Euphorbia peplus	Petty Spurge
Euphorbia sp.	Spurge sp.
Euphrasia nemorosa	Common Eyebright
Festuca rubra	Red Fescue
Foeniculum vulgare	Fennel
Forsythia x. intermedia	Forsythia
Frankenia laevis	Sea Heath
Fraxinus excelsior	Ash
Fumaria officinalis	Common Fumitory
Fuschia sp.	Fuschia sp.
Galanthus nivalis	Snowdrop
Galeopsis angustifolia	Red Hemp-nettle
Galium aparine	Cleavers
Galium mollugo	Hedge Bedstraw
Galium saxitile	Heath Bedstraw
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill

Geranium molle	Dove's-foot Crane's-bill
Geranium robertianum	Herb-Robert
Glaucium flavum	Yellow Horned-poppy
Glaux maritima	Sea Milkwort
Glechoma hederacea	Ground Ivy
Hedera helix	Ivy
Heracleum sphondylium	Hogweed
Hieracium sp.	Hawkweed sp.
Hippophae rhamnoides	Sea-buckthorn
Hirschfeldia incanca	Hoary Mustard
Holcus lanatus	Yorkshire-fog
Hordeum murinum	Wall Barley
Hordeaum sp.	Barley sp.
Hyacinthoides hispanica	Spanish Bluebell
Hypericum perforatum	Perforate St John's-wort
Hypericum pulchrum	Slender St. John's wort
Hypochoeris radicata	Common Cat's-ear
Ilex aquifolium	Holly
Inula conyzae	Ploughman's-spikenard
Iris foetidissima	Stinking Iris
Iris sp.	Iris sp. (garden escape)
Juncus bufonius	Toad Rush
Juncus gerardii	Saltmarsh Rush
Juncus influexus	Hard Rush
Lamium album	White Dead-nettle
Lamium purpureum	Red Dead-nettle
Lathyrus pratensis	Meadow Vetchling
Lavatera arborea	Tree-mallow
Leontodon saxatilis	Lesser Hawkbit
Lepidium draba	Hoary Cress
Leucanthemum vulgare	Oxeye Daisy
Ligustrum sp.	Privet sp.
Limonium binervosum agg.	Rock Sea-lavender
Limonium vulgare	Common Sea-lavender
Linaria purpurea	Purple Toadflax
Linaria vulgaris	Common Toadflax
Linum catharticum	Fairy Flax
Lobularia maritima	Sweet Alison
Lolium perenne	Perennial Rye-grass

Lonicera periclymenum	Honeysuckle
Lotus corniculatus	Common Bird's-foot-trefoil
Lotus pedunculatus	Greater Bird's-foot-trefoil
Lunaria annua	Honesty
Lycium barbarum	Duke of Argyll's Teaplant
Lysimachia punctata	Dotted Loosestrife
Malus sp.	Apple sp.
Malva moschata	Musk Mallow
Malva sylvestris	Common Mallow
Matricaria recutita	Scented Mayweed
Medicago arabica	Spotted Medick
Medicago lupulina	Black Medick
Melissa officinalis	Balm
Mentha spicata	Spear Mint
Mercurialis annua	Annual Mercury
Myosotis arvensis	Field Forget-me-not
Myosotis ramosissima	Early Forget-me-not
Odontites vernus	Red Bartsia
Oenanthe crocata	Hemlock Water-dropwort
Ononis repens	Common Restharrow
Oxalis articulata	Pink-sorrel
Papaver dubium	Long-headed Poppy
Papaver rhoeas	Common Poppy
Papaver somniferum	Opium Poppy
Pastinaca sativa	Wild Parsnip
Pentaglottis sempervirens	Green Alkanet
Persicaria maculosa	Redshank
Petasites fragrans	Winter Heliotrope
Phleum pratense	Timothy
Picris echioides	Bristly Oxtongue
Picris hieraciodies	Hawkweed Oxtongue
Pilosella officinarum	Mouse-ear-hawkweed
Pinus sylvestris	Scots Pine
Plantago coronopus	Buck's-horn Plantain
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Plantago maritima	Sea Plantain
Plantago media	Hoary Plantain
Poa annua	Annual Meadow-grass

