

NPWS

Kilpatrick Sandhills SAC
(site code: 001742)

**Conservation objectives supporting document-
Coastal habitats**

Version 1
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Please note that the opinions expressed in the site reports from the Coastal Monitoring Project (CMP) are those of the authors and do not necessarily reflect the opinion or policy of NPWS.

Please note that this document should be read in conjunction with the following report: NPWS (2017) Conservation Objectives: Kilpatrick Sandhills SAC 001742 Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (European Commission, 2013). It is defined in positive terms, such that a habitat type or species must be prospering and have good prospects of continuing to do so.

Kilpatrick Sandhills SAC is situated on the north Co. Wexford coast, about 8km south of Arklow town. This SAC encompasses a range of coastal habitats but primarily is a mature, relatively intact sand dune system, which extends south from Kilmichael Point for a distance of 2km. The dunes attain impressive heights and a good diversity of habitats and species are present including sandy beach, shingle beach, embryonic dunes, mobile dunes, species-rich fixed dunes and dune slack. The presence of gorse (*Ulex europaeus*) suggests that the SAC may also support the nationally rare decalcified fixed dune (dune heath) habitat (NPWS, 2013). This is of particular importance owing to its rarity in Ireland generally and particularly on the east coast (Ryle *et al.*, 2009).

At the northern end of the SAC, there is a rocky headland, Kilmichael Point. Rock outcrops occur where the overlying boulder clay drift has eroded, exposing cliffs which rise in steps to about 10m. A bedrock shoreline occurs below the cliffs. The headland supports a short-cropped, species-rich coastal grassland and cliff vegetation. The Regionally Extinct species (Wyse Jackson *et al.*, 2016) sea stock (*Matthiola sinuata*) was observed among rocky crevices here in the past (NPWS, 2013).

South of Kilmichael Point, there are several flushes running down clay slopes (Ryle *et al.*, 2009). Behind the dunes, in the middle of the SAC, there is a low-lying freshwater marsh. Wet grassland occurs adjacent to the marsh and part of this area floods. To the west of the marsh is a small area of wet scrub woodland of alder (*Alnus glutinosa*) and willows (*Salix* spp.) (NPWS, 2013).

Kilpatrick Sandhills SAC (site code: 001742) is selected for strandline vegetation and sand dune habitats. The following five coastal habitats are the Qualifying Interests for the SAC (* denotes a priority habitat):

- 1210 Annual vegetation of drift lines
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
- 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*
- 2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea)*

All of these habitats are associated with sand dune systems and are usually found in close association with each other. It should be noted that the status of the last habitat, Atlantic decalcified fixed dunes (Calluno-Ulicetea)*, in Ireland is under review and that the conservation objective may be reviewed at a later stage.

2 Conservation Objectives

A conservation objective aims to define the favourable conservation condition of a habitat or species at a particular site. Implementation of the objective will help to ensure that the habitat or species achieves favourable conservation status at a national level.

This supporting document sets out the conservation objectives for the five coastal habitats listed above in Kilpatrick Sandhills SAC, which is defined by a list of parameters, attributes and targets. The main parameters are (a) Range (b) Area and (c) Structure and Functions, the last of which is broken down into a number of attributes, including physical structure, vegetation structure and vegetation composition.

The targets set for the sand dune habitats are based primarily on the results of the Coastal Monitoring Project (Ryle *et al.*, 2009) and this document should be read in conjunction with that report.

The Coastal Monitoring Project (CMP) surveyed, mapped and assessed a single sub-site associated with Kilpatrick Sandhills SAC (Ryle *et al.*, 2009):

Kilpatrick (CMP site ID: 023)

The distribution of sand dune habitats within Kilpatrick Sandhills SAC is presented in Appendix I. As part of the CMP, a detailed individual report and habitat map were produced for the Kilpatrick sub-site and these are presented in Appendix II at the end of this document.

The conservation objectives for the sand dune habitats in Kilpatrick Sandhills SAC are based on the findings of the CMP, combined with the results of Gaynor (2008). It is thought that the sub-site as surveyed by the CMP represents the entire area of sand dunes within Kilpatrick Sandhills SAC.

3 Sand dune habitats

Sand dunes are hills of wind-blown sand that have become progressively more stabilised by a cover of vegetation. In general, most sites display a progression through strandline, foredunes, mobile dunes and fixed dunes. Where the sandy substrate is decalcified, fixed dunes may give way to dune heath. Wet hollows, or dune slacks, occur where the dunes have been eroded down to the level of the water table. Transitional communities can occur between dune habitats and they may also form mosaics with each other. Dune systems are in a constant state of change and maintaining this natural dynamism is essential to ensure that all of the habitats present at a site achieve favourable conservation condition.

In Ireland, there are nine sand dune habitats (including annual vegetation of drift lines) listed under Annex I of the EU Habitats Directive (92/43/EEC) (* denotes a priority habitat):

- **Annual vegetation of drift lines (1210)**
- **Embryonic shifting dunes (2110)**
- **Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)**
- **Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) ***
- Decalcified dunes with *Empetrum nigrum* (2140) *
- **Atlantic decalcified fixed dune (Calluno-Ulicetea) (2150) ***
- Dunes with *Salix repens* subsp. *argentea* (Salicion arenariae) (2170)
- Humid dune slacks (2190)
- Machairs (21A0) *

The five dune habitats indicated in **bold** above are each selected as a Qualifying Interest (QI) for Kilpatrick Sandhills SAC and were recorded during the CMP by Ryle *et al.* (2009) from the SAC. These habitats include mobile areas at the front as well as more stabilised parts of dune systems. There is some doubt concerning the presence of the habitat 'Atlantic decalcified fixed dunes'. The status of this habitat in Ireland is under review. The CMP also recorded humid dune slacks (2190), but this habitat has not been selected as a QI for this SAC (Ryle *et al.*, 2009), nor has the coastal Annex I habitat perennial vegetation of stony banks (1220) which was also recorded by Ryle *et al.* (2009).

Annual vegetation of drift lines is found on beaches along the high tide mark, where tidal litter accumulates. It is dominated by a small number of annual species (i.e. plants that complete their life-cycle within a single season). Tidal litter contains the remains of marine algal and faunal material, as well as a quantity of seeds. Decaying detritus in the tidal litter releases nutrients into what would otherwise be a nutrient-poor environment. The habitat is often represented as patchy, fragmented stands of vegetation that are short-lived and subject to frequent re-working of the sediment. The vegetation is limited to a small number of highly specialised species that are capable of coping with salinity, wind exposure, an unstable substrate and lack of soil moisture. Typical species include spear-leaved orache (*Atriplex prostrata*), frosted orache (*A. laciniata*), sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*) and prickly saltwort (*Salsola kali*).

