

**Raven Point Nature Reserve SAC (site code 710)
Conservation objectives supporting document
-coastal habitats**

NPWS

Version 1

October 2011

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Please note that the opinions expressed in the site reports from the Coastal Monitoring Project 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 (2011) Conservation Objectives: Raven Point Nature Reserve SAC 000710. Version
1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.**

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 (Commission of the European Communities, 2003). 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.

Raven Point Nature Reserve SAC is situated on the northern side of Wexford Harbour and incorporates the large dynamic sand dune system of the Raven as well as sand flats, saltmarsh and afforested areas. The southern end of Raven Point is particularly dynamic where significant accretion is building the dunes westwards along the wall which forms the southern boundary of the Wexford Slobs. Lagoons occur as a transient feature associated with this highly dynamic coastal system.

The site represents one of the few afforested dune systems in Ireland. The site was planted with commercial conifer forest in the 1930s and 1950s, partly as a defence measure to stabilise the dunes and protect the slobs behind. Species planted include Corsican pine (*Pinus nigra* var *maritima*), sitka spruce (*Picea sitchensis*), Scot's pine (*Pinus sylvestris*), contorta pine (*Pinus contorta*), Monterey pine (*Pinus radiata*), Mountain pine (*Pinus mugo*) and monkey puzzle (*Araucaria araucana*). Although the natural structure of the dunes has been compromised by the presence of commercial forestry, the site is of high conservation value and supports a number of rare and protected species, including round-leaved wintergreen (*Pyrola rotundifolia* ssp. *maritima*) and lesser centaury (*Centaureum pulchellum*).

Raven Point Nature Reserve SAC (site code: 710) is designated for a range of coastal habitats including sand dunes and saltmarsh. The following seven Annex I coastal habitats are included in the qualifying interests for the site:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)
- Annual vegetation of drift lines (1210)
- Embryonic shifting dunes (2110)
- Shifting dunes along the shoreline with *Ammophila arenaria* (2120)
- Fixed coastal dunes with herbaceous vegetation (2130)
- Dunes with *Salix repens* (2170)
- Humid dune slacks (2190)

The first habitat is a saltmarsh habitat and the last six are associated with sand dune systems where they occur in complex mosaics. A map of the known distribution of saltmarsh habitats found at the Raven is presented in Appendix I and a map of the known distribution of sand dune habitats is presented in Appendix II.

This backing document sets out the conservation objectives for the seven coastal habitats listed above in Raven Point Nature Reserve 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 saltmarsh present at the Raven is of recent origin and was not included in the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009). An area of 1.523ha was mapped during the Coastal Monitoring Project (Ryle *et al.*, 2009), but its conservation value was not assessed. Therefore the current targets set for the Atlantic salt meadows are based on generic targets set for this habitat and may change in light of future survey work.

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009) and this document should be read in conjunction with that report. As part of the Coastal Monitoring Project (CMP) a detailed individual report and habitat map was produced for the site and this is included in the Appendices to this document (Appendix III).

2 Conservation Objectives

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

3 Saltmarsh habitats

Saltmarshes are stands of vegetation that occur along sheltered coasts, mainly on mud or sand, and are flooded periodically by the sea. They are restricted to the area between mid neap tide level and high water spring tide level. In Ireland, there are four saltmarsh habitats listed under Annex I of the EU Habitats Directive (92/43/EEC):

- *Salicornia* and other annuals colonising mud and sand (1310)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)
- Mediterranean salt meadows (*Juncetalia maritimi*) (1410)
- Mediterranean and thermo-Atlantic halophilous scrub (1420)

Atlantic salt meadows (ASM) is the only habitat listed as a Qualifying Interest for Raven Point Nature Reserve SAC, although Ryle *et al.* (2009) also recorded the presence of a significant area of *Salicornia* mudflats (1.3ha).

3.1 Overall Objectives

The overall objective for 'Atlantic salt meadows' in Raven Point Nature Reserve SAC is to 'maintain the favourable conservation condition'.

This objective is based on an assessment of the current 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 extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. This site was not surveyed by the Salt marsh Monitoring Project (SMP), however an area of 1.523ha of saltmarsh habitat was mapped during the CMP (Ryle *et al.* 2009). This baseline habitat map is included with the individual site report at the end of this document (Appendix III). Most of this area is *Salicornia* mudflats, but 0.221ha is Atlantic salt meadow (ASM). This saltmarsh system is of recent origin and should continue to develop naturally.

The target is that the area should be stable or increasing, subject to natural processes, including erosion and succession.

3.3 Range

3.3.1 Habitat distribution

Saltmarsh is currently found at the southern tip of the site in close association with the sand dune habitats (Ryle *et al.* 2009).

There should be no decline or change in the distribution of Atlantic salt meadow habitat, 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 saltmarshes are governed by sediment supply, tidal regime, wind-wave climate and sea level change. The slope of the saltmarsh allows the development of several ecological gradients such as tidal submergence and salinity, and this

influences the development of distinctive zones of halophytic (salt-tolerant) plant communities. The saltmarsh zonation at the Raven is not well developed in view of its recent origin. Maintaining the favourable conservation condition of the ASM habitat in Raven Point Nature Reserve in terms of its structure and functions depends on a range of attributes for which targets have been set as outlined below.

3.4.1 Physical structure: sediment supply

Accretion and erosion are natural elements of saltmarsh systems and the Raven is a naturally highly dynamic system. Maintaining the sediment supply is vital for the continued development and natural functioning of a saltmarsh system. Interruption to the sediment circulation through physical structures can starve the system and lead to accelerated erosion rates.

The target is therefore to maintain the natural circulation of sediment and organic matter, without any physical obstructions.

3.4.2 Physical structure: creeks and pans

Saltmarshes can contain a distinctive topography with an intricate network of creeks and pans occurring on medium to large-sized sites. Creek density is influenced by vegetation cover, sediment supply and tidal influence. Creeks absorb tidal energy and assist with delivery of sediment into the saltmarsh. The efficiency of this process depends on creek pattern. Creeks allow pioneer vegetation to become established along their banks higher up into the saltmarsh system. Major erosion of saltmarsh is indicated by internal dissection and enlargement of the drainage network, ultimately leading to the creation of mud basins. However, the saltmarsh at the Raven is of recent origin and has yet to develop a creek and pan network.

The target for this particular site is to allow creek and pan networks to form, subject to natural processes, including erosion and accretion.

3.4.3 Physical structure: flooding regime

The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and indeed survival of saltmarshes. Saltmarsh vegetation consists of a limited number of halophytic species that are adapted to regular immersion by the tides. Species in the lowest part of the saltmarsh require regular inundation, while those higher up on the marsh can only tolerate occasional inundation.

The target is to maintain a flooding regime whereby the lowest levels of the saltmarsh are flooded daily, while the upper levels are flooded occasionally (e.g. highest spring tides).

3.4.4 Vegetation structure: zonation

Saltmarshes are naturally dynamic coastal systems. In order to ensure the ecological functioning of all of the saltmarsh habitats it is vital to maintain the zonations and transitions to other habitats, including inter-tidal, shingle and sand dune habitats.

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

3.4.5 Vegetation structure: vegetation height

A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds.

The target is to maintain structural variation within the sward. A general guideline is that there should be a sward ratio of 30% tall:70% short across the entire saltmarsh.