Polygonum aviculare	Knotgrass
Polygonum maritimum	Sea Knotgrass
Populus alba	White Poplar
Potentilla anserina	Silverweed
Potentilla reptans	Creeping Cinquefoil
Primula vulgaris	Primrose
Prunella vulgaris	Selfheal
Prunus domestica	Wild Plum
Prunus spinosa	Blackthorn
Pulicaria dysenterica	Common Fleabane
Quercus ilex	Evergreen Oak
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus ficaria	Lesser Celandine
Ranunculus repens	Creeping Buttercup
Ranunculus sardous	Hairy Buttercup
Raphanus raphanistrum	Wild Radish
Raphanus raphanistrum ssp. *raphanistrum*	Sea Radish
Raphanus sp.	Radish sp.
Reseda luteola	Weld
Rhinanthus minor	Yellow Rattle
Ribes sp.	Currant sp.
Rosa canina	Dog Rose
Rosa sp.	Rose sp.
Rubus caesius	Dewberry
Rubus fruticosus agg.	Brambles
Rubus laciniatus	Cut-leaved Blackberry
Rumex acetosa	Common Sorrel
Rumex acetosella	Sheep's Sorrel
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leafed Dock
Sagina sp.	Pearlwort sp.
Salicornia agg.	Glassworts
Salicornia ramosissima	Purple Glasswort
Salix caprea	Goat Willow
Salvia verbenaca	Wild Clary
Sambucus nigra	Elder
Scilla verna	Spring Squill
Scrophularia nodosa	Common Figwort
Sedum acre	Biting Stonecrop

Sedum album	White Stonecrop
Sedum anglicum	English Stonecrop
Senecio cineraria	Silver Ragwort
Senecio erucifolius	Hoary Ragwort
Senecio jacobaea	Common Ragwort
Senecio viscosus	Sticky Groundsel
Senecio vulgaris	Groundsel
Seriphidium maritimum	Sea Wormwood
Silene latifolia	White Campion
Silene dioica	Red Campion
Silene uniflora	Sea Campion
Sinapsis arvensis	Charlock
Sison amomum	Stone Parsley
Sisymbrium officinale	Hedge Mustard
Smyrnium olusatrum	Alexanders
Solanum dulcamara	Bittersweet
Solanum nigrum	Black Nightshade
Sonchus arvensis	Perennial Sowthistle
Sonchus asper	Prickly Sowthistle
Sonchus oleraceus	Smooth Sowthistle
Sonchus sp.	Sowthistle sp.
Spergularia marina	Lesser Sea-spurrey
Stachys sylvatica	Hedge woundwort
Stellaria graminea	Lesser Stitchwort
Stellaria media	Common Chickweed
Suaeda maritima	Annual Sea-blite
Symphoricarpos albus	Snowberry
Taraxacum agg.	Dandelions
Teucrium scorodonia	Wood Sage
Torilis japonica	Upright Hedge Parsley
Tragopogon pratensis	Goat's-beard
Trifolium campestre	Hop Trefoil
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Trifolium scabrum	Rough Clover
Tripleurospermum inodorum	Scentless Mayweed
Tripleurospermum maritimum	Sea Mayweed
Tulipa sp.	Tulip sp.

Tussilago farfara	Colt's-foot
Ulex europaeus	Common Gorse
Urtica dioica	Common Nettle
Valeriana officinalis	Common Valerian
Valerianella sp.	Cornsalad sp.
Verbascum lychnitis	White Mullein
Verbascum thapus	Great Mullein
Veronica agrestis	Green Field-speedwell
Veronica arvensis	Wall Speedwell
Veronica chamaedrys	Germander Speedwell
Veronica filiformis	Slender Speedwell
Veronica hederifolia	Ivy-leaved Speedwell
Veronica polita	Grey Field-speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Veronica verna	Spring Speedwell
Vicia cracca	Tufted Vetch
Vicia hirsuta	Hairy Tare
Vicia sativa	Common Vetch
Vicia tetrasperma	Smooth Tare
Vinca major	Greater Periwinkle
Vinca minor	Lesser Periwinkle
Viola odorata	Sweet Violet