Embryonic dunes are low accumulations of sand that form above the strandline. They are sometimes referred to as foredunes, pioneer dunes or embryo dunes, as they can represent the primary stage of dune formation. They are characterised by the presence of the salt-tolerant dune grasses sand couch (*Elytrigia juncea*) and lyme-grass (*Leymus arenarius*), which act as an impediment to airborne sand. Strandline species can remain a persistent element of the vegetation.

Where sand accumulation is more rapid than in the embryonic dunes, marram grass (*Ammophila arenaria*) invades, initiating the transition to mobile dunes (Shifting dunes along the shoreline with *Ammophila arenaria*). Marram growth is actively stimulated by sand accumulation. These unstable and mobile areas are sometimes referred to as 'yellow dunes' (or 'white dunes' in some European countries), owing to the areas of bare sand visible between the tussocks of marram.

Fixed dunes refer to the more stabilised area of dune systems, generally located in the shelter of the mobile dune ridges, where the wind speed is reduced and the vegetation is removed from the

influence of tidal inundation and salt spray. This leads to the development of a more or less closed or 'fixed' carpet of vegetation dominated by a range of sand-binding species (Gaynor, 2008).

Atlantic decalcified fixed dune (Calluno-Ulicetea) (dune heath) occurs at the older landward edge of the fixed dunes, where leaching of basic minerals and nutrients can lower the pH over time, or where sand has blown up over rock that is siliceous (silica-rich) in nature, and conditions suitable for colonisation by heath species are created. As these decalcified or acidic conditions can only form on the older, landward extremes of dune systems, they are often vulnerable to housing or other developments. Decalcified dune heath is characterised by the presence of heathers (*Calluna vulgaris*, *Erica tetralix*, *E. cinerea*) and gorse species (*Ulex europaeus* and *U. gallii*) which differentiates it from the other dune heath habitat, decalcified *Empetrum* dunes. Well-developed dune heath communities containing the classic dwarf ericoid shrubs, such as heathers, that are generally regarded as characterising the habitat are not well-represented in Ireland.

Humid dune slacks are wet or moist depressions between dune ridges. They are characterised by the occurrence of a water table that is maintained by a combination of groundwater (which may or may not be slightly saline), precipitation and an impermeable layer in the soil. In the winter, the water table normally rises above the soil surface and inundation occurs. In spring and summer, the water table drops, but the layer of the soil remains wet. Proximity of the water table to the surface is evidenced in the vegetation, in which rushes, sedges and moisture-loving herbs such as marsh pennywort (*Hydrocotyle vulgaris*), bog pimpernel (*Anagallis tenella*), grass of Parnassus (*Parnassia palustris*), common marsh-bedstraw (*Galium palustre*) and marsh helleborine (*Epipactus palustris*) are obvious features. The frequency and duration of flooding, as well as the level of salinity, determines the vegetation composition. In addition, nutrient-enrichment can occur as a result of leaching from the surrounding dune ridges (Gaynor, 2008).

All of the dune habitats indicated above occur as a complex mosaic of constantly changing and evolving vegetation communities. They are inextricably linked in terms of their ecological functioning and should be regarded as single geomorphological units. As such, no dune habitat should be considered in isolation from the other dune habitats present at a site, or the adjoining semi-natural habitats with which they often form important transitional communities.

Detailed descriptions from the Coastal Monitoring Project (Ryle *et al.*, 2009) of each sand dune habitat found at the Kilpatrick sub-site are presented in Appendix II. A total of 13.76ha of sand dune habitat was mapped within the Kilpatrick Sandhills SAC, 13.57ha (98.6%) of which represents habitats that are listed as Qualifying Interests for this particular SAC.

3.1 Overall objectives

The overall objective for 'Annual vegetation of drift lines' in Kilpatrick Sandhills SAC is to '*maintain the favourable conservation condition*'.

The overall objective for 'Embryonic shifting dunes' in Kilpatrick Sandhills SAC is to '*restore the favourable conservation condition*'.

The overall objective for ‘Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)’ in Kilpatrick Sandhills SAC is to ‘*restore the favourable conservation condition*’.

The overall objective for ‘Fixed coastal dunes with herbaceous vegetation (grey dunes)’ in Kilpatrick Sandhills SAC is to ‘*restore the favourable conservation condition*’.

While acknowledging that the habitat may be poorly developed in this SAC, the overall objective for ‘Atlantic decalcified fixed dune (Calluno-Ulicetea)’ in Kilpatrick Sandhills SAC is to ‘*maintain the favourable conservation condition*’.

These objectives are based on an assessment of the recorded condition of each habitat under a range of attributes and targets. The assessment is divided into three main headings: (a) Area (b) Range and (c) Structure and Functions.

3.2 Area

3.2.1 Habitat area

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. A baseline habitat map was produced for the sand dune habitats in the Kilpatrick sub-site during the Coastal Monitoring Project (Ryle *et al.*, 2009). This map is included with the individual site report in Appendix II at the end of this document.

The total areas of each sand dune habitat within the Kilpatrick sub-site (CMP site ID: 023) as estimated by Ryle *et al.* (2009) are presented in the second column of the following table. These figures were subsequently checked and adjusted to take into account any mapping anomalies. The adjusted figures for the total areas of each sand dune habitat within the boundary of Kilpatrick Sandhills SAC are presented in the third column.

Habitat	Total area (ha) of habitat from CMP	Total area (ha) of habitat within SAC boundary
Annual vegetation of drift lines (1210)	0.03	0.03
Embryonic shifting dunes (2110)	0.22	0.25
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (2120)	0.36	0.36
Fixed coastal dunes with herbaceous vegetation (2130)	12.99	12.93
Decalcified dune heath (2150)	Not mapped	Unknown
Total	13.60	13.57

The general target for this attribute in the case of each habitat is that the area should be stable, or increasing. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is always assessed subject to natural processes, including erosion and succession.

3.3 Range

3.3.1 Habitat distribution

The distribution of sand dune habitats in Kilpatrick Sandhills SAC, as mapped by Ryle *et al.* (2009), is presented in Appendix I.

The annual vegetation of drift lines habitat is of limited extent and occurs on the sandy beach and consists of two small separate patches of habitat, one at the extreme southern end, and the other nearer the centre. However, there is no evidence that it has recently shown a trend towards declining area (Ryle *et al.*, 2009).

The total embryonic dune area consists of a number of small patches of habitat in the middle and southern sections of the site (Ryle *et al.*, 2009).

The mobile dunes consist of a continuous strip, mostly less than 10m wide, located to the south of the rocky cliffs, but not extending to the extreme south of the site. The mobile dune extent is poorly developed and restricted in its distribution due to the ongoing effects of erosion and recreational pressures (Ryle *et al.*, 2009).