3.4.6 Vegetation structure: vegetation cover

Vegetation cover can have a major effect on saltmarsh development by reducing the velocity of the tide and thereby enhancing the deposition of sediment. Excessive bare mud can lead to destabilisation and accelerated erosion of the system.

The target is to maintain >90% of the saltmarsh vegetated.

3.4.7 Vegetation composition: typical species & sub-communities

Saltmarshes contain several distinct zones that are related to elevation and frequency of flooding. The lowest part along the tidal zone is generally dominated by the most halophytic (salt-tolerant) species including common saltmarsh-grass (*Puccinellia maritima*) and species more usually associated with *Salicornia* muds. The mid-marsh zone is generally characterised by sea thrift (*Armeria maritima*), sea plantain (*Plantago maritima*) and sea aster (*Aster tripolium*). This mid-zone vegetation generally grades into an herbaceous community in the upper marsh, dominated by red fescue (*Festuca rubra*), sea milkwort (*Glaux maritima*) and saltmarsh rush (*Juncus gerardii*). At the Raven, vegetation associated with the low and mid-marsh zones have been recorded.

The target for this attribute is to ensure that a typical flora of saltmarshes is maintained, as are the range of sub-communities within the different zones. Below are lists of typical species for the different saltmarsh zones, although some of these species have a restricted distribution nationally

and may not occur in the Raven area. In addition, the saltmarsh at the Raven is of recent origin and as a result the vegetation composition is not as diverse as at other sites.

Typical species		
Lower marsh	Low-mid marsh	Mid-upper marsh
<i>Salicornia</i> spp. <i>Suaeda maritima</i> <i>Puccinellia maritima</i> <i>Aster tripolium</i>	<i>Puccinellia maritima</i> <i>Triglochin maritima</i> <i>Plantago maritima</i> <i>Atriplex portulacoides</i> <i>Aster tripolium</i> <i>Spergularia</i> sp. <i>Suaeda maritima</i> <i>Salicornia</i> spp. <i>Glaux maritima</i> Turf fucoids	<i>Festuca rubra</i> <i>Juncus gerardii</i> <i>Armeria maritima</i> <i>Agrostis stolonifera</i> <i>Limonium humile</i> <i>Glaux maritima</i> <i>Seriphidium maritimum</i> <i>Plantago maritima</i> <i>Aster tripolium</i> <i>Juncus maritimus</i> <i>Triglochin maritima</i> <i>Blysmus rufus</i> <i>Eleocharis uniglumis</i> <i>Leontodon autumnalis</i> <i>Carex flacca</i> <i>Carex extensa</i> Turf fucoids

3.4.8 Vegetation composition: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (*Spartina anglica*). The aim is that negative indicators such as *Spartina* should be absent or under control. The Coastal Monitoring Project did record a very small area of *Spartina* from the south-west corner of the site.

The current target is that it there should be no significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.

4 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.

Although much of The Raven has been stabilised by plantation forestry, it remains an extremely dynamic system and displays extensive patterns of erosion (along its eastern side) and accretion (along its southern side). A vegetation map produced in 1980 (Anon, 1980) shows good foredune development along the length of the eastern side, although erosion was noted as a problem in areas. The erosion problem appears to coincide with harbour construction works, in particular the construction of new piers and works in Rosslare Harbour just south of Wexford, to accommodate the modern facilities for the ferry companies and their passengers in the early 1980's. The new harbour configuration has acted as a large groyne, trapping large quantities of sediment on the updrift side and preventing longshore drift northwards along the coast. Any sand bypassing the harbour is now pushed into deeper water and is lost to the beaches to the north, including The Raven.

The loss of habitats along the eastern flank of the site has been somewhat compensated by the accretion along the south and the subsequent development of dune and saltmarsh vegetation. These changes are particularly evident when the CMP habitat map (Appendix III) is compared with the vegetation map produced in 1980 (Anon, 1980).

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* (2120)**
- **Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) ***
- Decalcified dunes with *Empetrum nigrum* (2140) *
- Decalcified dune heath (2150) *
- **Dunes with *Salix repens* (2170)**
- **Humid dune slacks (2190)**
- Machair (21AO) *

The six habitats indicated in bold above are listed as Qualifying Interests for Raven Point Nature Reserve SAC. A small area of 'Perennial vegetation of stony banks' associated with the site was also noted by the CMP (Ryle *et al.*, 2009). The vegetation of The Raven is described in Anon (1980), while more recent descriptions of each sand dune habitat found at Raven Point Nature Reserve SAC during the Coastal Monitoring Project (Ryle *et al.*, 2009) can be found in Appendix I.

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*). At the Raven this habitat was confined to an area in the south-west and was absent from the entire east coast stretch from Raven Point to Curraclloe, where erosion has taken place in recent times (Ryle *et al.*, 2009).

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. A large actively accreting area near Raven Point, at the southern tip of the site, accounted for much of the total embryonic dune area (Ryle *et al.*, 2009).

Where sand accumulation is more rapid, 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. A number of substantial mobile dune ridges have developed in recent years in the south of the site at Raven Point (Ryle *et al.*, 2009). Mobile dunes display a more patchy distribution along the eastern flank from Raven Point to Curraclloe, reflecting the effects of sea erosion. It is difficult to assess how much of this erosion is natural and how much can be attributed to human intervention associated with the harbour developments.

Fixed dunes refers 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. At the Raven, the fixed dunes are notable for their significant lichen and moss content (Ryle *et al.*, 2009).

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 top 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 (*Epipactis 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. There are a number of dune slacks throughout the Raven, including some within the wooded area. Others have developed in association with artificial ponds, created as habitat for the Natterjack toad (*Bufo calamita*), which has been successfully introduced at the site. Other ponds have been created for use as forest fire reservoirs. Many slacks are known to have dried up due to afforestation or scrub encroachment (Ryle *et al.*, 2009).

Dunes with creeping willow (*Salix repens*) occur where this shrub forms a dense ground cover and are found in close association with dune slacks. The distinguishing feature is the proximity of the water table to the surface, which in the case of dunes with *S. repens* is below a level where it exerts an influence on the vegetation. As a result, the moisture-loving plants generally associated with dune slacks are noticeably reduced or absent. Dunes with *S. repens* are often found on sandy hummocks within slacks, or on the sides of dune ridges adjacent to slacks. At the Raven there is good species diversity in this habitat and species of particular interest include the nationally protected round-leaved wintergreen (*Pyrola rotundifolia* ssp. *maritima*). Other diagnostic species of this habitat include carline thistle (*Carlina vulgaris*), sand sedge (*Carex arenaria*), red fescue (*Festuca rubra*), Lady's bedstraw (*Galium verum*), common birds-foot trefoil (*Lotus corniculatus*) as well as a high proportion of *Salix repens* (Ryle *et al.* 2009). Within Raven Point SAC, the *Salix* dune habitat is located within a cleared zone in the plantation area and is somewhat raised and drier than the surrounding habitat. Trees may play a role in influencing the water table and producing the conditions that lead to the drying of dune slacks and the establishment of vegetation communities that are characteristic of *Salix repens* dunes (Ryle *et al.*, 2009).

All 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 a geomorphological unit. 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.

4.1 Overall objectives

The overall objective for 'Annual vegetation of drift lines' in Raven Point Nature Reserve SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Embryonic shifting dunes' in Raven Point Nature Reserve SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Raven Point Nature Reserve SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation' in Raven Point Nature Reserve SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Dunes with *Salix repens*' in Raven Point Nature Reserve SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Humid dune slacks' in Raven Point Nature Reserve SAC is to 'restore the favourable conservation condition'.

These objectives are based on an assessment of the current 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.

4.2 Area

4.2.1 Habitat extent

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 Raven Point Nature Reserve SAC during the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009). This map is included with the individual site reports in Appendix I at the end of this document. The total areas of each sand dune habitat within the SAC 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 some overlapping polygons and mapping errors. The adjusted figures are presented in the final column. The total area currently under forestry (1849.67ha) is included as 'potential' dune habitat, although it is acknowledged that not all of this area has the potential to revert to sand dune habitat.

Habitat	Total area (ha) of habitat from CMP	Total area (ha) of habitat within SAC boundary
Annual vegetation of drift lines	0.369	0.369
Embryonic shifting dunes	1.087	1.127
Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	5.231	9.370
Fixed coastal dunes with herbaceous vegetation	26.937	22.654
Dunes with <i>Salix repens</i>	0.112	0.136
Humid dune slacks	0.743	0.753
Sub-total	34.479	34.409
Potential dune habitat (i.e. area under forestry)	1849.67	1849.67
Total	1884.149	1884.079

The general target for this attribute in the case of each habitat is that the area should be stable, or increasing. However, in the case of 'embryonic dunes' and 'shifting dunes along the shoreline with *Ammophila arenaria*' losses were reported during the baseline survey (Ryle *et al.*, 2009). Therefore, the target for these two habitats is that they should be increasing. In addition, the dune slack and fixed dune areas should ideally be increasing in view of the proposed removal of trees from parts of the site. 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.

4.3 Range

4.3.1 Habitat distribution

The main body of the Raven supports afforested dune habitat, the remainder of the site is extremely dynamic. The strandline, embryo dune, mobile dune, fixed dune, dune slack and dunes with *Salix repens* habitats at the Raven occur along the eastern, southern and south western edges. The distribution as mapped by Ryle *et al.* (2009) is presented in Appendix I. It is likely however that within the area mapped as afforested dunes there may be areas of the above habitats present.

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.

4.4 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 Raven Point Nature Reserve SAC in terms of structure and functions depends on a range of attributes for which targets have been set as outlined below.

4.4.1 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, as is the case at the Raven, as a result of harbour developments at Rosslare and Wexford. 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, 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.

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. The sediment supply has been compromised by the works associated with Rosslare and Wexford Harbour, but the system should now be moving towards a more natural state of equilibrium.

4.4.2 Physical structure: hydrological and flooding regime

The conservation of dune slacks and dunes with *S. repens* is inextricably linked with the local hydrological regime. Dune slacks are characterised by the proximity of a groundwater table that is maintained by the combination of an impermeable layer in the soil, or deeper salt water and precipitation. Dunes with *S. repens* are closely associated with dune slacks but are distinguished from them by a water table that is at a depth that no longer exerts an influence on the vegetation. Most dune slacks are fed by a range of water sources, including precipitation water, surface water or groundwater. The latter two sources are usually somewhat calcareous while the former is acid.

The most important influence on the nature and vegetation of a dune slack is the groundwater-table, which can fluctuate considerably throughout the year. The frequency and duration of periods of flooding or inundation determines the vegetation composition. The water table depth has been identified as the primary determining factor in vegetation variation, followed by weak trends in calcium and sodium availability. Other contributing factors include stage of development, precipitation, distance from the sea, the grazing regime, recreational pressure, nature of the sediment, soil pH and the porosity of the sediment.

Dune slack habitats should never be considered in isolation, but as part of the larger dune system that functions as an eco-hydrological unit. Dune slacks are highly sensitive to human influences on their hydrology, either through water abstraction or drainage works. Most dune slacks are fed by a range of water sources, including precipitation water, surface water or groundwater. Generally, the maintenance of a naturally functioning dune slack depends on both the amount of (a) precipitation and (b) groundwater discharge. Water abstraction interferes with the local hydrology, potentially having serious implications for the plant and animal communities of slacks. Abstraction can lower the level of the groundwater table, causing the slacks to dry out. It can also lead to saline infiltration in slacks formed close to the front of a dune system and particularly where the underlying substrate is highly permeable (e.g. shingle).

The target is to ensure that the hydrological regime continues to function naturally and that there are no increased nutrient inputs in the groundwater.

4.4.3 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 the saltmarsh communities.

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

4.4.4 Vegetation structure: bare ground

This target applies to fixed dunes, dunes with *Salix repens* and dune slacks. It does not apply to the other habitats present where high levels of bare sand are a natural component of the habitat. In the fixed and slack 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.

The target is to achieve up to 10% bare sand, with the exception of pioneer slacks which can have up to 20% bare sand. This target is assessed subject to natural processes.

4.4.5 Vegetation composition: plant health of dune grasses

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.

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

4.4.6 Vegetation composition: vegetation height

This attribute applies to the more fixed habitats (fixed dunes, dunes with *S. repens* and dune slacks). 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).

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

4.4.7 Vegetation structure: vegetation cover

The only habitat where this is a specific attribute is humid dune slacks where that target is to maintain less than 40% cover of *S. repens*. This species forms a natural component of many dune slack communities in Ireland. However, high covers of this shrub can lower the level of water-table causing the slacks to dry out. It can also form a dense canopy that shades out slack species leading to a reduction in biodiversity.

The target is therefore to keep the cover of *S. repens* below 40%.

4.4.8 Vegetation composition: typical species & 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 birdsfoot trefoil (*Lotus corniculatus*), wild thyme (*Thymus praecox*), kidney vetch (*Anthyllis vulneraria*), wild pansy (*Viola tricolor*) and biting stonecrop (*Sedum acre*).

The Raven supports a characteristic dune flora, details of which can be found in Anon (1980) and in the site report from the CMP (Ryle *et al.*, 2009) which is included in Appendix I. Rare elements of the site flora include round-leaved wintergreen (*Pyrola rotundifolia* ssp. *maritima*) and lesser century (*Centaureum pulchellum*), which are indicators of local distinctiveness. Other notable species from the Raven include wild asparagus (*Asparagus officinalis* ssp. *prostratus*) and yellow bird's-nest (*Monotropa hypopitys*), the latter of which is associated with the forestry.

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

4.4.9 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 *Pteridium aquilinum* and *Hippophae rhamnoides*. The invasion of non-native species compromises the typical plant community structure. *Pteridium aquilinum* 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 *H. rhamnoides*, which can form dense impenetrable thickets.

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

4.4.10 Vegetation composition: scrub/trees

This attribute only applies to the fixed dunes, dunes with *S. repens* and dune slacks. 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 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. However, in the case of 'dunes with *S. repens*', this scrub/tree cover target excludes the shrub *Salix repens* (see 4.4.7).