The fixed dunes at Kilpatrick are quite extensive, and comprise the vast majority of the total extent of Qualifying Interest Annex I sand dune habitats (Ryle *et al.*, 2009).

Of particular interest in the SAC is the possible existence of an area of decalcified dune heath, a priority Annex I habitat, towards the back of the fixed dunes at Kilpatrick. This habitat is normally characterised by the presence of ericoid or heath species in association with dune species. Although ericoid species are absent, the presence of gorse (*Ulex europaeus*) is seen as an indicator of the acidic nature of the substrate. The status of this habitat in Ireland is currently under review.

The target is that there should be no decline or change in the distribution of these sand dune habitats, unless it is the result of natural processes, including erosion, accretion and succession.

3.4 Structure and Functions

The location, character and dynamic behaviour of sand dunes are governed by a combination of geographic, climatic, edaphic and anthropogenic factors. Sand dunes are highly complex, dynamic systems, where the habitats occur in a complex and constantly evolving and changing mosaic. They function as systems in terms of geomorphology and hydrology and maintaining the favourable conservation condition of the habitats present depends on allowing these processes to continue unhindered. Maintaining the favourable conservation condition of all of the sand dune habitats in Kilpatrick Sandhills SAC in terms of structure and functions depends on a range of attributes for which targets have been set as outlined below.

3.4.1 Physical structure: functionality and sediment supply

Coastlines naturally undergo a constant cycle of erosion and accretion. There are two main causes of erosion: (a) those resulting from natural causes and (b) those resulting from human interference. Natural causes include the continual tendency towards a state of equilibrium between coasts and environmental forces, climatic change (particularly an increase in the frequency of storms or a shift in storm tracks), relative sea level rise and natural changes in the sediment supply. Human interference is usually associated with changes in the sediment budget, either directly, through the removal of beach or inshore sediment, or indirectly, by impeding or altering sediment movement. It is important to recognise that the process of coastal erosion is part of a natural tendency towards equilibrium. Natural shorelines attempt to absorb the energy entering the coastal zone by redistributing sediment.

Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Sediment supply is especially important in the embryonic dunes and mobile dunes, as well as the strandline communities where accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to develop, thus increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or over-stabilisation of dunes.

In Kilpatrick Sandhills SAC, annual strandline vegetation is less susceptible than other habitats to the damaging effects of recreational activities. Indeed, the availability of sediment released from erosion of the sand hills may act to increase the extent of strandline vegetation (Ryle *et al.*, 2009).

Although there has been some recent embryonic accumulation, the habitat is thought to have undergone a loss of overall extent in recent times, due to recreational pressures (Ryle *et al.*, 2009).

The target for this attribute is to maintain the natural circulation of sediment and organic matter throughout the entire dune system, without any physical obstructions.

3.4.2 Vegetation structure: zonation

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation; therefore, it is important that the transitional communities are also conserved, including those to saltmarsh communities.

Despite its small size, Kilpatrick Sandhills SAC is ecologically important as an example of a relatively intact sand dune system which shows the various development stages of dunes, from strandline, to embryonic dunes, to white dunes stabilised by marram (*Ammophila arenaria*), to fixed dunes (Ryle *et al.*, 2009).

The target is to maintain the range of coastal habitats, including transitional zones, subject to natural processes, including erosion and succession.

3.4.3 Vegetation structure: bare ground

This target applies to the fixed dunes and dune heath. It does not apply to the other QI habitats present where high levels of bare sand are a natural component of the habitat. In the fixed areas, some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions including invertebrates, helping to increase biodiversity.

While most of the severe erosion at Kilpatrick Sandhills SAC can be attributed to natural wind and wave action, recreational activities are believed to have been a contributory factor. At the southern end of the site, the sand dunes and beach are used by visitors for amenity purposes. Over-exposure to amenity usage can cause damage to dune vegetation and exacerbate dune erosion. Trampling has caused damage and there are numerous tracks and a number of large blowouts (Ryle *et al.*, 2009).

The effects of erosion, heavy recreational pressures and surface break-up caused by livestock, can be seen in the high proportion of bare ground at Kilpatrick Sandhills SAC, which was estimated to exceed 20% of the total fixed dune area at the time of survey (Ryle *et al.*, 2009).

The target is not to exceed 10% bare sand. This target is assessed subject to natural processes.

3.4.4 Vegetation structure: sward height

This attribute applies to the more fixed habitats (fixed dunes and dune heath) where a varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of moderate levels of grazing on dunes have been well-documented (Gaynor, 2008). Moderate grazing regimes lead to the development of a species-rich vegetation cover. The animals increase biodiversity by creating micro-habitats through their grazing, dunging and trampling activities. Grazing slows down successional processes and in some cases, reverses them, helping to achieve a diverse and dynamic landscape. The effects of trampling assist the internal movement of sand through the development of small-scale blowouts, while dunging can eutrophicate those dune habitats whose nutrient-poor status is crucial for the survival of certain vegetation types. Many species, from plants to invertebrates, benefit immensely from the open and diverse system created by a sustainable grazing regime. Many dune species are small in size and have relatively low competitive ability. Consequently, the maintenance of high species diversity on a dune system is dependent on the existence of some control to limit the growth of rank coarse vegetation (Gaynor, 2008).

Parts of Kilpatrick Sandhills SAC are used for grazing cattle. The fixed dune grassland contains plenty of short turf areas, with good species diversity. The high proportion of short turf at the site may be attributable to livestock grazing, while a rabbit population also helps to maintain the short turf. There is however, some evidence of localised poaching damage and the cattle seemed to favour blowouts or eroded areas for lying, thereby exacerbating their condition. During the CMP, stocking levels were modest and not thought to have a significant negative impact on the sand dune habitats (Ryle *et al.*, 2009).

The target for this attribute is to maintain structural variation within the sward.

3.4.5 Vegetation composition: plant health of dune grasses

This attribute applies to the embryonic dunes and the marram dunes where blown sand is a natural feature. The health of the dune grasses (particularly *Ammophila arenaria* and *Elytrigia juncea*) are assessed by the plant parts above the ground (they should be green) and the presence of flowering heads. This gives a clear indication of the status of the supply of blown sand, which is required for these species to thrive.

At Kilpatrick Sandhills SAC, there are places where marram (*Ammophila arenaria*) is stabilising some of the previously eroded areas. However, there were some areas where a significant cover of unhealthy marram (*Ammophila arenaria*) was symptomatic of a lack of mobility in the habitat (Ryle *et al.*, 2009).

The target for this attribute is that more than 95% of the dune grasses should be healthy.