5 References

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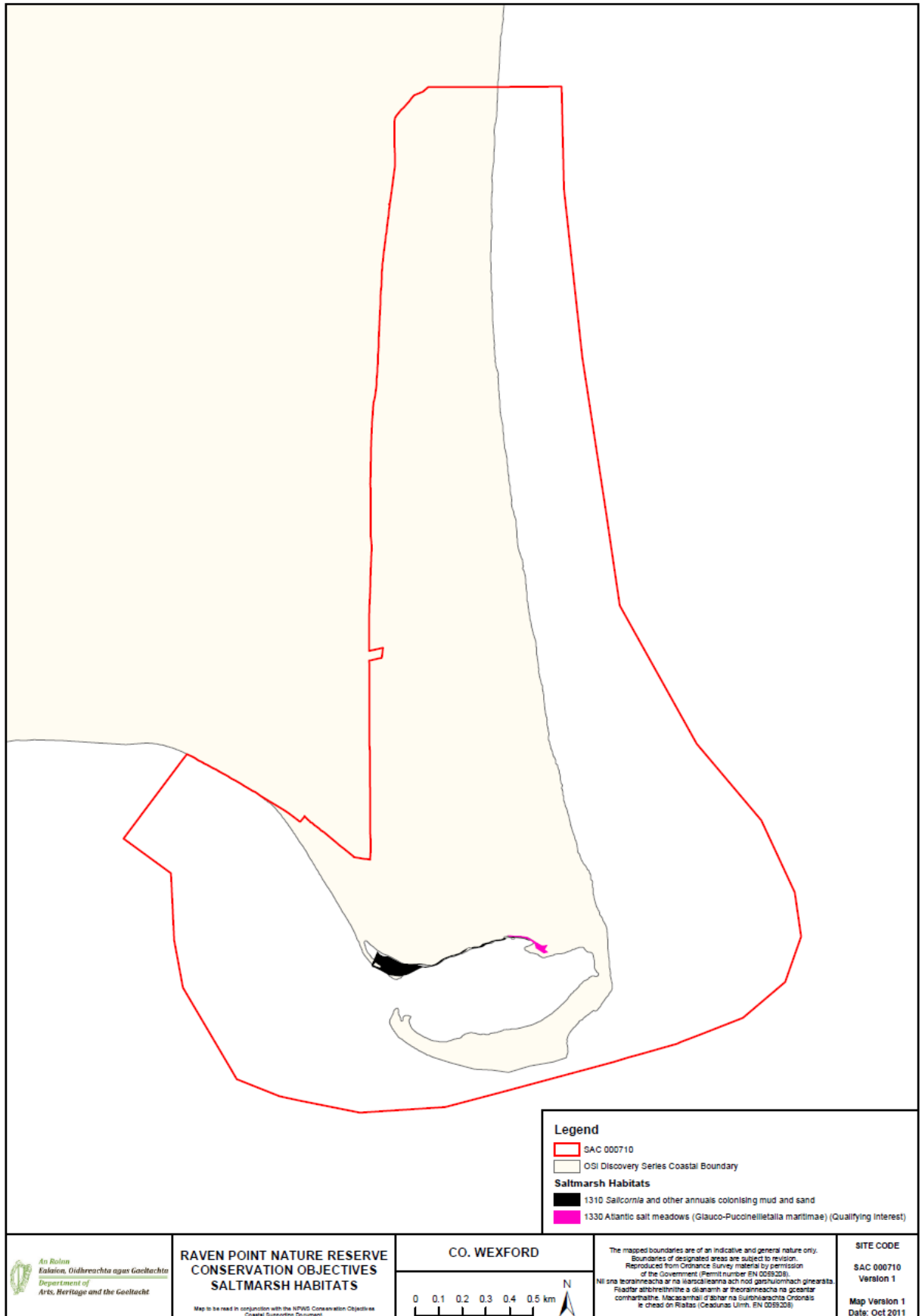
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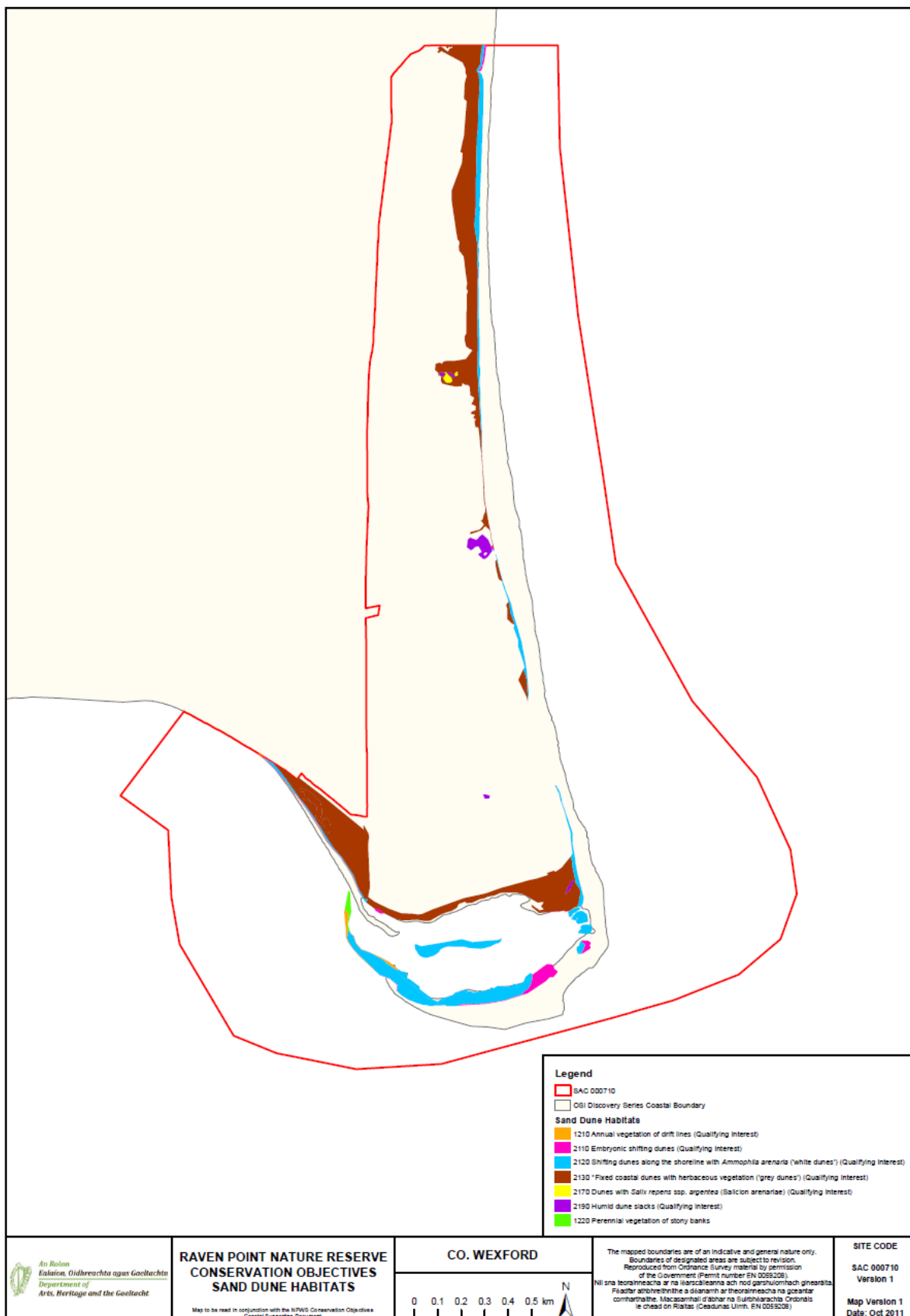
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Appendix I – Saltmarsh habitats distribution map.