3.4.6 Vegetation composition: typical species and sub-communities

Species diversity and plant distribution in dunes is strongly controlled by a range of factors, including mobility of the substrate, grazing intensities, moisture gradients, nutrient gradients and human disturbance. In the younger, more mobile dunes, marram (*Ammophila arenaria*) is common, while groundsel (*Senecio vulgaris*), sea rocket (*Cakile maritima*) and dandelion (*Taraxacum* sp.) are also present. The fixed, more stable dune vegetation includes lady's bedstraw (*Galium verum*), common bird's-foot trefoil (*Lotus corniculatus*), wild thyme (*Thymus polytrichus*), kidney vetch (*Anthyllis vulneraria*), wild pansy (*Viola tricolor*) and biting stonecrop (*Sedum acre*).

The strandline habitat at Kilpatrick Sandhills SAC is characterised by the presence of typical strandline species such as sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*) and prickly saltwort (*Salsola kali*). The presence of a number of typical species and vegetation of robust and healthy appearance indicates that the habitat is in good condition (Ryle *et al.*, 2009).

Embryonic dunes occur mainly along the middle and southern sections of Kilpatrick Sandhills SAC. Species such as marram (*Ammophila arenaria*), sand couch (*Elytrigia juncea*), sea spurge (*Euphorbia paralias*) and sea sandwort (*Honckenya peploides*) are present. Typical strandline species, such as sea rocket (*Cakile maritima*) and prickly saltwort (*Salsola kali*), were also present in this habitat (Ryle *et al.*, 2009).

The shifting dunes of Kilpatrick Sandhills SAC are dominated by marram (*Ammophila arenaria*), with species such as sea spurge (*Euphorbia paralias*), sea bindweed (*Calystegia soldanella*) and sea-holly (*Eryngium maritimum*) also found (Ryle *et al.*, 2009).

In the fixed dunes at Kilpatrick Sandhills SAC, red fescue (*Festuca rubra*) is the dominant grass. Other species present include lady's bedstraw (*Galium verum*), kidney vetch (*Anthyllis vulneraria*), wild thyme (*Thymus polytrichus*), common restharrow (*Ononis repens*), cat's ear (*Hypochaeris radicata*) and sheep's-bit (*Jasione montana*). This fixed dune/coastal grassland also contained coastal cliff elements such as thrift (*Armeria maritima*) and buck's-horn plantain (*Plantago coronopus*). On the older dunes, there is an abundance of legumes, including common bird's-foot trefoil (*Lotus corniculatus*), white clover (*Trifolium repens*), hop trefoil (*T. campestre*) and lesser trefoil (*T.*

dubium). Lichens noted included *Peltigera* sp. and *Cladonia* species. Further inland, on the more mature grey dunes, burnet rose (*Rosa pimpinellifolia*) is common (Ryle *et al.*, 2009).

The area classified as dune heath habitat, which occurs as a mosaic with the fixed dunes, is dominated by gorse (*Ulex europaeus*) and other species recorded in this area include blackthorn (*Prunus spinosa*), bracken (*Pteridium aquilinum*), cleavers (*Galium aparine*), common sorrel (*Rumex acetosa*), common ragwort (*Senecio jacobaea*), burnet rose (*Rosa pimpinellifolia*), tormentil (*Potentilla erecta*) and bramble (*Rubus fruticosus* agg.) (Ryle *et al.*, 2009).

The target for this attribute is to maintain a typical flora for each particular sand dune habitat.

3.4.7 Vegetation composition: negative indicator species

Negative indicators include non-native species (e.g. *Hippophae rhamnoides*), species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered characteristic of the habitat. Sea buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled.

The main invasive species identified in Gaynor (2008) were bracken (*Pteridium aquilinum*) and sea buckthorn. The invasion of non-native species compromises the typical plant community structure. Bracken is becoming increasingly dominant, particularly where sites have been abandoned or where grazing levels have been significantly reduced. The vegetation retains many elements of the original vegetation cover, but there is a reduction in biodiversity. As the canopy becomes taller and ranker, many of the low-growing species disappear. In this case, the vegetation is treated as a sub-community of the original community that was invaded. This is always the case unless the original vegetation cover has been completely destroyed, as can happen with sea buckthorn, which can form dense impenetrable thickets.

At Kilpatrick Sandhills SAC, the negative indicator species common ragwort (*Senecio jacobaea*) and creeping thistle (*Cirsium arvense*) were noted in the mobile dunes and fixed dunes, but their frequency was not at a level that would indicate poor condition in the habitat (Ryle *et al.*, 2009).

The dune heath scrub includes bracken (*Pteridium aquilinum*), which is also invading the fixed dunes, particularly at the southern end of the site (Ryle *et al.*, 2009).

The target is that negative indicators (including non-native species), such as sea buckthorn, should represent less than 5% of the vegetation cover.

3.4.8 Vegetation composition: scrub/trees

This attribute only applies to the fixed dunes and dune heath. Scrub encroachment leads to reduction in dune biodiversity and needs to be controlled. The presence of scrub and trees which have deep roots can also lower the groundwater table which can have significant impacts on the slack communities.

The dune heath scrub is dominated by gorse (*Ulex europaeus*) and other species recorded in this area include blackthorn (*Prunus spinosa*) (Ryle *et al.*, 2009).

The target for this attribute therefore is that the cover of scrub and tree species should be under control or represent no more than 5% of the vegetation cover.