Appendix II – Sand dune habitats distribution map.



Appendix III – The Raven Point Nature Reserve SAC site report and habitat map from the CMP (Ryle *et al.* 2009)

SITE DETAILS

CMP04 site name: **The Raven** CMP04 site code: **035** CMP Map No.: **33**

County: **Wexford** Discovery map: **77** Grid Reference: **T 115 225**

6 inch Digital Photographs: **WX 033 & 038**

Aerial photographs (2000 series): **O 5391-B & D; O 5452-B & D; O 7063-A & C**

NPWS Site Name: **Raven Point Nature Reserve**

NPWS designation: pNHA: **710** cSAC: **710** SPA: **4019**

 Nature Reserve: **Raven** Other: **Ramsar site**

Ranger Area: **Wexford South**

MPSU Plan: **N/A**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

The Raven, on the north side of Wexford harbour, comprises the dynamic sand system of Raven point, and a long (approximately 4 km) stretch on the east coast, from Raven Point to Curracloe House. Most of the site is included in a statutory nature reserve of 589ha, which was established in 1983. The cSAC in which the dune system is located (Raven Point Nature Reserve cSAC 710) also includes marine areas, sea inlets and afforested areas.

The Raven is a very dynamic coastal system, known to be accreting westwards along the southern boundary of the adjacent Wexford slob. The rate of accretion in this area has recently been measured at about 3 m per year. A number of substantial building dunes, mapped at the tip of Raven Point during the current survey, seem to be considerably larger than they appeared in the 2000 series aerial photographs. Long term changes in this area can be seen by comparison with Raven point on the 6' series maps.

Much of the sand dune area was planted with exotic conifers in the early 1930's and 1956/1957, mainly as a coastal defence measure. Among the more commonly planted

species were *Pinus nigra* (Maritime pine), *P. sylvestris* (Scot's pine) and *Picea sitchensis* (Sitka spruce).

Recent erosion along the eastern stretch of coast has been quite severe. In a number of places, erosion has continued for some distance into the wooded area, toppling mature trees onto the strand. The seaward side of the front dune ridge is quite bare of vegetation in places, although some of these areas are being stabilised by the growth of *Ammophila arenaria* (Marram). However, as the site appears to be in dynamic balance, with erosion occurring towards the north and accretion to the south, the rates of erosion are not as big a cause of concern as might otherwise be the case. Material eroded in some areas appears to provide sediment for accretion in other areas.

The EU Annex I sand dune habitats at the Raven are listed in Table 35A. Other Annex I habitats include Atlantic salt meadow, *Salicornia* mud, sand flats and lagoons, all of which are found at the southern tip of the site, in close association with the sand dunes.

Table 35A Areas of EU Annex I habitats mapped at The Raven

<i>EU Code</i>	<i>EU Habitat</i>	
H1210	Annual vegetation of driftlines	0.369
H1220	Perennial vegetation of stony banks	0.204
H2110	Embryonic shifting dunes	1.087
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	5.231
H2130	Fixed coastal dunes with herbaceous vegetation	26.937
H2170	Dunes with <i>Salix repens</i>	0.112
H2190	Humid dune slacks	0.743
	<i>Total Sand dune</i>	34.683

There are a number of notable elements in the flora at The Raven, including the very rare Round-leaved wintergreen (*Pyrola rotundifolia* ssp. *maritima*), which was noted in dune slacks in the present survey. Broad-leaved helleborine (*Epipactis helleborine*) was noted in the forested area. Also noted was *Juncus acutus* (Sharp rush). Material adequately matching the accepted description of Lesser centaury (*Centaureum pulchellum*) was examined, but, as was the case at a number of other sites, at least as much material seemed to be intermediate in characteristics between *C. pulchellum* and *C. erythraea*. Other notable species known from The Raven, which were not recorded in the present survey, include Wild asparagus (*Asparagus officinalis* ssp. *prostratus*) and Yellow bird's-nest (*Monotropa hypopitys*).

The Raven is renowned for its invertebrate fauna, which includes several rare species, and species of limited distribution with a requirement for undisturbed dune habitat. It is also a Special Protection Area (SPA 4019), and supports populations of European importance of Greenland White-fronted Goose, Red-throated Diver, Great Northern Diver, Common Scoter and Slavonian Grebe.

Fixed dunes (H2130)

The fixed dunes, amounting in total to almost 27ha (Table 35A), are comprised of a number of discrete large areas (and several smaller patches), at the southern tip of the site and also along the east coast stretch towards Curraclloe. Along the eastern portion of the site, stretching from Raven Point to Curraclloe, there are areas (particularly to the south) where fixed dune is absent. In these places, the afforested zone runs right to the beach. Much of the total forested area covers fixed dune habitat, but only the open areas were mapped here. Previous studies, such as the NATURA 2000 survey, have suggested it is inadvisable to include wooded areas as fixed dune, due to the dramatic modification of habitat that has taken place from the influence of growing trees. However, mapping much of the afforested area as fixed dune could be justified on the basis that it can be restored as a functioning element of the dune system. Should future monitoring and reporting surveys adopt this approach, the reported area of fixed dunes will be greatly increased.

There are currently plans to restore some of the sand dunes by felling trees. In such cases, it may be necessary to instigate an appropriate grazing regime, if the cleared areas are not to revert entirely to scrub and woodland.

The fixed dunes support a good diversity of typical species, such as *Festuca arubra* (Red fescue), *Daucus carota* (Wild carrot), *Hypochaeris radicata* (Cat's ear), *Galium verum* (Lady's bedstraw) and *Lotus corniculatus* (Common Bird's-foot trefoil). In places there is an abundance of *Cladonia* spp. and *Peltigera* spp. lichens, and mosses such as *Hypnum cupressiforme* and *Rhytidiadelphus triquetris*.

Four monitoring stops were carried out in the fixed dunes, including two in the south-west corner of the site – one of which reflected a rather rank area with large amounts of Marram and little or no short turf; the other one was placed towards the back of the zone, where *Rosa pimpinellifolia* (Burnet rose) was common. This area also had greater species diversity and was largely free of Marram. Another monitoring stop, in the south-east end of the site also contained a high proportion of Marram, reflecting the general lack of short turf in the area, while the fourth monitoring stop was situated on the east coast near Curraclloe, in an area with both dune slack and *Salix repens* dunes. The fixed dunes here are among those areas with significant lichen and moss content.

Bare ground in the fixed dunes exceeds 10% of the total area, largely due to the presence of tracks, and the effects of erosion along the east coast stretch. This amount of bare ground is generally considered undesirable in fixed dunes.

Dunes with *Salix repens* (H2170)

Areas mapped as Dunes with *Salix repens* ssp. *argentea* (*Salicion arenaria*) at the site have previously been considered as humid dune slacks, probably at least partly due to the overlap between these two habitat types, as described in the Interpretation manual of EU habitats. However, NPWS staff have recently confirmed the presence and significance of Dunes with *S. repens* at The Raven. There is a good diversity of species in the habitat at the site, including the nationally protected *Pyrola rotundifolia* ssp. *maritima* (Round-leaved wintergreen) and *Carlina vulgaris* (Carlina thistle). These species are considered to be diagnostic of the habitat. A single monitoring stop, reflecting the presence of the above-named species, and also a high proportion of *S. repens*, was carried out. Other species in the habitat included *Carex arenaria* (Sand sedge), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common Bird's-foot-trefoil).

The mapped area of dunes with *S. repens* - amounting to little more than 0.1 ha - is associated with dune slack and fixed dune. The *Salix* dune habitat is located within a cleared zone in the plantation area and is somewhat raised and drier than the surrounding habitat. The marked similarities in the habitat at The Raven and those found at Strandhill (site 133) and Mullanasole (site 142), which are also within clear areas in conifer plantations, suggests the trees may play a role in influencing the water table and

producing the conditions that lead to the drying of dune slacks and the establishment of vegetation communities that are characteristic of *Salix repens* dunes.

1.2 Humid dune slacks (H2190)

There are a number of dune slacks throughout the site, including some within the wooded area. Others have developed in association with artificial ponds, created as habitat for the Natterjack toad (*Bufo calamita*), which has been successfully introduced at the site. Other ponds have been created for use as forest fire reservoirs. Many slacks are known to have dried up due to afforestation or scrub encroachment. The single monitoring stop carried out in the habitat contained species such as *Juncus acutus* (Sharp rush), *J. articulatus* (Jointed rush), *Carex arenaria* (Sand sedge), and *Lotus corniculatus* (Common Bird's-foot-trefoil).

The total area of dune slack mapped was just under 0.75 ha, although all slacks in the wooded areas may not have been located due to their small size and the large survey area.

Mobile dunes (H2120)

Over 5ha of mobile dune were mapped, although much of the total area consisted of numerous isolated patches of habitat, spread throughout the site. In common with embryonic and fixed dunes, mobile dune was absent along significant stretches from Raven Point to Curraclloe, reflecting the affects of sea erosion. However, significant building of mobile dune, including a number of substantial ridges at Raven Point, has occurred in recent years. Some habitat mapped as mobile dune consists of building Marram in front of previously eroded dune faces.

The mobile dune ridges are not particularly high, with none attaining heights greater than 5m. The habitat was characterised by the presence of *Ammophila arenaria* (Marram) and *Euphorbia paralias* (Sea spurge).

Embryonic dunes (H2110)

The embryonic dunes, characterised by the presence of *Elytrigia juncea* (Sand couch) and *Leymus arenarius* (Lyme-grass), amounted to just over 1ha in total area. A large actively

accreting area near Raven Point, at the southern tip of the site, accounted for much of the total embryonic dune area. The remainder consisted of numerous, mostly very small, individual patches of habitat. Zone health was generally thought to be good and was reflected in both of the monitoring stops that were carried out in the habitat.

Shingle strandline (H1220)

A single strip of just over 0.2ha represented the shingle strandline mapped at the site. However, the habitat was not noted at The Raven in the NATURA 2000 survey. It remains to be seen if it will persist in the future. Species noted included *Beta vulgaris* ssp. *maritima* (Sea beet) and *Tripleurospermum maritimum* (Sea mayweed).

Annual Vegetation of Driftlines (H1210)

Strandline habitat mapped at the site, consisted of a number of separate patches near Raven Point, amounting to 0.37 ha in total area. The habitat was absent from the entire east coast stretch from Raven Point to Curraclloe, where erosion has taken place in recent times. A single monitoring stop, on the seaward side of embryonic and mobile dunes in the south-west end of the site, was taken in the habitat. The typical strandline plants, *Cakile maritima* (Sea rocket), *Honckenya peploides* (Sea sandwort), *Salsola kali* (Prickly saltwort) and *Atriplex laciniata* (Frosted orache), were all noted at the site.

IMPACTS

Activities observed or known to be impacting on sand dune habitats at The Raven are shown in table 35B. Most of the site is a statutory nature reserve, which may afford protection from some potentially damaging uses. However, Curraclloe at the north end of the site is a popular summer resort, resulting in considerable pressure from recreational activities (code 622). Car parking and picnic tables etc. are in place to facilitate visitors. Pedestrian tracks are common on the eastern stretch of the site between Raven point and Curraclloe. Birdwatching is a popular activity around Raven point. Some of the pedestrian tracks in this area may be attributable to use resulting from this activity.

Table 35B Intensity and impact of various activities on sand dune habitats at the Raven

<i>EU Habitat Code</i> ¹	<i>Activity Code</i> ²	<i>Intensity</i> ³	<i>Impact</i> ⁴	<i>Area affected/ha</i>	<i>Location of Activity</i> ⁵
H2130	149	B	-1	8	Inside
H2130	160	A	-1	70	Inside
21BB	421	C	-1	0.2	Inside
21BB	621	D	0	Unknown	Outside
H2120	622	C	-1	0.5	Inside
H2130	622	C	0	3	Inside
H2130	720	B	-1	2	Inside
H2110	900	A	-1	0.5	Inside
H2120	900	A	-1	2	Inside
H2130	900	B	-1	8	Inside
H2110	990	B	1	1	Inside

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

²Description of activity codes are found in Appendix 5

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

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

⁵Location 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

Horse riding is known to cause damage to habitats, particularly to the embryonic and mobile dunes at the northern end at the site. The southern parts of the site however, are some distance from habitation, car parks and the areas of heavy recreational use, providing some relief from potentially damaging activities.

The aquaculture zoning plan (Draft 2: Consultation) for The Raven SPA, noted an increased use of All-Terrain Vehicles (ATV's) on the beach in recent times, including at the southern tip of the Raven. Water sports such as jet skiing, yachting and pleasure boating (code 621) were also noted, although these activities are unlikely to negatively affect the sand dune habitats. Bait-digging and shellfish collection were also noted at the site but are also unlikely to be exert any noticeable influence.

Undergrazing (code 149) is impacting on the fixed dunes, leading to the encroachment of scrub and trees. This may become more pronounced in future, should larger areas of clear-felling be established, although the introduction of grazers (most likely horses or ponies) to maintain short turf areas between Natterjack Toad ponds has been mooted.

Forestry management (code 160) is regarded as having an influence of high intensity on the fixed dunes, principally through the loss or modification of natural sand dune area.

Separate activity codes dealing with any modification of hydrographic functioning or management of water levels arising from forestry management regimes, are not included, as the affects of these activities are not reliably estimated.

Erosion (code 900) has had a considerable influence on embryonic and mobile dunes, and is regarded as a repairable negative influence. However, as the site appears to be in dynamic balance, it should be considered that erosion in one area is providing sediment material to facilitate accretion elsewhere. Accretion (code 990) is currently exerting a positive influence, principally through the accumulation of embryonic dunes.

Some small scale littering (code 421) was noted.

CONSERVATION STATUS

The overall conservation status assessment of each habitat at The Raven is based on a combination of *Habitat Extent, Structure & Functions*, and *Future Prospects* assessments (Table 35C). Structure and functions were assessed by means of monitoring stops carried out in the habitats (Table 35D).

As is often the case where erosion and accretion are happening simultaneously at different parts of a site, there were difficulties in determining the overall conservation status of habitats, particularly those of a more ephemeral nature, such as embryonic dunes. However, much of the recent erosion can be attributed to natural processes.

Future prospects for the site are good insofar as it is state owned and carries a number of conservation designations. It is also a nature reserve. It is the focus for considerable attention from the state conservation agencies for a number of reasons, including the successful establishment of Natterjack toad populations at the site. Some of the measures aimed at improving toad habitat, such as improving connectivity between ponds through grazing, may also benefit sand dune habitats through the maintenance of short swards.