4 References

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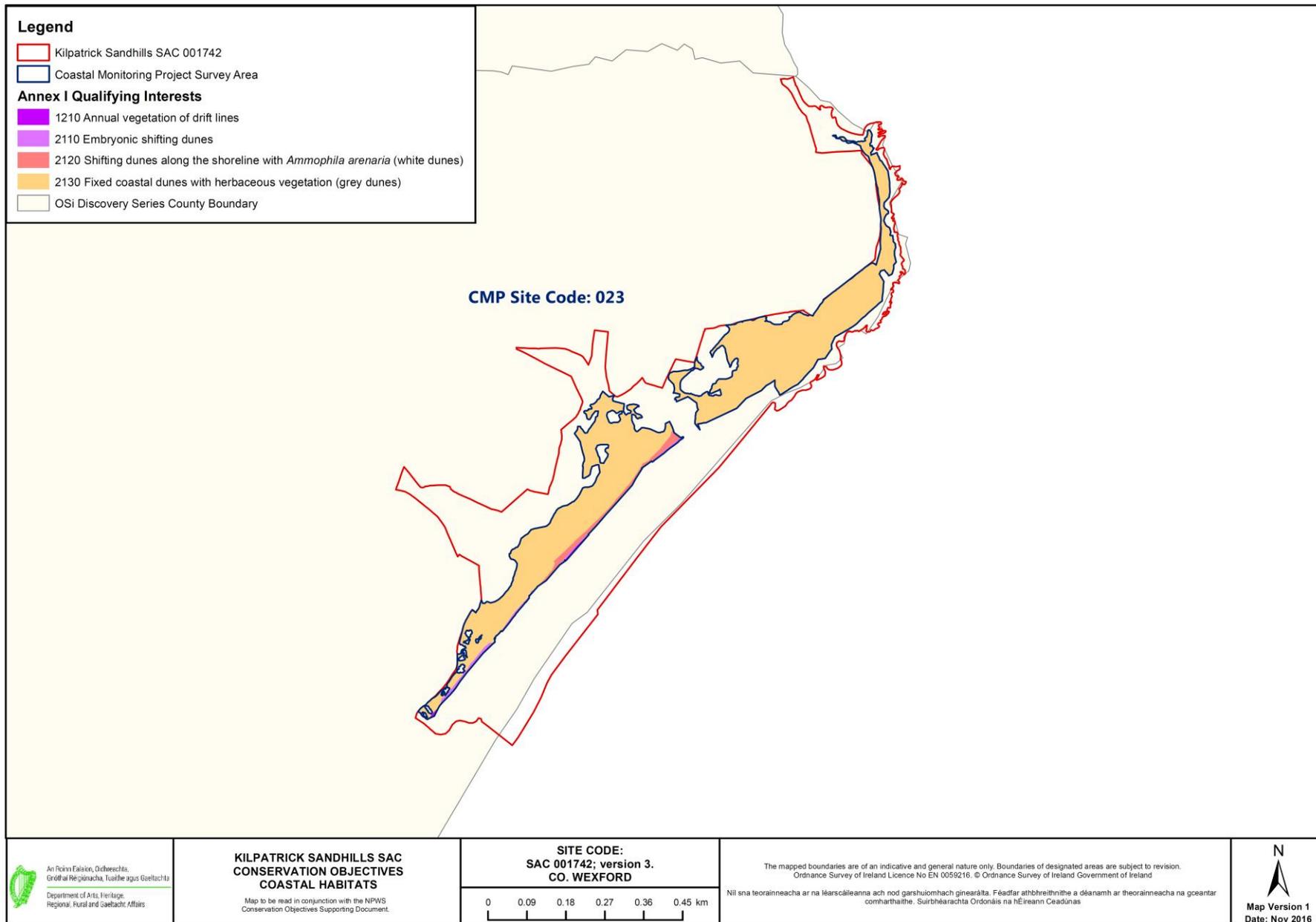
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Appendix I – Distribution map of Sand dune habitats within Kilpatrick Sandhills SAC



Appendix II – Kilpatrick site report and habitat map from the Coastal Monitoring Project (Ryle *et al.*, 2009)

KILPATRICK

SITE DETAILS

CMP04 site name: Kilpatrick **CMP04 site code:** 023 **CMP Map No.:** 21

County: Wexford

Discovery map: 62

Grid Reference: T 250 655

6 inch Digital Map: WX 07B

Aerial photographs (2000 series): O 4545-C; O 4604-C

NPWS Site Name: Kilpatrick Sandhills

NPWS designation: NHA: N/A cSAC: 001742

Ranger Area: Wicklow South/Wexford North

MPSU Plan: N/A

Report Author: Kieran Connolly

SITE DESCRIPTION

Kilpatrick sandhills extend over approximately 2 km of coastline southwards from just north of Kilmichael Point (at the Wicklow-Wexford border). The site is notable for a mature, relatively intact dune system with a wide range of habitats, including a large proportion of fixed dune, and the nationally rare, decalcified fixed dune (dune heath). Around Kilmichael Point (the northern boundary of the site) there are vegetated rocky cliffs and a coastal grassland area. Bedrock shoreline lies below the cliffs. A freshwater marsh and a small patch of wet woodland are also within the cSAC (Kilpatrick Sandhills cSAC 001742) boundary. The site is highly scenic with a fine sandy beach, and dunes attaining impressive heights.

There are some areas of severe natural erosion at Kilpatrick, particularly in the centre and southern regions, with damage frequently extending into mobile and fixed dunes. Trampling has also caused damage and there are numerous pedestrian tracks and a number of large blowouts, some of which are visible on the aerial photographs. There are however, places where the foredunes are currently accreting, and in places, marram grass (*Ammophila arenaria*) is stabilising some of the previously eroded areas.

Above the headland at Kilmichael Point, there is a short-cropped, species-rich coastal grassland. South of Kilmichael Point, there are several flushes running down clay slopes, where species such as *Triglochin palustre* (marsh arrowgrass), *T. maritimum* (sea arrowgrass), *Plantago maritima* (sea plantain), *Agrostis stolonifera* (creeping bent) and *Carex flacca* (glaucous sedge) are found.

Kilpatrick was formerly a site for *Matthiola sinuata* (sea stock), which is now thought to be extinct in Ireland. The locally distributed and increasingly rare *Thalictrum minus* (lesser meadow-rue) has been

recorded at the site, but was not seen in the current survey. No other rare species were noted at the site.

The areas of EU Annex I habitats mapped at Kilpatrick are shown in Table 23A. Other habitats mapped were scrub, agricultural grassland, amenity grassland and rocky cliff vegetation.

Table 23A Areas of EU Annex I habitats mapped at Kilpatrick

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of drift lines	0.034
H1220	Perennial vegetation of stony banks	0.030
H2110	Embryonic shifting dunes	0.220
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	0.362
H2130	Fixed coastal dunes with herbaceous vegetation	12.992
H2190	Humid dune slacks	0.191
	Total Sand dune	13.829

Fixed dunes (H2130)

The fixed dunes (including dune heath vegetation) at Kilpatrick are quite extensive, and at just short of 13 ha in total area, comprise over 90% of the total Annex I sand dune habitats.

The dune grassland contains plenty of short turf areas, with good species diversity. Included among the typical dune grassland species recorded were *Anthyllis vulneraria* (kidney vetch), *Festuca rubra* (red fescue), *Galium verum* (lady's bedstraw), *Hypochaeris radicata* (cat's ear), *Lotus corniculatus* (common bird's-foot trefoil), *Ononis repens* (common restharrow) and *Thymus polytrichus* (wild thyme). Lichens noted included *Peltigera* sp. and *Cladonia* spp.

In some places the fixed dunes grade into more 'improved' agricultural grassland, dominated by coarse grasses. Species such as *Lolium perenne* (perennial rye-grass) and agricultural weeds such as *Urtica dioica* (common nettle) were common in these areas. Bracken (*Pteridium aquilinum*) is also invading the fixed dunes to an undesirable degree, particularly at the south end of the site. Among the other negative indicator species recorded in the habitat were *Senecio jacobaea* (common ragwort) and *Cirsium arvense* (creeping thistle), although neither of these were frequent enough to be indicative of poor condition in the habitat.