Table 35C Conservation status assessment of Annex I sand dune habitats at The Raven

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 - Unchanged
Annual Strandline (H1210)	Extent/ Structure & functions/ Future prospects			Favourable	Favourable-Maintained
Embryonic Dune (H1210)		Structure & functions/ Future prospects	Extent	Unfavourable - Bad	Unfavourable - Declining
Mobile Dune (H2110)		Extent/ Structure & functions/ Future prospects		Unfavourable - Inadequate	Unfavourable - Declining
Dunes with Salix repens (H2170)	Extent/ Structure & functions/	Future prospects		Unfavourable - Inadequate	Unfavourable- Unchanged
Dune Slack (H2190)	Extent/ Structure & functions	Future prospects		Unfavourable - Inadequate	Unfavourable - Unchanged

¹EU Codes as per Interpretation Manual

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

Current plans for the site include replacement of much of the conifer stands with hardwood species (NATURA 2000 survey report) and the expansion of clear-felled areas. It is thought this may lead to restoration of vegetation close to the original in a short time. However, some clear-felling has led to the regeneration of shrubs and trees. If the long-term intention is to promote restoration of fixed dune, then appropriate grazing regimes may have to be implemented. It may be felt that the site is large enough to facilitate both the expansion of fixed dune and establishment of native woodland.

The Wexford county council of 1993 explicitly states the aim of protecting The Raven nature reserve and encouraging greater use of it for recreation and education.

The status of rare elements of the site flora, particularly *Pyrola rotundifolia* ssp. *maritima* (Round-leaved wintergreen) and *Centaureum pulchellum* (Lesser centaury) should be monitored in the future and their presence at the site included as *indicators of local distinctiveness* in the relevant habitats, although It should be noted that Stace (1997) questions the taxonomic value of the subspecies of *P. rotundifolia*, pointing out that almost all diagnostic characteristics break down. Any significant threats to their status should be considered when assessing the future prospects of each habitat.

Fixed dunes (H2130)

Severe erosion along the east coast stretch from Raven Point to Curracloe has made significant inroads into fixed dune habitat, although this is largely attributable to natural processes. As recreational or other activities are unlikely to have contributed significantly to recent erosion, extent is considered *favourable*. The loss of a large proportion of the dunes to the forestry plantation is not factored into the assessment, as the planting pre-dates by many years the timeframe on which the current monitoring and reporting cycle is based.

Of the eight monitoring stops carried out in the fixed dunes, seven passed and one failed the overall required target, indicating *unfavourable-inadequate* structure and functions. Tracks created by pedestrian traffic and other recreational activities currently account for over 10% of the total habitat area. A number of negative indicator species such as *Senecio jacobaea* (Ragwort), *Cirsium arvense* (Creeping thistle) and *Lolium perenne* (Perennial rye-grass), were noted in the fixed dunes and were represented in some of the monitoring stops, but not at a level, individually or collectively, that exceeded the maximum cover of 5%, beyond which the attribute would be deemed to fail.

Table 35D Pass/Fail results of monitoring stops for Annex I sand dune habitats at The Raven

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Fixed dune (H2130)	7	1	Unfavourable - Inadequate
Strandline (H1210)	1	0	Favourable
Embryonic dune (H2110)	4	0	Favourable
Mobile dune (H2120)	7	1	Unfavourable - Inadequate
Dunes with <i>Salix repens</i> (H2170)	1	0	Favourable
Dune Slack (H2190)	3	0	Favourable

Future prospects are rated as unfavourable-inadequate, because of the ongoing damage caused by recreational use of the dunes and also because of the threat of scrub encroachment at the dune grassland/forestry plantation interface.

A combination of *favourable* and *unfavourable-inadequate* assessments for the individual parameters of conservation status, indicates an overall conservation status assessment of *unfavourable-inadequate*.

The corresponding assessment thought most appropriate under the proposed Irish conservation system is *unfavourable-unchanged*, as it is likely that the habitat has been in a similar condition for some time.

Humid dune slacks (H2190)

As there were no indications of a recent overall loss of area, extent (area) is considered *favourable*. Although some slacks are believed to have dried up due to afforestation, this may have pre-dated the current reporting cycle timeframe.

As all of the monitoring stops carried out passed the overall criteria, structure and functions are considered to be *favourable*.

Future prospects are regarded as *unfavourable-inadequate* due to the ongoing threat of scrub encroachment and the uncertainty regarding the impact of future forestry management practices on the extent and condition of dune slacks.

As the individual components of conservation status assessment are a combination of *favourable* and *unfavourable-inadequate* assessments, the overall assessment is *unfavourable-inadequate*.

The assessment thought most appropriate in the proposed Irish system is *unfavourable-unchanged*, reflecting the apparent long-term existence of the current significant threats to the habitat.

This habitat was rated as having ‘average or reduced conservation’ in the NATURA 2000 survey report, mostly due to uncertainty regarding the impact of forestry management techniques on their long-term prospects, and because some slacks, particularly the artificially created, are prone to dessication. Current recommendations for the site (developed by NPWS staff) include the expansion of clear-felled areas, which may have the affect of raising the water table and promoting slack development. It remains to be seen if this will be the case. Although some uncertainty surrounding the future prospects of dune slacks remains, a commitment to monitor water table changes arising from management practices should help to ensure their continued viability.

Dunes with *Salix repens* (H2170)

The Raven NATURA 2000 survey report did not deal thoroughly with this habitat and referred to a need for further field survey work. As there are no previous habitat extent data that may be used for the purposes of comparison with the present results, and in the absence of any indication of a recent loss of area, extent is rated as *favourable*.

As the only monitoring stop carried out in the habitat passed the overall target, structure and functions are rated as *favourable*. A single stop was deemed sufficient to represent the small area.

As the habitat faces the same threats that may negatively affect the dune slacks at the site - principally the threat of scrub encroachment and the uncertainty regarding the impact of future forestry management practices - future prospects are rated as *unfavourable-inadequate*.

As the individual components of conservation status assessment are a combination of *favourable* and *unfavourable-inadequate* assessments, the overall assessment is *unfavourable-inadequate*.

The Irish conservation status assessment thought most appropriate is *unfavourable-unchanged*.

Mobile dunes (H2120)

Although mobile dunes are actively accreting at the site, particularly around Raven Point, other areas have been eroded in recent times. While much of the erosion of foredunes at the site can be attributed to wind and wave action, the affects of trampling, horse riding etc. in the northern end of the site have certainly been a contributory factor, and for this reason, habitat extent (area) is rated as *unfavourable-inadequate*.

Of the eight monitoring stops carried out in the mobile dunes, seven passed and one failed the overall target, indicating *unfavourable-inadequate* structure and functions. An excess of unhealthy *Ammophila arenaria* (Marram) accounted for the failed monitoring stop.

Future prospects for the habitat are rated *unfavourable-inadequate* as the negative affects of recreational activities are likely to continue for the foreseeable future.

All of the individual parameters of conservation status are *unfavourable-inadequate*, indicating an overall *unfavourable-inadequate* assessment for the habitat.

The corresponding assessment thought most appropriate under the proposed Irish conservation system is *unfavourable-declining*, as the total habitat area appears to have declined somewhat in recent years.

Embryonic dunes (H2110)

The Raven is highly dynamic and foredune accretion (particularly around Raven Point) is a notable feature of the site. However, embryonic dunes are absent along almost the entire east coast stretch of coastline between Raven Point and Curraclloe. Because of this general lack of embryonic dune development and severely disrupted zonation of habitat, extent (area) is considered to be *unfavourable-bad*.

Embryonic dunes, where present, were generally in good condition, with mostly healthy vegetation and an absence of negative indicator species – a fact reflected in the monitoring stops carried out, all of which passed the overall target criteria. As all monitoring stops passed, structure and functions are rated as *favourable*.

The current lack of foredune development along the east coast part of the site is unlikely to be reversed in the near future, particularly as recreational activities exert some influence on the dune system here. For this reason, future prospects are considered to be *unfavourable-inadequate*.

As the individual parameters of conservation status assessment include an *unfavourable-bad* assessment, the overall assessment must also be *unfavourable-bad*.

The almost total absence of embryonic dunes over much of the site suggests that *unfavourable-declining* may be the most appropriate rating under the Irish system of conservation status assessment (Table 35D).

Shingle strandline (H1220)

Shingle strandline (Perennial vegetation of stony banks) was not noted at The Raven in the NATURA 2000 survey. As the area mapped here is extremely small, the conservation status of the habitat has not been assessed.

Annual Vegetation of Driftlines (H1210)

The presence of the habitat, albeit of very limited area, is deemed sufficient to assess habitat extent as *favourable*. There are no available data on recent trends in the annual

development of the habitat at the site, with which the current information may be compared.

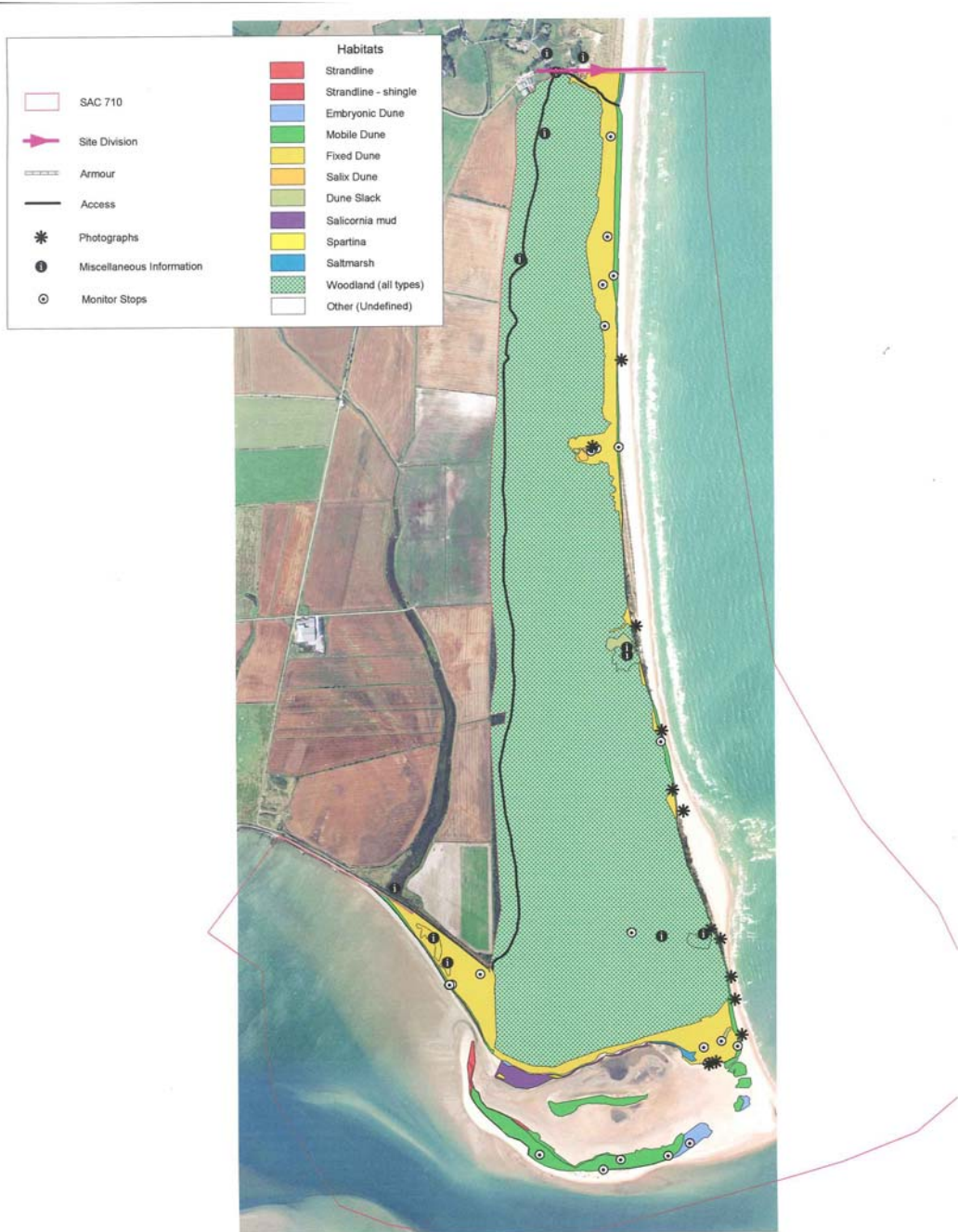
A single monitoring stop, reflecting the presence of typical species and an absence of negative indicator species, passed the overall target criteria, indicating *favourable* structure and functions.

Future prospects are considered to be *favourable* on the basis that the habitat can be expected to continue to occur annually at the site, particularly as the southern parts of the site are relatively undisturbed by recreational or other activities.

As all three components of conservation status assessment are *favourable*, that is also the overall conservation status assessment for the habitat. As is frequently the case, an overall *favourable* assessment for annual strandline habitat should not be regarded as particularly significant, or as an indication of future foredune development. The availability of locally recycled sediment will generally ensure some development of annual strandline vegetation, and the presence of even very small expanses of habitat is usually considered as indicating *favourable* extent, especially where there are no data to indicate a recent trend of decline in the habitat.

The habitat is adjudged to be *favourable-maintained* under the Irish system of conservation status assessment. It is present in a number of discrete strips around Raven Point - mainly fronting areas of active accretion and therefore contributing to dune development. Several typical species were noted throughout the habitat.

Annual vegetation of driftlines was dealt with only in a summary manner in the NATURA 2000 survey report for the site. Conservation status was adjudged to be 'B: good conservation' despite the acknowledgement of the need for further survey work.



<p>COASTAL MONITORING PROJECT 2004</p>	<p>The Raven Raven Point Nature Reserve</p> <p><small>The content of this map is a result of a project funded by the Department of Environment and Heritage. It is subject to revision. Reproduction of this map is prohibited without the permission of the Department. (Printed under 1992)</small></p> <p><small>All other boundaries are as shown on all red government gazettes. Further information is available at www.environment.gov.au for greater detail. Information is available on the Department's website at www.environment.gov.au.</small></p>	<p>CMP Code: 835</p> <p>NPWS Code: SAC 710</p>	<p>Map produced by: CMP 2004</p> <p>Date of Survey: 16/09/04</p> <p>Map Version: Final - 16/12/04</p>
	<p>0 300 600 900 Meters</p> <p>Scale: 1:12493</p>		