The effects of erosion and heavy recreational pressures can be seen in the high proportion of bare ground, which is estimated to exceed 20% of the total fixed dune area.

Dune heath (referable to the Annex I habitat 'Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150)) is reputed to occur at the site and is estimated to cover 25% of the total cSAC area in the site NATURA 2000 report. However, like a number of other sites where the habitat is believed to occur, it is characterised floristically by the presence of *Ulex europaeus* (gorse) but lacks the 'classic' ericoid species by which the habitat is usually recognised. For this reason, and also because the potential heath occurs in a mosaic structure (towards the back of the fixed dunes) and would be extremely difficult and time consuming to treat separately, it was not mapped separately here. As a satisfactory protocol for assessing dune heath habitats will probably depend upon a nationwide dedicated survey of all known and potential dune heath sites (see main report), it has not been assigned a conservation status assessment here. It remains to be seen if the habitat at Kilpatrick will fall within the accepted

definition of dune heath that may result from future comprehensive surveys. Nevertheless, the presence of potential habitat at the site is noteworthy in view of the scarcity of dune heath in Ireland, and because of its status as a priority Annex I habitat. Other species associated with *U. europaeus* included *Rosa pimpinellifolia* (burnet rose), *Prunus spinosa* (blackthorn), *Pteridium aquilinum* (bracken) and *Rubus fruticosus* (bramble).

Humid dune slacks (H2190)

A dune slack in the centre of the site contained a limited number of typical dune slack species. Among those recorded were *Juncus articulatus* (jointed rush) and *Potentilla anserina* (silverweed). However, most of the area, as indicated in the single monitoring stop that was carried out in the habitat, was dominated by *Agrostis stolonifera* (creeping bent). The habitat was not assessed in the NATURA 2000 survey. If present and noted at the time, it may have been regarded as wet grassland.

The negative indicator species *Cirsium arvense* (creeping thistle) was observed in the habitat, but at a very limited frequency.

Mobile dunes (H2120)

The mobile dunes consisted of a continuous strip, mostly less than 10 m wide, located to the south of the rocky cliffs, but not extending to the extreme south of the site. This habitat, in which 2 monitoring stops were carried out, was characterised by the presence of *Ammophila arenaria* (marram) and *Euphorbia paralias* (sea spurge). Erosion has adversely affected parts of the habitat in recent times, although some of these areas are being stabilised by the growth of marram. Whether this marram growth is attributable to a summer build up or continues to accumulate may be observed over time.

The negative indicator species *Senecio jacobaea* (common ragwort) and *Cirsium arvense* (creeping thistle) were also noted in the mobile dunes, but their collective frequency was not at a level that would indicate poor condition in the habitat

Embryonic dunes (H2110)

The total embryonic dune area of just over 0.2 ha consists of a number of small patches of habitat in the southern half of the site. The habitat was characterised by the presence of *Elytrigia juncea* (sand couch) and *Euphorbia paralias* (sea spurge). A single monitoring stop, reflecting the presence of the above-named species, was carried out. Typical strandline species, such as *Cakile maritima* (sea rocket) and *Salsola kali* (prickly saltwort) were also present, albeit sparsely, in the habitat.

Shingle strandline (H1220)

In addition to annual vegetation of drift lines, a single narrow strip of shingle strandline at the centre of the site was mapped. Extending to 0.03 ha, the habitat was characterised by the presence of typical species such as *Tripleurospermum maritimum* (sea mayweed) and *Rumex crispus* (curled dock). This habitat was not assessed in the NATURA 2000 survey for the site, as the vegetation was considered insufficient to warrant recognition as a distinct habitat. In the long term, this may prove to be the more appropriate judgement.

Annual Vegetation of Drift lines (H1210)

The total mapped area (0.034 ha) of annual vegetation of drift lines consisted of 2 separate patches of habitat, both at the southern end of the site - one at the extreme southern end, and the other nearer the centre. The habitat was characterised by the presence of typical strandline species such as *Cakile maritima* (sea rocket), *Honckenya peploides* (sea sandwort) and *Salsola kali* (prickly saltwort). There was no evidence of mechanical beach cleaning operations at the site.

IMPACTS

Activities observed or known to be impacting on sand dune habitats at Kilpatrick are shown in Table 23B. The site is used for camping and caravanning (code 608), which places a considerable burden on the habitats. There are numerous pedestrian tracks (code 622) throughout the site - particularly in the more heavily used southern portion - which are clearly visible on the aerial photographs (year 2000). Littering of the beach and dunes is also a consequence of the amenity use of the site. Car, quad bike and motorbike tracks have previously been noted throughout the southern part of the dunes. The beach and grassland at the north end of the site are used for horse riding.

Table 23B Intensity and impact of various activities on sand dune habitats at Kilpatrick

EU Habitat Code ¹	Activity Code ²	Intensity ³	Impact ⁴	Area affected/ha	Location of Activity ⁵
H2130	103	A	-1	1.0	Inside
H2130	140	C	0	11.0	Inside
H2130	403	A	-2	1.0	Inside
H2130	421	C	0	0.2	Inside
H2130	608	A	-1	1.0	Inside
H2130	608	A	-1	1.0	Inside
H2110	622	B	-1	0.220	Inside
H2130	622	B	-1	8.0	Inside
H2120	900	A	-1	0.362	Inside
H2130	900	B	0	3.0	Inside

¹ EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

² Description of activity codes are found in Appendix 5

³ Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

⁴ Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

⁵ Location of activity: Inside = activities recorded within and directly impacting the sand dune habitat. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the sand dune habitat

Cattle have been grazed (code 140) for some time on the dunes, but are probably not contributing significantly to erosion. There was however, some evidence of localised poaching damage. Stocking levels are currently modest, but an increase in numbers could be problematic. The high proportion of short turf at the site may be partly attributable to livestock grazing, while a rabbit population also helps to maintain the short turf. Previous reports noted the presence of grazing sheep, but none were present on the survey date.

There are currently areas of fixed dune (albeit of limited area), which have a more 'agricultural' appearance, with elevated levels of coarse grasses and plants such as *Urtica dioica* (nettle), indicating that some improvement (code 103) has been carried out.

Natural erosion (code 900) has caused a retreat of the dunes over recent years although the loss of area is difficult to assess in the absence of data that may be compared to those produced here. The mobile dune area affected is recorded as the current total habitat area, as the entire area is believed to be susceptible to further erosion.

A house in the south end of the site, outside the mapped sand dune area, but probably within the natural sand dune range at the site is accounted for by reference to 'dispersed habitation' (code 403).

There was evidence of dumping of household waste at the site (code 421).

CONSERVATION STATUS

The conservation status assessment of each habitat at Kilpatrick is based on the combination of habitat extent, structure & functions, and future prospects assessments (Table 23C). The structure and functions assessments are mostly based on the pass/failure rates of monitoring stops, which are shown in Table 23D.

Kilpatrick is an important site, with mature, fairly intact dunes. There is a range of habitats from developing foredunes to species-rich fixed dunes, and potentially, the nationally rare dune heath. It is one of the more impressive dune systems in the region. However, due to the damaging effects of erosion and overuse, most habitats were adjudged to be in *unfavourable* condition with regard to conservation status. Heavy recreational use is likely to continue at the site, while any further increase could be extremely detrimental to the conservation value of habitats.

Fixed dunes, mobile dunes, embryonic dunes, and strandline all rated as 'B: good conservation status' in the NATURA 2000 survey. However, the categories do not correspond to those employed in the current survey and are therefore of limited value for the purposes of comparison. To some extent, therefore, the conservation status assessments, summarised in Table 23C, are based on the current condition of habitats.

Recent stocking levels are not thought to have resulted in a significant negative impact on the site, through the effects of overgrazing (NATURA 2000 Survey). However, some localised poaching was noted during the current survey, and the animals also seemed to favour blowouts or eroded areas for lying, thereby possibly exacerbating their condition. Any significant increase in stocking levels would almost certainly adversely affect the sand dune habitats.

The coastal zone management plan for Co. Wexford of 1992 recommended the prohibition of any development in the dunes or marsh areas, or within 100 m of the high water mark.

Table 23C Conservation status assessment of Annex I sand dune habitats at Kilpatrick

Habitat ¹	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system ²
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
Fixed Dune (H2130)		Extent/ Structure & functions/ Future prospects		Unfavourable - Inadequate	Unfavourable - Declining
Annual Strandline (H1210)	Extent/ Structure & functions/ Future prospects			Favourable	Favourable - Maintained
Embryonic Dune (H2110)	Structure & functions	Extent/ Future prospects		Unfavourable - Inadequate	Unfavourable - Declining
Mobile Dune (H2120)	Structure & functions	Extent/ Future prospects		Unfavourable - Inadequate	Unfavourable - Declining
Humid Dune Slacks (H2190)	Extent		Structure & functions/ Future prospects	Unfavourable - Bad	Unfavourable - Declining

¹ EU Codes as per Interpretation Manual

² Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

Fixed dunes, mobile dunes, embryonic dunes, and strandline all rated as ‘B: good conservation status’ in the NATURA 2000 survey. However, the categories do not correspond to those employed in the current survey and are therefore of limited value for the purposes of comparison. To some extent, therefore, the conservation status assessments, summarised in Table 23C, are based on the current condition of habitats.

Table 23D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Kilpatrick

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Fixed dune (H2130)	7	1	Unfavourable - Inadequate
Embryonic dune (H1210)	1	0	Favourable
Mobile dunes (H2120)	4	0	Favourable
Humid dune slacks (H2190)	0	1	Unfavourable - Bad

Fixed dunes (H2130)

Erosion has been a feature of the site in recent years, and while this can be mostly attributed to wind and wave action, recreational activities are believed to have been a contributory factor. For this reason, habitat extent (area) is rated as *unfavourable-inadequate*.

Eight monitoring stops were carried out in the fixed dunes, seven of which satisfied the target criteria, indicating *unfavourable-inadequate* structure and functions. A lack of typical species and excessive cover of negative indicator species – in this case both *Lolium perenne* (perennial rye-grass) and *Senecio jacobaea* (common ragwort) – explain the single failed stop. Two further monitoring stops in the northern part of the site were also assigned to *fixed dune/coastal grassland*. Both stops passed the fixed dune target criteria, but contained coastal cliff elements such as *Armeria maritima* (thrift) and *Plantago coronopus* (buck's-horn plantain) and were not considered as part of the fixed dune monitoring protocol.

Future prospects for the habitat are considered to be *unfavourable-inadequate* due to ongoing pressures from recreational and agricultural activities. Bare ground, much of which can be attributed to pedestrian traffic and surface break-up caused by livestock, is currently estimated to exceed 20% of the total fixed dune area.

As each of the individual parameters of conservation status are rated as *unfavourable-inadequate*, the overall habitat assessment is also *unfavourable-inadequate*.

The corresponding assessment chosen under the Irish system of conservation status assessment is *unfavourable-declining*, reflecting the probable loss of condition over time, due to agricultural practices.

Humid dune slacks (H2190)

This habitat was not recognised in the NATURA 2000 survey, which suggests the single slack mapped here may not have formed in the typical manner. It is to the rear, or landward, side of the fixed dunes and may have formed from an input of freshwater from this area. Standing water of some depth was present on the survey date, suggesting it may have been created or modified in order to provide a watering area for livestock. However, it is included here as a dune slack, and as no data exist as to its previous extent, it is rated as *favourable* for extent.

The single monitoring stop carried out failed the overall criteria, indicating *unfavourable-bad* structure and functions. There are only a very limited number of typical slack species, and a high proportion of grasses present in the habitat, although such was the depth of standing water that the area suitable for the growth of dune slack species may have been somewhat limited.

Future prospects are considered *unfavourable-bad*, as the habitat is within the area of most intensive agricultural improvement, and the vegetation is already dominated by grass species.

As there are *unfavourable-bad* assessments among the individual parameters of conservation status assessment, the overall assessment is also *unfavourable-bad*.

The dominance of grasses within the habitat and its location in an area that has seen some agricultural improvement suggest that *unfavourable-declining* is the appropriate assessment under the Irish system of conservation status assessment (Table 23D).

Mobile dunes (H2120)

Based on the current habitat condition, mobile dune extent is rated as *unfavourable-inadequate*. The habitat, in places, is poorly developed and restricted in its distribution.

All four monitoring stops carried out in the habitat passed the overall criteria, indicating *favourable* structure and functions. However, there were some areas where a significant cover of unhealthy *Ammophila arenaria* (marram) was symptomatic of a lack of mobility in the habitat.

As is the case with most habitats at the site, future prospects are less than assured due to the on-going negative effects of erosion and recreational pressures. As the current threat to the habitat is probably less than severe, future prospects are considered to be *unfavourable-inadequate*.

A combination of *favourable* and *unfavourable-inadequate* assessments in the individual parameters of conservation status assessment determines an overall *unfavourable-inadequate* assessment.

A recent loss of habitat and an apparent lack of mobility in the habitat in certain parts of the site suggest that *unfavourable-declining* is the most appropriate assessment under the Irish system of conservation status assessment.

Embryonic dunes (H2110)

Although there has been some recent foredune accumulation, the habitat is thought to have undergone a loss of overall extent in recent times, at least some of which can be attributed to the effect of recreational use of the site. For this reason, habitat extent (area) is rated as *unfavourable-inadequate*.

As the single monitoring stop carried out passed the overall target, structure and functions are rated as *favourable*.

As is the case with mobile dunes, future prospects for embryonic dunes are less than assured due to the on-going negative effects of erosion and recreational pressures. As the current threat to the habitat is probably less than severe, future prospects are considered to be *unfavourable-inadequate*.

A combination of *favourable* and *unfavourable-inadequate* assessments in the individual parameters of conservation status assessment determines an overall *unfavourable-inadequate* assessment.

The assessment thought most apt under the Irish system of conservation status assessment is *unfavourable-declining*, due to the apparent recent loss of habitat.

Shingle strandline (H1220)

This habitat was not recognised in the NATURA 2000 survey, apparently due to the lack of typical species and the unlikelihood of a significant flora developing. Because of this lack of significant

vegetation and species diversity, and the small area of habitat, the habitat was not assigned a conservation status assessment.

Annual Vegetation of Drift lines (H1210)

The conservation status of the strandline at Kilpatrick is considered to be favourable under the EU system, and favourable-maintained under the Irish system.

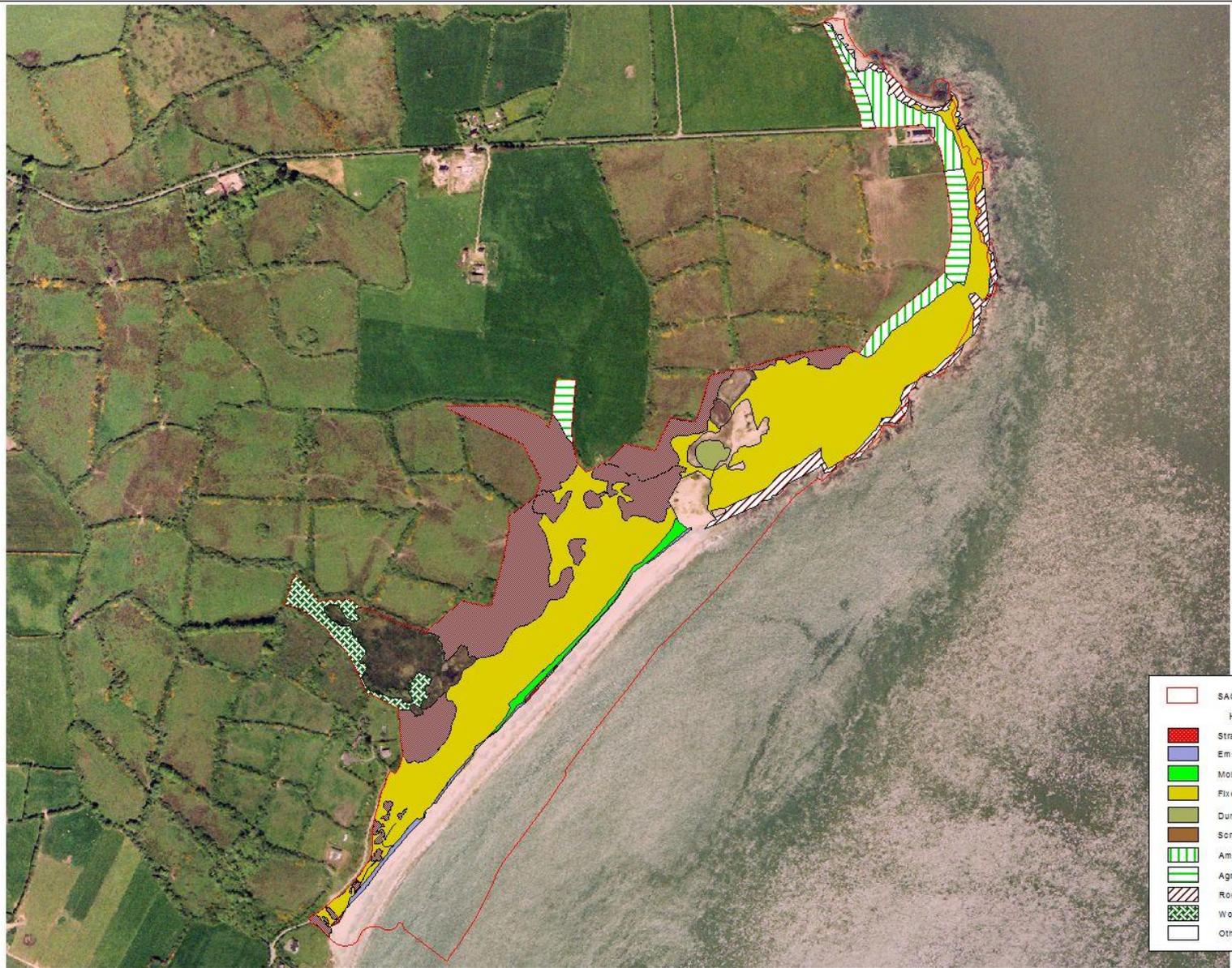
Although annual strandline habitat is of limited extent, and is currently confined to two small patches, there is no evidence that it has recently shown a trend towards declining area. Habitat extent is therefore rated as *favourable*.

Monitoring stops were not carried out in the habitat, although the presence of a number of typical species, and vegetation of robust and healthy appearance justifies a *favourable* structure and functions assessment.

Annual strandline vegetation may be less susceptible than other habitats to the damaging effects of some recreational activities or intensive agricultural management. Indeed, the availability of sediment released from erosion in the sand hills may act to increase the extent of strandline vegetation. Although this is undesirable in the context of the conservation value of the sand hills as a whole, it suggests that the future prospects of the habitat can be considered *favourable*.

As all three components of conservation status assessment are *favourable*, that is also the overall conservation status assessment. As is the case at some other sites where erosion is occurring at significant rates, a favourable assessment for annual strandline is somewhat trivial and should not be considered as a positive indicator of dune development.

The Irish conservation status assessment, in the absence of any previous data on habitat extent or condition, is considered *favourable-maintained*.



	SAC 1742
Habitats	
	Stranline
	Embryonic Dune
	Mobile Dune
	Fixed Dune
	Dune Slack
	Scrub
	Amenity grassland
	Agricultural land
	Rocky cliff + vegetation
	Woodland (all types)
	Other (Undefined)

	Coastal Monitoring Project 2004-2006	Kilpatrick Kilpatrick Sandhills (SAC 1742)	CMP code: 023	0 100 200 300 400 Meters 	
			<small>This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number: 5953)</small>	Date of production: 25/11/2008 Map version: 1	